Iis Tussyadiah
Alessandro Inversini *Editors*

Information and Communication Technologies in Tourism 2015

Proceedings of the International Conference in Lugano, Switzerland, February 3–6, 2015

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ISBN 978-3-319-14342-2 ISBN 978-3-319-14343-9 (eBook)
DOI 10.1007/978-3-319-14343-9

Library of Congress Control Number: 2015930331

Springer Cham Heidelberg New York Dordrecht London

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media (www.springer.com)

Preface

Organized by the International Federation for IT and Travel & Tourism (IFITT), ENTER2015 eTourism Conference is to take place in Lugano, Switzerland, on February 3–6, 2015. The 22nd annual international conference features the latest research and industry case studies on the application of information and communication technologies (ICT) to travel and tourism. The conference theme, "eTourism: Transforming Mobility," was an invitation to discuss the transformation in travel and tourism due to the latest development in digital technologies.

The research track of ENTER2015 received a total of 125 submissions, 107 of which were full research papers covering a diverse variety of fields within the area of ICT and tourism. Each research paper submission went through a rigorous double-blind review process with members of ENTER2015 Scientific Committee assigned as reviewers. Where issues remained, additional reviews were commissioned. As a result, 63 full research papers were accepted for presentation at the conference and are included in these proceedings.

While still maintaining a broad topic of ICT applications in travel and tourism, the papers presented in this volume advance the state-of-the-art research on big data and analytics, social media, electronic marketing, mobile computing and recommender systems, mobile sensors and geosocial services, augmented reality, wearable computing, smart tourism, electronic distribution for tourism and hospitality products and services, e-learning, responsive web design and management, and eTourism for development. The papers featured in these proceedings bring new perspectives to the field and give promising evidence that the field of ICT and tourism will continue to contribute to our society. We hope these proceedings will serve as a valuable source of information on the state of the art in ICT and tourism research.

We greatly appreciate the considerable time put in by all members of ENTER2015 Scientific Committee who helped us ensure that the content of the research papers was of high quality. We are indebted to the panel of experts who helped us with additional reviews to select candidates for best paper award.

We are also thankful to ENTER2015 Overall Chair, Aurkene Alzua-Sorzabal, IFITT President, Lorenzo Cantoni, other ENTER2015 organizers, IFITT Board, and all members of IFITT for their support and for accommodating the many inquiries we have made while managing the research track. Importantly, we thank all authors for their willingness to disseminate their latest research at ENTER2015. This conference would not be possible without their efforts. Lastly, we thank all who have expressed interest in the conference and contributed to it. We hope you enjoy Lugano.

Iis Tussyadiah
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Part I
Consumer Intelligence and Analytics

A Method for Analysing Large-Scale UGC Data for Tourism: Application to the Case of Catalonia

Estela Marine-Roig and Salvador Anton Clave

Abstract In recent years, many articles have been published about the study of user-generated content (UGC) data in the domains of tourism and hospitality, in particular concerning quantitative and qualitative content analysis of travel blogs and online travel reviews (OTR). In general, researchers have worked on more or less population-representative samples of travel diaries, of tens or hundreds of files, which enables their manual processing. However, due to their dramatic growth, especially in the case of hospitality OTRs, this article proposes a method for semi-automatic downloading, arranging, cleaning, debugging, and analysing large-scale travel blog and OTR data. The main goal is to classify the collected webpages by dates and destinations and to be able to perform offline content analysis of the written text as provided by the author. This methodology is applied to analyse about 85,000 diaries of tourists who visited Catalonia between 2004 and 2013, and significant results are obtained in terms of content analysis.

Keywords Travel blog • Online travel review • Web harvesting • Web data mining • Massive content analysis • Catalonia

1 Introduction

UGC offers huge possibilities for e-commerce, business intelligence, marketing, and social studies; and a growing number of firms contribute to developing, distributing, rating, and mining UGC (Moens et al. 2014). UGC data in tourism is considered a good source of information for National Tourism Organizations (NTOs), Destination Marketing Organizations (DMOs), stakeholders and future travellers because it consists of freely expressed opinions. Travel blogs and OTRs allow learning first-hand experiences that travellers narrate during their stay at the destination and seeing their photo or video uploads.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_1

The most popular research methods for the analysis of travel diaries have been content analysis, both qualitative and quantitative, and narrative analysis (Banyai and Glover 2012). The topic areas of the studies are very diverse; Lu and Stepchenkova (2014) classify them, in order of frequency, in: service quality, destination image and reputation, UGC such as eWOM, experiences and behaviour, and mobility patterns.

Such UGC data have exponentially grown in recent years and it is now considered that its manipulation requires the use of Big Data technologies. However, Lu and Stepchenkova (2014), in an exhaustive work about UGC as a research mode, have proved that, in most studies, UGC data were collected "by hand", limiting the sample size. Small samples can hardly represent the population; Banyai and Glover (2012) contend that usually samples are not selected by chance, which also questions their representativeness. Moreover, the collection of UGC data via manual copying is extremely time-consuming (Johnson et al. 2012; Lu and Stepchenkova 2014).

Lu and Stepchenkova (2014) state that, in general, the methods used to collect UGC data are unclear. As recent examples, after the 122 articles surveyed by these authors, Wang et al. (2013), Schmunk et al. (2014), and Serna et al. (2014) mention an ad hoc web crawler to collect data, without further details.

To fill this gap in UGC-related research, this article aims to propose a method for semi-automatic downloading, arranging, cleaning, debugging, and analysing large-scale travel blog and OTR data. The methodology is applied to the case of Catalonia to analyse about 85,000 travel diaries created between the years 2004 and 2013.

2 State of the Art

Liu (2011) considers that web mining, using data mining techniques, intends to find useful information or to extract knowledge of the hyperlink structure and content of webpages; to automatize the process of extraction, first a Web crawler programme is needed, capable of roaming the hyperlink structure and downloading the linked webpages. Schmunk et al. (2014) collect 1,441 reviews about hotels from TripAdvisor.com and Booking.com to extract decision-relevant knowledge from UGC. To do so, these authors propose a sentiment analysis process. Johnson et al. (2012), using a web harvesting programme, claim to automatize the collection of 5,730 OTRs from TripAdvisor about Nova Scotia, but recognize that they had to eliminate manually reviews of many other destinations because they first identified the initial pages by searching "Nova Scotia" in TripAdvisor and all the destinations that residents in this Canadian province had visited also appeared. These authors make a basic classification of OTRs (attractions, hotels, and restaurants) and group them by destinations.

As examples of massive downloads in TripAdvisor, using ad hoc crawling or scraping software are Serna et al. (2014) with about 30,000 OTRs to analyse cognitive destination image applying morphological parsing and semantic

categorization techniques; and Wang et al. (2013) with 834,304 OTRs to compute two impact indexes to measure reviewer credibility based on the number of reviews and destinations on which a reviewer has posted reviews, and the number of helpful votes received by the reviews.

3 Methodology

Abburu and Babu (2013) propose a framework for web data extraction and analysis based on three basic steps: finding URLs of webpages, extracting information from webpages, and data analysis. This proposed system architecture is divided into three modules: web crawling, information extraction, and mining. Schmunk et al. (2014) propose a process divided into five stages: selecting and collecting review pages, document processing (information extraction, removing reviews with no text, filtering English texts, and generating sentences), mining, evaluation, and usage.

The main difference with the method we propose is in the web data extraction phase, because instead of just extracting the information, we add the cleaning and debugging phases to eliminate the *noise* present in the webpage to be able to get to the content analysis phase with quality information in the original HTML format (Fig. 4). That is to say, the resulting webpages only contain what the user wrote and preserve their semi-structured format.

To be able to demonstrate the effectiveness of the method to manage large-scale data placed in time and space, first a destination with a large tourist inflow and territorial division is selected. Consecutively, the four websites hosting travel blogs and OTRs that are most suitable for the case study are selected. Finally, the different phases are described until we reach content analysis. The *Results* section gathers the outcome of the application of the methodology to the case study.

3.1 Destination Selection

Although this method can be applied to any destination, more accurate results are obtained when working with large-scale data. To be able to classify entries, the destination needs to be divided territorially, as for example a continent into countries, or a state into regions or provinces. However, it could also be applied directly to a destination city like Barcelona. Catalonia has been selected for reasons of proximity and because it fulfils the following terms:

Catalonia is a Mediterranean destination with a millenary history, its own culture and language, and a wealthy historical and natural heritage. Catalonia is the third European region in number of overnight stays (Eurostat 2014). In 2013, it welcomed more than 20 million tourists, more than three-quarters of whom came from abroad.

Tourist brand	Abbr.
Barcelona	*Barna*
Costa Barcelona	*cBarc*
Costa Brava	*cBrav*
Costa Daurada	*cDaur*
Paisatges Barcelona	*pBarc*
Pirineus	*Pyren*
Terres de l'Ebre	*tEbre*
Terres de Lleida	*tLlei*
Val d'Aran	*vAran*
(unclassified)	*unCla*

Fig. 1 Tourist brands of Catalonia (Catalan Tourist Board Press Pack, 2014)

Its territory is divided into nine tourist brands, which facilitates the study of delimited spaces with a relatively homogeneous tourist offer (Fig. 1). Catalonia is not an Anglophone region, and therefore the problems related to character codification beyond ASCII 127 should be considered and, specifically, those related to existing accent marks in destination and tourist attraction factor names.

3.2 Websites Selection

By means of a popular specialized search engine (BlogSearch.Google.com: "travel blog" OR "travel review"), on 2014-08-01, 7,830,000 indexed pages were initially obtained. The problem is that blogs come from diverse sources and websites do not have homogeneous structures, which makes it impossible to automatize the process of downloading, classification and refinement, as intended in this study.

Therefore, based on previous works, a group of websites hosting travel blogs and reviews (OTRs) were selected with at least 100 entries about Catalonia during the studied period. We also verify that the entries have a creation or modification date and that we can deduce the destination to which they refer. Entries focusing on hotels and restaurants are discarded because of their great volume and specialization. Finally, 11 websites remained: GetJealous.com (GJ), MyTripJournal.com (MT), StaTravel.com (ST), TravBuddy.com (TY), TravelBlog.org (TB), TravelJournals.net (TJ), TravellersPoint.com (TS), TravelPod.com (TP), TripAdvisor.com (TA), Venere.com (VN), and VirtualTourist.com (VT).

With the previous websites, a ranking was built by applying the weighted formula "TBRH = 1*B(V) + 1*B(P) + 2*B(S)" (Marine-Roig 2014a), where 'B'

Table 1 Webometrics of the top four websites hosting travel diaries (2014-08-01)

		TA	TB	TP	VT
Indexed pages	Google.com	18,600,000	478,000	759,000	1,120,000
	Bing.com	23,800,000	320,000	448,000	415,000
Link-based rank	Google PR	8	6	6	7
	Yandex CY	1,600	110	350	375
Visit-based rank	Compete.com	51	32,558	10,755	2,383
	Quantcast.com	127	36,067	9,279	2,065
	Alexa.com	182	21,123	21,324	4,156
Size	Entries	72,874	2,988	2,116	7,791
TBRH	Rank	1	3	4	2

corresponds to Borda's ordering method, 'V' to the visibility of the website (quantity and quality of inbound links), 'P', its popularity (received visits and traffic in general), and 'S', the size (number of entries related to the case study), and then the first four in the rank are selected (Table 1).

Previously, partial rankings are calculated with the same method (1) 'V' applying Borda's method, without weighting (25 % each), with the components: indexed pages in Google and Bing (the two most popular search engines), Google PageRank PR and Yandex CY (two rankings based on the quantity and quality of the incoming links); (2) 'P' with the rankings based on unique visitors and traffic in general: Compete.com (US: 25 %), QuantCast.com (US: 25 %) and Alexa.com (WW: 50 %), the weighting is due to the fact that Alexa's classification is on a world-wide level while Compete and QuantCast are based on USA traffic (Marine-Roig 2014a); (3) 'S' considering the quantity of entries, with narrative content, excluding hotels and restaurants, corresponding to Catalonia between the years 2004 and 2013 (85,769 entries adding travel blogs and OTRs).

The four selected websites are best suited to the case study according to Marine-Roig (2014a). Moreover, they represent a variety of trip diaries: TB and TP host travel blogs; TA hosts OTRs about hotels, restaurants and attractions; and VT, which is a virtual community, hosts travel pages, travelogues, and OTRs about hotels, restaurants, things to do, favourites, nightlife, off the beaten path, tourist traps, warnings or dangers, transportation, local customs, what to pack, shopping, and sports & outdoors.

3.3 Data Download

The first step to download data is to navigate the selected websites manually to identify the initial pages, that is to say, those containing hyperlinks which lead to the individual blogs and OTR pages, and save their complete URLs.

Second, a study about which are the most efficient filters to minimize download time and space used in the local disk should be carried out. The filters can be

combined and, except for the level filter, they can be inclusive or exclusive (1) A Level 0 filter only downloads the page indicated by the initial URL, a Level 1 filter, downloads that page and all the resources directly linked to it, etc.; (2) The file type filter allows to download, for example, only HTML files, and the remaining files (multimedia, PDF, etc.) will only be visualized if an Internet connection is available; this system is ideal to analyse the textual content of diaries saving space in the local disk; (3) The URL filters allow to act at any part of it (protocol, server, domain, subdirectories or folders, filename and file type); and (4) The content filter is the least efficient because it is necessary to download the page to assess whether or not it contains the chain of key characters, while with URL filters only the pages of interest are downloaded (Fig. 2).

For example, in the case of TB, it is sufficient to place an inclusive folder filter: /*Catalonia*/, with no level limit, because the server has a hierarchical territorial structure of folders to store the files. Conversely, in the case of TA, all the files of interest contain the word *Catalonia*, those which have hyperlinks which lead to OTRs start with *Attraction*, and those of the same OTRs start with *ShowUserReview*; therefore, a couple of inclusive filename filters are enough: *Attraction*Catalonia* and *ShowUserReview*Catalonia*. To understand the importance of the filters in this case, we ought to bear in mind that TA reached the figure of more than 170,000,000 reviews and opinions, and all its webpages are linked at different levels by hyperlinks.

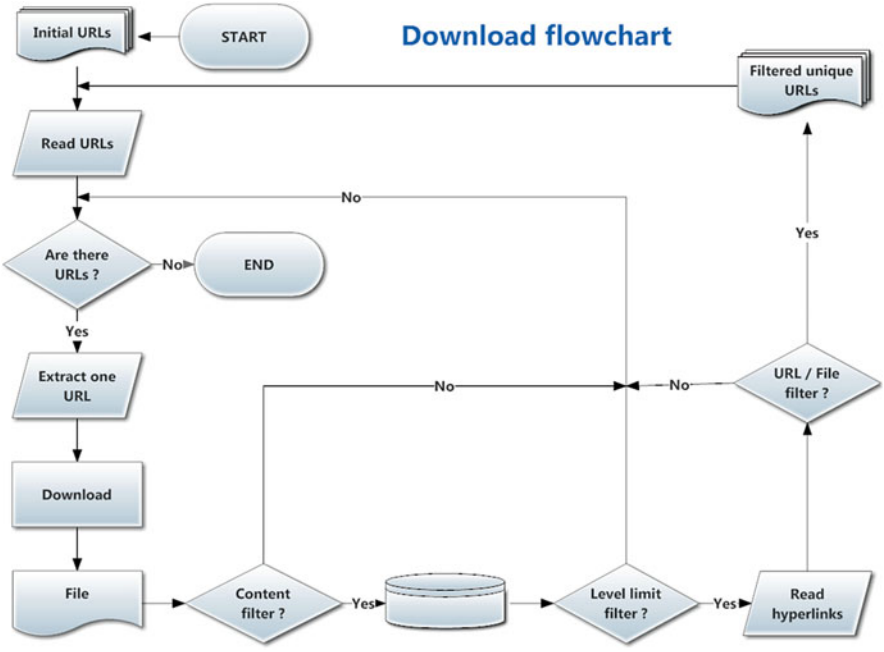

Fig. 2 Simplified flow diagram of the process of downloading travel diaries

Finally, once the web copier programme has been configured, we proceed to the massive download of the HTML pages of each website. In this research, we used the free programme *HTTrack Website Copier* (www.httrack.com).

3.4 Data Arrangement

To facilitate multiple classifications, in a region divided into several territorial brands, we adopted the following structure of folders and files (Fig. 3):

root\website\brand\destination\date_lang_pagename_[theme].htm

Website can consist of 2 letter initials (Table 2); *Brand*, an abbreviation of 5 letters (Fig. 1); *Destination*, the name of the destination and if it is a composite name joined by a hyphen; *Date* with the format *yyyymmdd*, based on the ISO 8061 norm, to allow its ordering; *Lang* two-letter code (ISO 639-1); *Pagename* can contain a combination of codes and/or words; *Theme*, an abbreviation of 4 letters if the website has a thematic classification.

Geographic Classification This requires elaborate preparation. It consists of including in a CSV file (comma-separated values) all the territorial information about the names and codes (if available) of the destinations. The CSV files are plain text and can be manipulated with a simple text editor or a spreadsheet.

Temporal Classification Based on heterogeneous originals (TA: January 13, 2012; TB: April 24th 2004; TP: Saturday, August 24, 2013; and VT: Dec 6, 2004) dates are converted to the format *yyyymmdd*.

Thematic Classification In TA and VT, there is a general classification of OTRs into Hotels, Restaurants, and Things to do. VT has catalogued the tips: Path (Off the beaten path), Shop (Shopping), ToDo (Things to do), Warn (Warnings or Dangers), etc. TA subclassifies the *Things to do* into types and/or categories, but a general

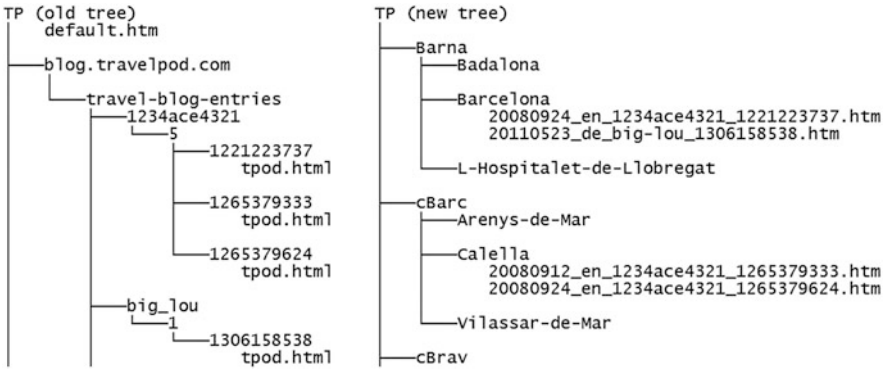

Fig. 3 Sample of files and folders before and after the arrangement process

Table 2 Trends in web hosting and Catalan brands

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
TA	40	38	81	117	204	608	1,421	5,933	28,387	36,045
TB	22	139	254	427	662	415	328	362	231	148
TP	29	100	236	276	258	226	238	218	189	346
VT	1,474	1,498	1,023	1,031	762	413	398	635	306	251
Barna	1,177	1,374	1,191	1,309	1,367	1,295	1,742	5,828	24,211	30,875
cBarc	34	42	53	70	79	34	63	115	325	560
cBrav	201	204	163	238	191	134	177	332	1,448	1,707
cDaur	61	46	82	117	134	121	288	698	2,599	2,498
pBarc	57	45	38	37	45	20	35	89	412	927
Pyren	10	20	12	25	8	10	22	14	62	149
tLlei	6	1	1	3	5	5	11	19	16	16
tEbre	4	3	0	1	1	5	1	2	3	10
vAran	1	0	7	0	0	3	2	3	9	11
unCla	14	40	47	51	56	35	44	48	28	37

thematic classification cannot be made because a same attraction can belong to multiple categories or types.

Language Detection This process is more complex (1) It has to be done on textual content, without structure (plain text), after the cleaning phase, because what the traveller has written only represents a minimal part of the page content (Fig. 4); (2) Specialized software is needed, in this study a Java programme (Marine-Roig 2013: Annex A3) based on the *Language Detection Library* (LDL) of N. Shuyo, which detects 53 languages, which number can be extended with an included process; (3) In the case of Catalonia, the Catalan language Wikipedia (more than a million pages) was downloaded, and through a frequency analysis of one character and groups of two and three consecutive characters, the programme deduces the probability that such items appear at the beginning, end or within a word; and (4) By means of this system, based on the Naive Bayes classifier, LDL detects each language with a great degree of precision (probability higher than 99 %).

To extract textual content a free utility, *HTML As Text* (www.NirSoft.net), was used. After that, the language detection programme was run (Marine-Roig 2013: Annex A3), which returns a CSV file with the code ISO 639-1 and the probability of success. Those diaries with a probability lower than 85 % have been considered unclassified because they usually have an insufficient quantity of text or it is multilingual.

Once the CSV files are ready, a batch programme (Marine-Roig 2013: Annex A3) is run for each website, which goes through all files, extracts internal data such as the date of the diary and the name of the destination, eliminates entries without narrative content (more than 70,000 OTRs in the case of TA), changes the format of such dates to *yyyymmdd*, creates new territorial directories, and transfers the diary to the destination folder already with its articulated name to facilitate future classifications. Finally, the two-character ISO 639-1 codes are introduced in the name of the files, after the date (Fig. 3).

3.5 Data Cleaning

This phase consists of eliminating all the *noise* around what is written and posted by the author (Fig. 4). The original HTML format should be preserved in order to be able to weight keywords and key phrases according to their potential impact (Wahsheh et al. 2012). Programmes such as *Site Content Analyzer* (SCA; www.CleverStat.com) take this format into account to calculate the frequency, site-wide density and average weight of keywords (Yadav and Yadav 2011).

Considering that the webpages of each site have a homogeneous structure and codification, elements that are not going to be used should be deleted: *comment*, *form*, *iframe*, *meta tag*, and *script*. With a web editor, such as *Microsoft Expression Web 4* (*free version*), all the superfluous HTML elements can be located manually, such as the *header* and *footer* sections (Fig. 4), which do not have a relationship

Fig. 4 Example of a VT blog entry before and after the cleaning stage

with what the user has written, and list opening and closing HTML tags in a TBL file (generic Table file). Given that directives can be nested, to be able to eliminate them ad hoc software is needed (Marine-Roig 2013: Annex A3). The programme itself can serve to eliminate the additional OTRs of TA. This website adds some OTRs related with the review contained in the page, which already have their respective pages. To avoid this redundant information, the programme must delete them all except for the first.

3.6 Data Debugging

Although the analysed OTRs are written in English, there are proper nouns (destination and attraction names) with codified accent marks. For example, the surname of the Catalan architect *Antoni Gaudí* can appear, at least, in four other forms: Misspelling (Gaudi), UTF-8 (Gaud$\tilde{A}$-), HTML number (Gaudí), and HTML name (Gaudí).

Besides, prior analysis should be done in order to detect the most common mistakes (MCM), especially in the writing of the mentioned proper nouns, which are usually frequent in the case of foreign visitors because their local phonemes do not coincide with the graphemes with which they are represented in other languages.

Such codifications and MCMs distort content analysis and should be corrected. The UTF codes and HTML entities can be related in a CSV file with their corresponding Latin-1 character (ISO 8859-15), and the MCM together with the correct word, and transfer it as a parameter to a free utility such as *TextCrawler* (DigitalVolcano.co.uk) to proceed to their replacement.

3.7 Content Analysis

Once the previous phases have been performed, the travel blog and OTR dataset is ready for any kind of content analysis, both qualitative and quantitative. In this research, travel diaries written in English have been selected and a first offline analysis of the frequency, density and weight of keywords has been conducted, with the SCA programme. Results can serve, for example, to study different tourist modes by grouping keywords into categories (sun, sea, and sand; tangible heritage; etc.). Serna et al. (2014) suggest extracting categories and transforming them into a model.

Previously, the SCA parser should be configured with the preferences for the case study. The most important ones are the *black list* and the *composite words*. The first prevents meaningless keywords from being analysed, such as adverbs,

prepositions and pronouns; moreover, less than three-letter words are dismissed. The second list indicates the word groups that form a unit such as *Sagrada Familia*.

4 Results

With the classification system seen in Sect. 3.4 it is easy to analyse the trends followed by the 85,769 travel blogs and OTRs along the 10 years of study (Table 2).

Concerning web hosting, strong growth by TA, but a decline in TB and VT, can be observed. Concerning the distribution by Catalan brands, we observe that the Barcelona brand (*Barna*) far outnumbers all the rest. Besides, we can observe that the *tLlei*, *tEbre* and *vAran* brands do not have enough entries to sustain reliable content analysis.

With respect to the problem of the seasonality of the tourist industry in the Spanish coastal regions, consisting of the concentration of *sun, sea and sand* tourists in the months of July and August, Fig. 5 shows that high season for the type of tourism studied extends to almost 6 months.

As an example of the validity, usability and capacity of the method, a simple first level of content analysis using SCA is performed with 84,614 travel diaries written in English (98.65 % of the 85,769 gathered). As illustrated in Table 3, very significant results are obtained. So, coinciding with the results in Table 2 concerning Barcelona brand (*Barna*), it can be observed in Table 3 that the keyword *Barcelona* has a much higher density than the other ones and a considerable weight. Barcelona is the sixth most powerful city brand in the world (Michael 2014). Among the top 15 keywords we can find 4 good feelings, as well as the architect Gaudi and two of his masterpieces with a highly significant weight. Gaudi's work is registered in UNESCO's World Heritage List (ref: 320). Concerning the great average weight of the *basilica* keyword, there is an interference with *Sagrada Familia*, because this church was raised to the rank of basilica on 2010-11-07

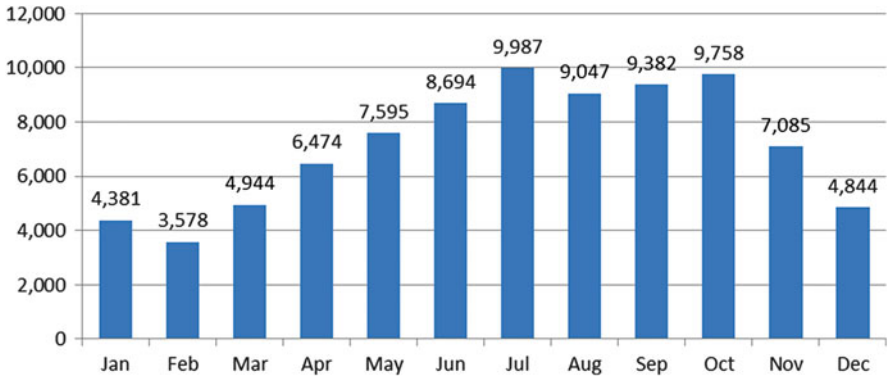

Fig. 5 Monthly distribution of travel blogs and OTRs (TA, TB, TP, and VT)

Table 3 Fifteen most frequent words of 65,536 unique words

Rank	Keyword	Count	Site-wide density (%)	Average weight	Remark
1	Barcelona	197,723	3.77	56.26	Capital of Catalonia
2	Great	51,525	0.98	23.73	Good feeling
3	Tour	49,221	0.94	18.08	
4	Sagrada familia	38,341	0.73	60.75	Gaudi's masterpiece
5	Gaudi	33,187	0.63	19.66	Architect A. Gaudi
6	City	28,155	0.54	11.70	
7	Place	26,597	0.51	15.73	
8	Good	26,098	0.50	15.02	Good feeling
9	Visit	25,973	0.49	14.86	
10	Amazing	25,242	0.48	24.18	Good feeling
11	Park	24,962	0.47	28.38	
12	Basilica	23,618	0.45	81.68	Religious building
13	Park guell	23,367	0.44	62.06	Gaudi's work
14	Beautiful	23,322	0.44	23.01	Good feeling
15	Way	22,996	0.44	15.02	

(Marine-Roig 2014b). The Catalan Tourist Board is aware of the significance of the Barcelona brand and recently renamed the "Central Catalonia" brand "Barcelona landscapes" (*pBarc*).

These results obtained by SCA can serve for different studies such as grouping keywords into thematic categories, how to ascertain the weight of a certain tourist modality, attraction factors, feelings, dichotomies, etc. in the whole region and in sub-regions. The same studies can be done at Catalan brand or city level and circumscribed to a certain period of time by applying SCA programme to the corresponding HTML subset.

5 Conclusions

The proposed methodology facilitates the massive gathering of UGC data from the most suitable sources for a specific case study. The hierarchical territorial structure of folders and the articulation of the name of the files which contain individual diaries, enable multiple classifications using utilities to order and manipulate the files of the same operating system (*Windows* or *Linux*). This structure also allows to focus the analysis on a specific place, language or subject (if this is available), in particular or combined, selecting the corresponding subset or a random sample thereof. The cleaning and debugging phases are essential to be able to obtain quality

information, limited to the web content as written and posted by the diary author, and overcoming the most significant errors.

Quantitative analysis results, at the level of territorial brands, may be useful for NTOs to improve their branding and positioning policies. Metrics of web hosting UGC data can be useful for the DMOs that want to promote products or services on such websites.

Most of the proposed phases of this method are useful for the content analysis of other web data sources. The HTML dataset is prepared for any offline content analysis in future work, for instance, a qualitative content analysis using qualitative data analysis software, or a sentiment analysis using a computer-aided text-analysis programme.

Acknowledgements This work was supported by the Spanish Ministry of Economy and Competitiveness [Grant id.: GLOBALTUR CSO2011-23004 / GEOG].

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A Visual Analysis of Social Influencers and Influence in the Tourism Domain

Chiara Francalanci and Ajaz Hussain

Abstract Identifying influencers is an important step towards understanding how information spreads within a network. In social media, hub nodes are generally considered as social influencers. Social networks follow a power-law degree distribution of nodes, with a few hub nodes and a long tail of peripheral nodes. While there exist consolidated approaches supporting the identification and characterization of hub nodes, research on the analysis of the multi-layered distribution of peripheral nodes is limited. However, influence seems to spread following multi-hop paths across nodes in peripheral network layers. This paper proposes a visual approach to the graphical representation and exploration of peripheral layers by exploiting the theory of k-shell decomposition analysis. We put forward three hypotheses that allow the graphical identification of peripheral nodes that are more likely to be influential and contribute to the spread of information. Hypotheses are tested on a large sample of tweets from the tourism domain.

Keywords Social media • Influence • Influencers • Power law graphs

1 Introduction

The literature on social media makes a distinction between influencers and influence. The former are social media users with a broad audience, while the latter is instead used to refer to the social impact of the content shared by social media users. In Boyd et al. (2010) and Myers and Leskovec (2014) authors note that a content that has had an impact on a user's mind is shared. Influencers are prominent social media users, but we cannot expect that the content that they share is bound to have high influence, as discussed by Benevenuto et al. (2010) and Messias et al. (2013). Previous research, (Bruni et al. 2013; Klotz et al. 2014) has shown how the content of messages can play a critical role and can be a determinant of the social influence of a message irrespective of the centrality of the message's author. This paper starts from the observation made by Chan et al. (2003) stating that social networks of

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influence follow a power-law distribution function, with a few hub nodes and a long tail of peripheral nodes, consistent with the so-called small-world phenomenon as noted by Xu et al. (2007). In social media, hub nodes represent social influencers (Ren et al. 2014), but influential content can be generated by peripheral nodes and spread along possibly multi-hop paths originated in peripheral network layers. In this paper, we exploit a modified power-law based force-directed algorithm (Francalanci and Hussain 2014; Hussain et al. 2014) to highlight the local multi-layered neighbourhood clusters around hub nodes. In our approach, the topology of the periphery is defined by grouping peripheral nodes based on the strength of their link to hub nodes, according to the metaphor of k-shell decomposition analysis (Carmi et al. 2007; Kitsak et al. 2010).

The approach is tested on a large sample of tweets expressing opinions on a selection of Italian locations relevant to the tourism domain. By visually exploring and understanding the multi-layered periphery of nodes, we propose three content related hypotheses exploring the role of peripheral nodes. Empirical and visual results show that peripheral nodes play a role as determinant of the social influence. The main innovative aspect of our approach is that we show our hypotheses visually to understand the practical meaning of our hypotheses.

2 State of the Art

Several research efforts in network visualization have targeted power-law algorithms and their combination with the traditional force-directed techniques, as for example in Andersen et al. (2004, 2007), Boutin et al. (2006), and Chen (2006). Among these approaches, the most notable is the Out-Degree Layout (ODL) for the visualization of large-scale network topologies, presented by Chan et al. (2003) and Perline (2005). The core concept of the algorithm is the segmentation of network nodes into multiple layers based on their out-degree, i.e. the number of outgoing edges of each node. The positioning of network nodes starts from those with the highest out-degree, under the assumption that nodes with a lower out-degree have a lower impact on visual effectiveness. The topology of the network plays an important role such that there are plausible circumstances under which nodes with a higher number of connections or greater betweenness have little effect on the range of a given spreading process (Cha et al. 2010).

Centrality metrics are the most widely used parameters for the structural evaluation of a user's social network. The concept of centrality has been defined as the importance of an individual within a network (Fan and Gordon 2014). A node that is directly connected to a high number of other nodes is obviously central to the network and likely to play an important role (Barbagallo et al. 2012; Sparrowe et al. 2001). The more recent literature has associated the complexity of the concept of influence with the diversity of content. Several research works have addressed the need for considering content-based metrics of influence (Bakshy et al. 2011; Bigonha et al. 2012; Hossain et al. 2006; Li et al. 2014; Naaman et al. 2010).

Clearly, this view involves a significant change in perspective, as assessing influence does not provide a static and general ranking of influencers as a result. However, there is a need for effective visualization techniques in social networks, which enable users to visually explore scalable complex social networks to identify the influencers who are responsible for influence spread.

3 The Power-Law Algorithm

An early version of the algorithm has been presented by Francalanci and Hussain (2014) and Hussain et al. (2014). This paper improves the initial algorithm by identifying multiple layers of peripheral nodes around hub nodes as per k-shell decomposition approach. The power-law layout algorithm, shown in following code snippet, belongs to the class of force-directed algorithms, such as the one by Chan et al. (2003)and Fruchterman and Reingold (1991).

```
begin
  NodeCharacterization();
  InitialLayout();
  while Temperature>0 do
    if Temperature > Th then
      call NodePlacement(Nh, Eh);
    else
      call NodePlacement(Np, Ep);
    end
    call TemperatureCooldown(Temperature);
  end
end
```

We partition the set of nodes N into the set of hub nodes N_h and the set of peripheral nodes N_p, such that $N = N_h \cup N_p$, with $N_h \cap N_p = \emptyset$. As a consequence, the set of edges E is also partitioned in the set of edges E_h for which at least one of the two nodes is a hub node, and the set E_p which contains all the edges connecting only peripheral nodes, with $E = E_h \cup E_p$, with $E_h \cap E_p = \emptyset$. The distinction of a node n as a hub node or peripheral node is based on the evaluation of its degree $\rho(n)$ against the constant ρ_h, which is a threshold defined as the value of degree that identifies the top ith percentile of nodes, sorted by decreasing value of degree. Since the power-law is supposed to hold in the degree distribution, we have assumed $i = 20$ and consequently ρ_h as the 20th percentile, thus considering as hub nodes the 20 % of the nodes with the highest values of degree—the Pareto's 80-20 Rule, as suggested by Koch (1999).

The NodeCharacterization() step is a pre-processing phase aimed at distinguishing hub nodes from peripheral nodes, so that in the following steps

it is possible to leverage the power-law distribution of nodes and assigning the level value (l_S) using k-shell decomposition analysis technique. In this paper, this step is performed by pre-identifying hub nodes as N_p, which represent either the predefined 7 brands or the 12 subjects of interest for the community, which contain set of categories of content referring to specific brand drivers of a destination's brand explained in Sect. 5. At first the NodeCharacterization() method builds local neighbourhood multi-clusters by taking placing these predefined hub nodes central to each cluster by using modified force directed algorithm and power-law based degree distribution. Later on, to create multi-layered periphery around each cluster, we apply *l*-shell decomposition analysis technique. The InitialLayout() step provides the initial placement of nodes (either a random placement or the result of another graph layout algorithm). The NodePlacement (N, E) step performs the placement of nodes based on the computation of forces among nodes; its inputs are a node set *N* and an edge set *E*, such that the placement of nodes can be selectively applied to chosen subsets of nodes/edges at each step. The TemperatureCooldown() step is responsible for the control of the overall iteration mechanism.

We tuned this technique by means of the metaphor of k-shell decomposition analysis (Abello and Queyroi 2013; Alvarez-Hamelin et al. 2006; Carmi et al. 2007; Kitsak et al. 2010), in order to define the concept of *level* of each node in the multi-layered periphery of our graphs. This process assigns an integer as level index (l_S) to each node, representing its location according to successive layers (*l* shells) in the network. The inner-most layer around cluster hub, will have highest l_s value, containing those authors, who tweeted most about that topic (cluster hub). So, by this metaphor, small values of (l_S) define the periphery of the network (outliers), while the innermost network levels correspond to greater values of l_S, as shown in Fig. 1.

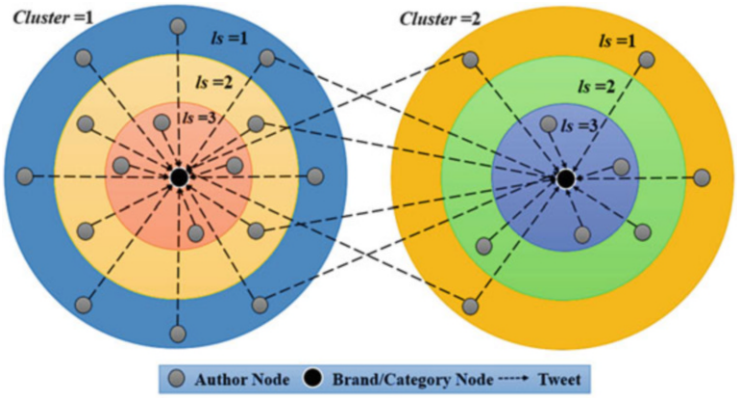

Fig. 1 Metaphor of k-shell decomposition analysis

4 Research Hypotheses

Previous research indicates that social media are associated with a long-tail effect (Meraz 2009; Myers and Leskovec 2014). The long-tail effect suggests that small communities are numerous and their specific interests are virtually boundless (Fan and Gordon 2014). Bruni et al. (2013) and Klotz et al. (2014) have shown how the content of messages can play a critical role and can be a determinant of the social influence of a message irrespective of the centrality of the message's author. Twitter users with a high volume of tweets can be referred to as '*information sources*' or '*generators*' (Hutto et al. 2013). Moreover, social media users intend to post content that is shared frequently by many other users (Asur et al. 2011; Li et al. 2014). Social media users wish to be influential (Myers and Leskovec 2014). Intuitively, since users want to be interesting to many, they post frequently and at the same time they will address the needs of multiple specific communities, multiple topics. Consequently, our first hypothesis posits a positive association among *frequency of tweets* and *content specificity* in multiple topics.

- H1: *Authors tweeting with a high frequency of tweets is positively associated with multiple topics* (*brands or categories*) (i.e. visually, *potential influencers* are peripheral authors).

The literature indicates that retweeting is associated with information sharing, commenting or agreeing on other peoples' messages and entertaining followers (Boyd et al. 2010). Kwak et al. (2010) also show that, the most trending topics have an active period of 1 week, while half of retweets of a given tweet occur within 1 h and 75 % within 1 day. The frequency of retweets can be an important criterion since users tend to retweet valuable posts (Myers and Leskovec 2014). Intuitively, if a user tweets about multiple topics, he/she is more likely to be interesting to many specific and active communities and as a consequence, he/she is more likely to obtain more retweets. In the following hypothesis, we posit a positive association between the *content specificity* and *frequency of retweets*.

- H2: *Tweeting about multiple topics* (*brands or categories*) *is positively associated with the frequency of retweets* (i.e. visually, peripheral authors, connected to multiple topics, are *actual influencers*).

Traditional media are based on broadcasting rather than communication, while social media are truly interactive (Benevenuto et al. 2010). In traditional media, the influencers intend to target a large audience by broadcasting and talking frequently. Similarly, in social media, e.g. in twitter, influencers intend to be more interactive by participating in the conversation with a variety of mechanisms and, most commonly, by frequently sharing the content that they have liked (Barbagallo et al. 2012; Bruni et al. 2013; Ren et al. 2014). In Leavitt et al. (2009) and Myers and Leskovec (2014), authors show that level of users' activity (number of tweets) depends upon retweets and their in-degree centrality (number of followers). In social media, while sharing content, users may be referred as '*generalist*' or

'*information sources*' who talk about multiple topics (Hutto et al. 2013). On the contrary, there exist users who are very specific in sharing content related to specific topics or brands. These authors seems to be potential influence spreaders (Fan and Gordon 2014). They are very likely to be active participants in each community by talking a lot. Our third hypothesis posits that such nodes have a greater probability of being retweeted, and can be both potential and actual influencers.

- H3: *Tweeting more frequently* (*with a high frequency*) *about a single topic* (*brand or category*) *is positively associated with the frequency of retweets* (i.e. visually, authors, drawn closer to single topic, are both *actual* and *potential influencers*).

We posit the aforementioned three hypotheses that tie *content specificity*, *frequency of tweets* and *frequency of retweets*. Hypothesis H1 can be visualized by observing the peripheral authors positioned in the outer-most layers of each cluster (lowest l-shell value, $l_s = 1$), which are only connected to one cluster hub (brand or category). Such outlier authors can be *potential* influencers, if they further connect to other authors via content sharing and tweeting about multiple topics (brands or categories). Similarly, hypothesis H2 can be visually verified by observing those authors who are placed in between multiple clusters, connected to multiple clusters' hubs (brands or categories), and accordingly talk about multiple topics. These authors are *actual* influencers as they receive a high number of retweets by tweeting about multiple topics. Moreover, hypothesis H3 can be visualized by observing authors who are positioned in the inner-most periphery of each cluster (highest l_s value), and seem to be placed close to the cluster hub (brand or category). Such authors are both *actual* and *potential* influencers as they are most specific about content sharing.

5 Experimental Methodology and Results

This section reports the discussion about the dataset and the network models used in our experiment. The obtained visualization results and proposed hypotheses are empirically evaluated in this section.

5.1 Variable Definition

Each graph G (A, T) has a node set A representing authors and an edge set T representing tweets. We define as N_T (a) the total number of tweets posted by author a. We define as N_R (a) total number of times author a, has been retweeted. Tweets can refer to a brand b or to a category c. We define as N_B (a) the total number of brands mentioned by each author a, in all his/her tweets, i.e. *brand*

specificity. Similarly, $N_C(a)$ represents the total number of categories mentioned by each author a, in all his/her tweets, i.e. *category specificity*.

5.2 Data Sample and Network Models

We collected a sample of tweets over a 2-month period (December 2012–January 2013). For the collection of tweets, we queried the public Twitter APIs by means of an automated collection tool developed ad-hoc. Twitter APIs have been queried with the crawling keywords, representing tourism destinations (i.e. brands). Two languages have been considered, *English* and *Italian*. Collected tweets have been first analysed with a proprietary semantic engine (Barbagallo et al. 2012; Bruni et al. 2013) in order to tag each tweet with information about (a) the location to which it refers, (b) the location's brand driver (or category) on which authors express an opinion, (c) the number of retweets (if any), and (d) the identifier of the retweeting author. Our data sample is referred to the tourism domain. We have adopted a modified version of the Anholt Nation Brand index model to define a set of categories of content referring to specific brand drivers of a destination's brand (Anholt 2006). Table 1 refer to the descriptive statistics of the original non-linear variables.

In order to verify the effectiveness of the proposed algorithm with respect to the goal of our research, we have defined two different network models based on the data set.

- Author → Brand (N_1). The network is modelled as an undirected affiliation two-mode network, where an author node n_a is connected to a brand node n_b whenever author a has mentioned brand b in at least one of his/her tweets.
- Author → Category (N_2). The network is modelled as an undirected affiliation two-mode network, where an author node n_a is connected to a category node n_c whenever author a has mentioned a subject belonging to category c in at least one of his/her tweets.

5.3 Network Visualization

Table 2 provides descriptive statistics on the size of the N_1 and N_2 networks, as discussed in Sect. 5.2. The empirical results and discussions on network visualization will adopt network N_1 network (i.e. Author → Brand) as reference example.

Figure 2 provides an enlarged view of network N_1 visualized by means of the proposed power-law layout algorithm. The network visualization depicted in Fig. 2 adopts multicolour nodes to represent authors, and highlighted encircled blue (dark) nodes to represent the tourism destinations (i.e. brands) on which authors have expressed opinions in their tweets.

Table 1 Basic descriptive statistics of our dataset

Variable	Value
Number of tweets	957,632
Number of retweeted tweets	79,691
Number of tweeting authors	52,175
Number of retweets	235,790
Number of retweeting authors	66,227

Table 2 Descriptive statistics on the dimensions of N_1 and N_2 networks

		N_1	N_2	
Authors	N_R (a)	N_B (a)	N_C (a)	N_T (a)
398	92	856	1,913	2,769
1,662	364	2,905	5,959	8,864
10,710	2,907	12,559	18,498	31,057
18,711	5,329	21,140	29,842	50,982
30,310	8,690	33,684	46,120	79,804
37,626	10,529	41,620	56,960	98,580
47,295	12,833	52,208	71,667	1,23,875

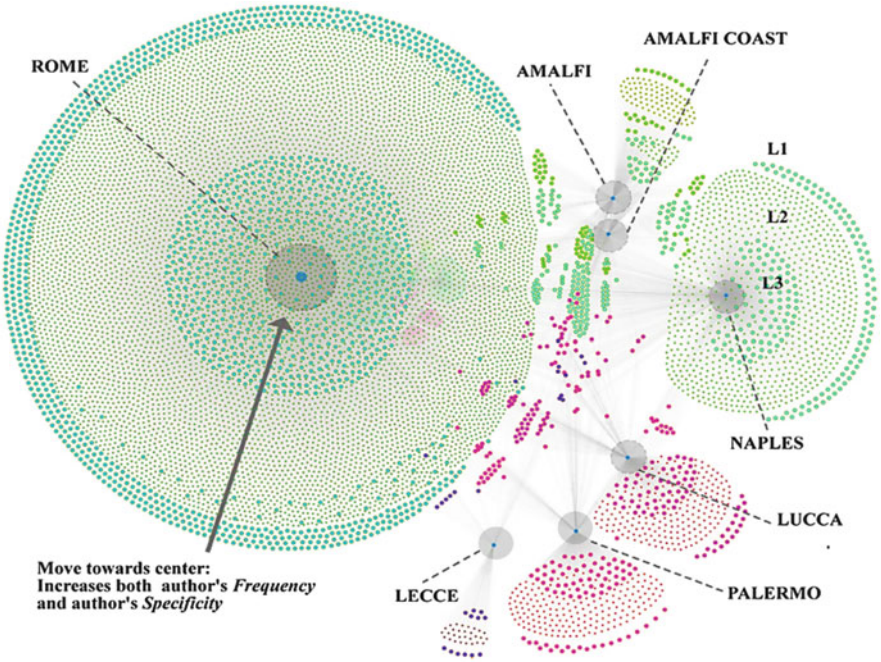

Fig. 2 Network N_1: Author → Brand (enlarged view)

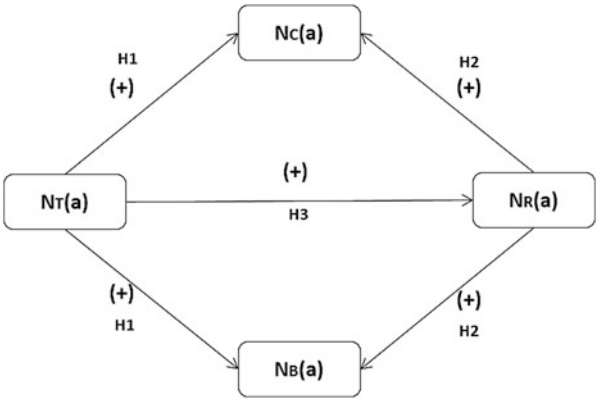

Fig. 3 Research model

5.4 Empirical Results

AMOS 20 (Arbuckle 2011) has been used to analyse the research model by means of structural equation modelling (SEM) (Bagozzi and Fornell 1982). All statistical analyses have been performed with SPSS 20 (Pallant 2010). The research model used for estimation analysis is shown in Fig. 3.

Table 3 presents the correlation matrix of our data variables. Table 4 follows that correlation is significant at 0.01 level (2-tailed). All persistence variables are positively correlated with each other, and thus have a significant impact upon each other.

The regression estimation results of the research model are shown in Table 4. All relationships between persistence metrics are significant, with $p < 0.001$.

Hypothesis H1 Hypothesis H1 has been tested through correlation. By Table 3, both N_C (a) and N_B (a) have a positive correlation of 0.898 and 0.590, respectively with N_T (a), at 0.01 level of significance, supporting the hypothesis H1. Authors by having greater probability of sharing contents, can be *potential influencers* in network. Similarly, through visualization results, Fig. 2 highlights clusters that group all the authors who tweeted about 7 distinct brands, in which '*ROME*' and '*NAPLES*' are seem to be mostly tweeted by authors i.e. they possess '*high specificity*', and the *peripheral* authors (visually drawn in outmost peripheries, lowest *l*-shell value), can be *potential influencers* in social network, if they further connect to other clusters through tweets (i.e. to talk about multiple topics).

Hypothesis H2 Similarly hypothesis H2, has been tested through correlation. By Table 3, both N_C (a) and N_B (a) have positive correlation of 0.254 and 0.235, respectively with N_R (a), at 0.01 level of significance, supporting the hypothesis H2. It means that, authors, who have large number of retweets, can also be '*information sources*' or '*generators*'. Such authors can be *actual influencers* in spreading the influence among networks, as they receive large number of retweets by tweeting about multiple topics. Through visualization standpoint, if we explore the produced

Table 3 Correlation matrix of persistence variables (Pearson Index)

	N_T (a)	N_R (a)	N_B (a)	N_C (a)
N_T (a)	1	0.326	0.590	0.898
N_R (a)	0.326	1	0.254	0.235
N_B (a)	0.590	0.254	1	0.392
N_C (a)	0.898	0.235	0.392	1

Table 4 Estimates of regression weights

$V_{Dependent}$	$V_{Independent}$	R_W	S.E	*p*-value
N_R (a)	N_T (a)	0.082	0.000	<0.001
N_B (a)	N_T (a)	0.303	0.002	<0.001
N_B (a)	N_R (a)	0.000	0.000	<0.001
N_C (a)	N_T (a)	0.000	0.000	<0.001
N_C (a)	N_R (a)	0.648	0.009	<0.001

graph (e.g. Fig. 2), authors who seems to be big sized nodes (visually drawn in-between multiple cluster peripheries) talking about multiple topics (brands or categories), also have the high number of retweets as well. As these authors can be referred as '*information sources*', it is evident to receive high number of retweets upon tweets about multiple topics (brands or categories).

Hypothesis H3 Similarly hypothesis H3, has been tested through correlation. From Table 3, N_T (a) and N_R (a) have positive correlation of 0.326 at 0.01 level of significance. Although the correlation coefficient is not high, the *p*-value (<0.001) in Table 4 showing significance and seems to support a positive (though weak) correlation between N_T (a) and N_R (a). Through visual standpoint, as shown in Fig. 2, we know that the nodes (which are drawn closer to single brand in innermost periphery of distinct clusters) are those authors who tweet most frequent about specific brand in its cluster. Such author nodes may be referred as *most specific* authors and can be both *potential and actual influencers* in social network, as they are frequent in tweeting and as well as in retweeting.

6 Discussions

Authors belonging to different clusters are in fact those who are more *generalist* in their content sharing, since they tweet about multiple different brands. On the contrary, authors belonging to the innermost clusters are those who are very *specific* in sharing content related to one selected brand. Since the *specificity* (generality) and *frequency of tweets* and *retweets* of authors was not an explicit variable in our dataset, it is possible to posit that the proposed network layout help to unveil specific (implicit) properties of the represented networks. We also noticed that, as the graph sizes increases, more peripheral layers seems to be formed surrounding hub nodes, which increases the influence spread across newly formed peripheral layers in multi-layered form. Thus authors tweeting about multiple topics among

multiple peripheries can be potential influence spreaders. An enlarged version of the network layouts for both networks N_1 and N_2 can be accessed online.[1] The clustering of nodes provides a distinct multi-layering of those authors who have tweeted about the same destination. The layering of nodes around brands is instead related to the intensity of tweeting about a given destination.

The emerging semantic of network visualization is related to the *brand fidelity* of authors, as shown in Fig. 2. Moreover, it is possible to point out which authors are tweeting about a brand as well as a competing brands to support the definition of specific marketing campaigns and for categories as well. Similarly, tourism practitioners can also point out the highly discussed touristic destination, and they can also identify the less popular destinations, upon which they can perform some strategic advertising campaigns.

7 Conclusion and Future Work

This paper proposes a novel visual approach for the analysis and exploration of social networks in order to identify and visually highlight influencers (i.e., hub nodes) and influence (i.e., spread of information across multi-layer peripheral nodes), represented by the opinions expressed by social media users on a given set of topics. Results show that our approach produces aesthetically pleasant graph layouts, by highlighting multi-layered clusters of nodes surrounding hub nodes (the main topics). These multi-layered peripheral node clusters represent a visual aid to understand influence. Empirical testing and evaluation results show that the proposed three hypothesis that tie *content specificity*, *frequency of tweets* and *retweets* are valid. Moreover, the parameters like *specificity*, *frequency*, and *retweets* are also mutually correlated, and have a significant impact on an author's influence and encourage us to further explore social network's intrinsic characteristics.

Such outcomes can be further utilizes by tourism practitioners, marketing departments or social media community. For example, one can analyse the most competitive locations, events or initiatives in the market. Social media marketing managers can also visually identify major key players in the network, like *information spreaders* and *information sources*. In social media communities, users like *information seekers*, would be able to visually identify the actual and potential influencers and can further follow them.

Although our experiment can be repeated with data from domains different from tourism, additional empirical work is needed to extend testing to multiple datasets and domains. Future work will consider measures of influence with additional parameters (e.g. number of followers, lists, mentions, URLs, etc.). In our current work, we are studying a measure of influence through the proposed visualization

[1] Further visualizations can be accessed online from: http://goo.gl/FmyWTq

approach, which can be used to rank influential nodes in social networks (Metra 2014) and help the practical use of our research results.

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What Types of Hotels Make Their Guests (Un)Happy? Text Analytics of Customer Experiences in Online Reviews

Zheng Xiang, Zvi Schwartz, and Muzaffer Uysal

Abstract A hotel is a complex, experience-based product and thus, finding out what leads to guest satisfaction is a practically important question. In this study, we explored the usefulness of applying guest experience dimensions previously identified based upon authentic online customer reviews to understand what types of hotels make their guests (un)happy. Hotels were grouped by experience dimensions and satisfaction ratings using cluster analysis. Then, these hotel clusters were examined in relation to words in customer reviews with correspondence analysis. The findings show that there were different types of hotels with unique, salient traits that satisfied their customers, while those who failed to do so mostly had issues related to cleanliness and maintenance-related factors. This study demonstrates that consumer generated content such as customer reviews can be useful data sources to generate new insights into the nature of the hotel product. It also points to a promising direction to employ authentic consumer experience data to support perceptual mapping and market segmentation for the hospitality and tourism industry.

Keywords Guest satisfaction • Customer experience • Customer reviews • Big data • Text analytics • Hotel management

1 Introduction

A hotel is a complex, experience-based product. Consumers may be satisfied or dissatisfied for different reasons after staying at a hotel. Finding out what makes a guest (un)happy is a practically important question. Particularly, through the identification of influential hotel services that enhance overall guest satisfaction,

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_3

hoteliers can be in an advantageous position to formulate service strategies in order to meet or exceed travellers' expectations (Pizam et al. 1982; Qu et al. 2000). However, while hotel guest satisfaction has been extensively studied in the past decades, conventional communication-based approaches have various limitations (Crotts et al. 2009; Oh 1999). Thus, finding out what makes a guest (un)happy remains an ongoing yet challenging task.

Today, the tremendous growth of social media and consumer-generated content on the Internet provides rich sources of data, which may reflect authentic customer experiences, for understanding these core variables in hospitality management. In order to explore the usefulness of consumer-generated content for understanding hotel guest experience, and its association with guest satisfaction, this paper builds upon a recent study that applies a text analytical approach to a large quantity of customer reviews extracted from one of the largest online travel agencies (Xiang et al. 2015). Specifically, the goal of this paper is to identify hotel segments with distinct guest experiences that can be used to explain different levels of guest satisfaction in order to gain insights into segmentation and positioning strategies in the hotel industry.

2 Research Background

2.1 Hotel Guest Experience and Satisfaction

Since the 1970s there has been a considerable amount of research on the concepts of hotel guest satisfaction (Oh and Parks 1997; Pizam et al. 1982). Various definitions of guest satisfaction have emerged with shared roots in consumer psychology (see Yoon and Uysal 2005 for a comprehensive review). From the practical point of view, understanding the components or antecedents of hotel guest satisfaction, i.e., what leads to guest satisfaction, is of immense importance. For example, the hotel product can be deconstructed into several levels including the core product, the facilitating product, the supporting product, as well as the augmented product (Kotler et al. 2006). The hotel product can also be represented as a set of attributes as suggested by Dolnicar and Otter (2003) and others (e.g., Qu et al. 2000). These attributes include services, location, room, price/value, food & beverage, image, security, and marketing. The most frequently-cited single items are friendliness of staff, price, professionalism/quality, and cleanliness of room, location, room service, comfort of bed, reputation, restaurant facilities and service speed. These hotel attributes have been shown to induce satisfaction or dissatisfaction of hotel guests. The question is then if these attributes would also operate in the same manner depending on different hotel segments. The frequently-cited Two Factor Theory (Herzberg 1966) postulates that hygiene factors like cleanliness and maintenance do not positively contribute to satisfaction, although dissatisfaction results from their absence, while motivator factors such as the experiential aspects of staying at a

hotel give positive satisfaction. More recently, scholars have adopted the service-dominant logic to argue that what a guest gains from staying at a hotel is not limited to what the hotel offers, but instead it is co-created by both the service provider and the hotel guest (Chathoth et al. 2013). This suggests the guest's multifaceted experience may serve as a better conceptual foundation for understanding guest satisfaction than simply using attributes of hotel services.

2.2 *Analytics Approach to Understanding Hotel Guest Satisfaction*

While different tools have been developed to measure hotel guest satisfaction, conventional methods such as consumer surveys and focus group studies have inherent limitations, both conceptually and methodologically (see Crotts et al. 2009; Oh 1999 for detailed critiques). In recent years social media and consumer-generated content on the Internet continue to grow and impact the hospitality industry (Browning et al. 2013; Xiang and Gretzel 2010). The growth of these data-generating sources has inspired the development of the so-called big data analytics with the goal to discover novel and meaningful patterns in data (George et al. 2014; Ginsberg et al. 2009). Specifically in the hospitality field there is a growing interest in using consumer-generated content to gauge guest/tourist satisfaction. For example, Pan et al. (2007) examined the usefulness of using online travel blogs as qualitative data to describe guests' likes and dislikes in their purchase experiences. Crotts et al. (2009) applied a quantitative analysis to measure hotel guest satisfaction using Internet blog narratives posted by guests.

Recently, Xiang et al. (2015) conducted a study that applied a text analytical approach to a large quantity of consumer reviews extracted from Expedia.com to deconstruct hotel guest experience and examined its association with satisfaction ratings. The findings showed that several dimensions of the guest experience carried varying weights and, more importantly, had novel, meaningful semantic compositions. These dimensions included not only hotel service attributes such as room, location, amenities, and maintenance but also those outside the scope of a hotel's operations such as attractions, shopping, as well as the guest's travel party. Especially, a hybrid dimension, which consisted of both maintenance-related and experience-related words, revealed that, if the guest was not satisfied with hygiene factors, then he/she was less likely to engage in the co-creation of experience. The association between guest experience dimensions and satisfaction appeared strong, confirming that these two domains of consumer behaviour were inherently connected. This study demonstrated the usefulness of data that reflect hotel customers' actual experience for generating new insights into variables that have been extensively studied in the hospitality literature.

2.3 Research Questions

In order to fully explore the usefulness of the analytics approach using experience-based data to understand guest satisfaction, this study aims to apply the hotel experience dimensions from the previous study to examine the hotel properties reviewed by consumers in the online travel agency (OTA). Specifically, the following research questions were formulated to guide this analysis:

1. Can hotels be distinguished by guest experience and satisfaction?
2. If so, for what reasons do hotels make their guests (un)happy?

3 Methodology

A large-scale text analytics study was conducted based upon publicly available data in Expedia.com. Expedia.com was chosen because it is the largest online travel agency in the world with more than 16.5 million monthly unique visitors (see www.advertising.expedia.com). Also, unlike other websites that host consumer reviews, Expedia requires reviewers to make at least one transaction through its website before being allowed to contribute a review to the website. Typically, on the customer review page a hotel property can have multiple entries of customer reviews, along which there are also other types of information including hotel price, star rating, and customers' ratings. Customers assign an overall satisfaction rating, ranging from 1 to 5, to the property, along with four additional ratings of room cleanliness, service & staff, room comfort, and hotel condition. The analysis focused on the satisfaction rating and textual content of customer reviews.

Data were collected during the period of 12 consecutive days using a crawler to extract customer reviews for all hotels listed by Expedia for the 100 largest U.S. cities. For each city the crawler gathered all available textual content of customer reviews, overall (star) rating for the hotel, average guest overall satisfaction, and all available data for each customer review. Data were collected for a total of 10,537 hotels, which represented more than one-fifth of the entire hotel population in the U.S., resulting in 60,648 customer reviews. Once the data were collected, the extraction process identified all unique words contained in the text comments. A relational database was created with unique identifiers assigned to every hotel property, every customer review, and every unique word so that associations could be easily established for analytical purposes. In total, this database contains about 1.3 million word-review pairs, which suggests that on average one customer review contains about 22 unique words.

Data analysis followed a standard text analytics procedure which typically involves several steps including data pre-processing, domain identification/classification, and statistical association analysis. Textual data pre-processing involves a series of operations such as stemming (i.e., coding several forms of a linguistic entity into a 'rudimentary' form which represents the same meaning), misspelling

identification, and identification and removal of stop words such as certain pronouns, adverbs, and conjunctions. For domain identification a coding schema was used to guide the process in order to extract words related to hotel guest experience (Xiang et al. 2015). This coding schema took into account the existing literature on each stage of the guest's experience with hotels services, i.e., reservation, arrival, on-site experience, and departure stages. It is believed that a broader perspective would have a better chance to capture the complex, idiosyncratic nature of personal experience. Coding was primarily conducted by one of the researchers and another researcher was charged with independently verifying the coding results in terms of relevancy to the coding schema, resulting in a dictionary of 416 "primary" words that were used by consumers to describe their experiences at a specific hotel.

However, the dataset that contained the hotel cases and these primary words was quite sparse. To identify a robust data structure that yields a strong association between guest experience and satisfaction, a linear regression model with satisfaction rating as the dependent variable and frequencies of words as input variables was used. Data reduction was achieved in an exploratory fashion from two "angles". First, hotels with very low frequencies of dictionary words were removed. Second, many of these 416 words also had relatively low total frequencies. In fact, more than 80 % of these words had occurred in less than 2 % of all customer reviews. As such, words with very low frequencies were removed. This model was optimized by adjusting the hotel and word frequency thresholds to maximize the explanatory power on satisfaction rating in a linear regression. As a result, the model achieved an adjusted R square of >0.63, which surpassed the recommended range in the literature on hotel satisfaction (Lewis 1985), resulting in a dataset of 529 hotels and 80 guest experience-related words. Among these hotel properties the vast majority of them (>96 %) were mid- and up-scale hotels ranging between two and four stars. These hotels were distributed in more than 30 states with half of them from California, Florida, New York and Washington, which may reflect the size of the industry as well as the overall hospitality atmosphere in those states.

Factor analysis was conducted on these 80 guest experience-related words to (1) reduce the complexity of the semantic space and (2) to identify the underlying structure of guest experience. In this way, extracted factors actually represent the common semantic space, i.e., the contexts in which a specific word was used. In order to answer the research questions, these factor scores, along with the satisfaction ratings, were then entered as input variables in cluster analysis to identify hotel segments that can be distinguished by the experience dimensions and degrees of satisfaction. The benefit of using factor scores as opposed to raw data (i.e., words) is primarily to reduce data complexity in order to examine the salient attributes of hotels that determine guest satisfaction. Then, the profiles of these hotel segments were examined.

4 Findings

Table 1 provides the list of the 80 guest experience-related words in customer reviews in Expedia.com along with their average frequency per hotel. As can be seen, these words reflect a wide spectrum of aspects related to the hotel guest experience, including (1) the very core product such as "room", "bed", and "bathroom"; (2) hotel amenities such as "front" (desk), "restaurant", "pool", "parking", "lobby", "shower", "TV", "bar", and "amenities", etc.; (3) hotel attributes such as "location", "downtown", "close", service", "price", "walking", "distance", "airport", "free", "view", "quiet", "noise", "far", "renovated", and others; (4) hotel staff-related descriptors such as "staff", "friendly", "helpful", and "courteous"; (5) hotel service encounters such as "parking", "checkin", "shopping", "complaint", "wait", and "pay"; (6) evaluation of experience such as "clean", "comfortable", "maintained", "safe", "smelled", "value", and "cheap"; (7) travel context such as "business" and travel party such as "family", "kids", and "husband"; and, (8) possible actions such as "recommend".

Factor analysis of guest experience based upon customer reviews showed that five meaningful factors emerged from the data. Each factor was named based upon the semantic space represented by the words in the specific factor. The first factor, containing primarily 14 words, was named "Hybrid" because it appears to be comprised of two distinctive groups of words representing very different hotel guest experiences. The first group of words, including "clean", "smelled", "dirty", "price", "cheap", "carpet", and "sleep", seems to be dominated by words related to cleanliness and maintenance-related aspects which could affect the guest's basic needs ("sleep") and perception of product ("cheap"). The second group of words, including "expensive", "shopping", "view", "restaurants", "distance", "location", and "walking", seems to represent the experiential aspects of the hotel guest experience, particularly in words such as "shopping", "restaurant", "location", "walking", and "view". What is revealing is that these two groups of words have the opposite signs in their loadings to this factor: loadings in the first group are all positive while in the second group are all negative. This suggests that, when a customer mentions the words in the first group, he/she is unlikely to use words in the second group to describe the experience.

Factor 2 was named "Deals" apparently because the word "free" occurred with "breakfast", "airport", and "shuttle". The third factor, i.e., "Family Friendliness", seems to suggest that, when customers share their story about staying at a hotel with their family members, their experience is likely to be linked with the need for a large room ("suite") or attractions they want to visit. It is unlikely for them to talk or care about the hotel service (with a "-" sign). The fourth factor reflects the core product of a hotel, i.e., the guest room, bed, and bathroom. Lastly, the fifth factor represents customers' experience with hotel staff with words such as "helpful", "friendly", and "staff". All three words have negative loadings on this factor, suggesting that, in general, there is a negative connotation to the context wherein customers mentioned their experience with hotel staff. Overall these factors capture

Table 1 Top 80 primary words in hotel customer reviews

Word	Avg. freq. per hotel	Word	Avg. freq. per hotel	Word	Avg. freq. per hotel
Room	10.7	Food	0.9	Kids	0.5
Clean	5.9	Distance	0.9	TV	0.5
Staff	5.5	Shuttle	0.8	Attractions	0.5
Location	5.4	Street	0.8	Water	0.5
Comfortable	4.1	Shopping	0.8	Coffee	0.5
Service	3.2	Maintained	0.8	Amenities	0.5
Friendly	3.1	Beach	0.8	Experience	0.5
Close	3.0	Access	0.8	Suite	0.4
Breakfast	2.9	Park	0.7	Money	0.4
Helpful	2.6	Floor	0.7	Carpet	0.4
Bed	2.5	Check in	0.7	Courteous	0.4
Price	2.5	Spacious	0.7	City	0.4
Restaurants	2.2	Bar	0.7	Expensive	0.4
Walking	1.9	Lobby	0.7	Dirty	0.4
Area	1.6	Internet	0.7	Renovated	0.4
Parking	1.5	Trip	0.6	Tub	0.4
Bathroom	1.4	Pay	0.6	Safe	0.4
Pool	1.4	Door	0.6	Far	0.4
Free	1.3	Shops	0.6	Air	0.4
Convenient	1.3	Sleep	0.6	Refrigerator	0.4
Downtown	1.3	Business	0.6	Quality	0.4
Airport	1.2	Complaint	0.6	Decor	0.4
Desk	1.2	Shower	0.6	Wait	0.4
View	1.1	Family	0.6	Freeway	0.4
Recommend	1.0	Value	0.5	Elevator	0.4
Noise	0.9	Cheap	0.5	Accommodation	0.2
Quiet	0.9	Smelled	0.5		

the salient aspects of hotel guest experience in that most of the primary words with high frequencies in customer reviews generated relatively high loadings on these factors.

In order to explore whether hotels could be distinguished by the guest satisfaction and experience, K-mean cluster analysis was employed to identify groups of hotels based upon average satisfaction rating and guest experience-related factors. This analysis was run several times with different cluster numbers. Based upon the observation of the distances between clusters and resulting cluster member numbers, it appeared that six- cluster solution was the most adequate. As can be seen in Table 2, these six clusters that were distinctively associated with the five guest experience factors, were identified. It seems that Clusters 1, 2, 3, 4, and 6 were deemed satisfactory, with the average rating around or above the grand mean, while Cluster 5 was the only group with a considerably less satisfactory score (3.207) than

Table 2 Hotel clusters identified using satisfaction rating and guest experience factors

	Means of cluster centre							
	C1 (N = 85)	C2 (N = 101)	C3 (N = 95)	C4 (N = 87)	C5 (N = 76)	C6 (N = 85)	F-ratio	Sig.
Satisfaction rating	3.996	4.209	4.077	4.216	3.207	4.304	93.100	0.000
Hybrid	0.575	−0.848	−0.170	0.548	1.054	−0.881	118.116	0.000
Deals	0.969	−0.375	−0.261	0.739	−1.281	0.158	113.540	0.000
Family friendliness	−0.976	0.311	−0.602	1.248	−0.081	0.075	102.835	0.000
Core product	−0.863	−0.643	1.177	0.436	−0.291	0.126	102.267	0.000
Staff	0.004	0.823	0.437	0.155	−0.372	−1.297	88.570	0.000

Total N = 529

others. It is quite revealing by examining the salient factors in association with the average satisfaction ratings. Specifically, Cluster 1 seems to be positively associated with "deals", even though these hotels were not necessarily family friendly or have good core products. Both Clusters 2 and 6 are high on the Hybrid factor (the negative sign suggests these hotels are positive on the experiential aspects) but almost the opposite on the Staff factor. This reveals that these two types of hotels offered quite similar experiential aspects for the guests but their staff was perceived in very different ways. Cluster 3 seemed to have good Core Product with less helpful and friendly staff (the positive sign implies negative experience with staff). Cluster 4 seemed to be predominantly distinguished by Family Friendliness. Among all these hotel segments Cluster 5 was rated unsatisfactory largely because of negative maintenance and hygiene factors (note the positive sign of the Hybrid factor) as well as the lack of Deals. It is particularly interesting that these groups of hotels were rated either satisfactory or unsatisfactory due to one or two dominant guest experience factors.

To further confirm the association between these hotel clusters and the distinct guest experience dimensions, correspondence analysis was conducted to create a correspondence map to visualize their positions in the semantic space consisting of the 80 words that define the underlying dimensions of guest experience. This map was generated based upon a co-occurrence matrix of hotel cluster and frequencies of specific words. As can be seen in Fig. 1, the first two extracted factors explain approximately 60 % of inertia in the data. This semantic space has a large set of words representing the core attributes of products and services of a hotel, densely distributed in the centre of the map and shared between the hotel clusters. More interestingly, most of the individual hotel clusters (except Clusters 2 and 6) are associated with some distinct words that "stretch" the semantic space of guest experience. In the case of Cluster 1, words such as "airport", "shuttle", "free", and "breakfast" are prominent, representing the underlying factor of "deals". Cluster 3 is closely associated with words such as "room" which represent the core product of the hotel. Cluster 4 is surrounded by words such as "kids", "family", and "value" which signify the family friendliness of this hotel cluster. Apparently, Clusters 2 and 6 are associated with words such as "restaurants", "walking", "shopping", "experience", "bar", "décor", "view", and "location", which represent the experiential aspect of the stay. It is interesting to note these two clusters are almost overlapping with each other in the semantic space; however, based upon the cluster scores in Table 2 the primary difference between these two clusters lies in customers' experiences with hotel staff, with one negative (Cluster 2) and the other positive (Cluster 6). Cluster 5 is the only hotel segment rated unfavourably by customers which is closely associated with words representing issues related to hotel maintenance or the hygiene factors. Also, Cluster 5 seems to be "isolated" in the lower half of the map, suggesting maintenance-related issues are important attributes that distinguish a hotel that makes its guests unhappy from those that make their guests happy (for different reasons).

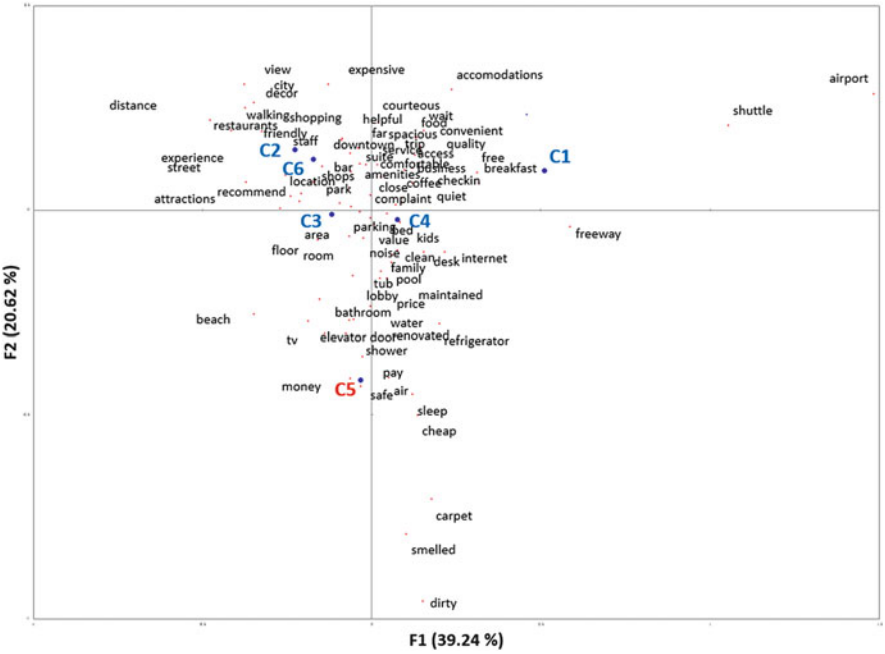

Fig. 1 Hotel cluster profiles in the semantic space [Correspondence analysis using symmetric plot (Axes F1 and F2: 59.86 %)]

To gain a better understanding of the compositions of these hotel clusters, hotel properties within each cluster were checked against their levels of service (i.e., star ratings). As can be seen in Fig. 2, Cluster 1 seems to be dominated by low- and mid-scale hotels (between two- and three-star). Considering Cluster 2 is strongly associated with the "Deals" dimension, this suggests that a hotel, even with limited services, can still make their guests happy by offering good deals such as free breakfast and transportation. Clusters 2, 3, and 6 consist of predominantly mid- and up-scale ones (between three- and four-star). These hotels appear to be quite similar and almost identical (especially Clusters 3 and 6) in terms of their star ratings. The vast majority of Cluster 4 hotels consists of mainly low-and mid-scale hotels (family-friendly). This suggests that, while star rating is, to a certain degree, indicative of the level of satisfaction, hotel customers may be happy for a variety of reasons regardless of star rating as in the cases of Clusters 2, 3, and 6. Finally, Cluster 5, which was rated unsatisfactory by their customers, appears to consist of lower-end hotels (i.e., majority of them are two-star or below).

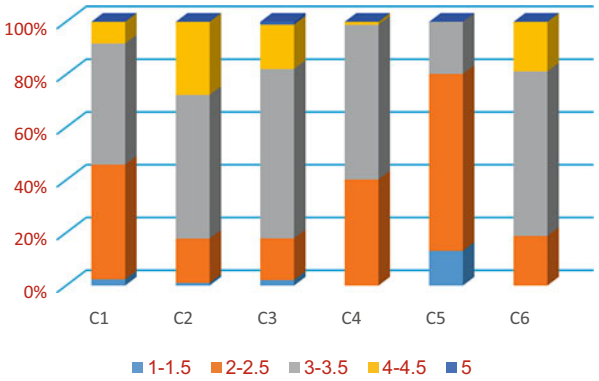

Fig. 2 Hotel cluster profiles with star ratings

5 Discussion and Conclusions

Post-purchase behavioural studies examining customer satisfaction can help practitioners effectively realign their strategies in service delivery and product development (Kozak and Rimmington 2000). In this study, we explored the usefulness of applying previously identified guest experience dimensions based upon authentic online customer reviews to understand what types of hotels make their guests (un) happy. The findings of the cluster analysis showed what hotel guests complained about the most were those unclean or poorly maintained hotels who did not offer good deals. However, customers were happy about their experiences at these hotels for very different reasons. For example, hotel guests could be quite happy simply because of the friendly and helpful staff, although other areas of hotel services were negative or mediocre at best. It was revealing to see some hotels were rated satisfactory even with two or three salient, contrasting factors. For example, some hotels made their guest happy by offering opportunities for experience co-creation while being quite poor on the core product plus having an unfriendly staff. This suggests that there were different types of hotels with unique salient traits such as good deals, family friendly amenities, as well as opportunities for experiential encounters that satisfied their customers, while those who failed to do so mostly had issues related to cleanliness and maintenance-related factors. This study demonstrates that consumer generated content such as customer reviews can be useful data sources to generate new insights into the nature of the hotel product.

The findings point out a number of important features about guest satisfaction at hotels. First, the terms/words that consumers use to express their experiences with hotels certainly vary across different hotel clusters and related segments. There exist words as attributes that are likely to discriminate products in the minds of consumers. Second, hotels have the leverage to make up for service attribute deficiency, which may extract from satisfaction, by focusing on and providing unique features that would help tangibilize intangible attributes. Third, sources of consumer satisfaction and dissonance may be a combination of several attributes

not necessarily operating in the same direction but at times in the opposite direction, suggesting that some words as attributes may have a duality role, one reflecting a maintenance factor and the other reflecting an expressive aspect of the hotel experience. Lastly, consumers do have previously formed expectations of hotel types, suggesting that certain words as attributes would be used to evaluate and rate certain hotels as also implied by the semantic space of corresponded analysis in Fig. 1. This last point also implies that consumers are cognizant of the brand/hotel types that exist in the market place and respond to their features and offerings accordingly.

Big data analytics leads to a profound epistemological change that reframes key questions about the constitution of knowledge, the processes of cognition and research, how we may engage with information, and the nature and the categorization of reality (Boyd and Crawford 2012). As shown by this study, consumer generated content such as customer reviews can be useful data sources to generate insights to complement traditional approaches and statistics. While the analysis was preliminary in terms of understanding the structure of the hotel sector, this study points to a promising direction to employ consumer experience data to support perceptual mapping and market segmentation. In combination with competitive set analysis and longitudinal analysis, hoteliers may find this approach particularly useful when they need empirical evidence to develop and position their products in the ever changing market.

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Analysing User Reviews in Tourism with Topic Models

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Abstract User generated content in general and textual reviews in particular constitute a vast source of information for the decision making of tourists and management and are therefore a key component for e-tourism. This paper explores different application scenarios for the topic model method to process these textual reviews in order to provide accurate decision support and recommendations as well as to build a basis for further analytics. Besides contributing a new model based on the topic model method, this paper also includes empirical evidence from experiments on user reviews from the YELP dataset and from TripAdvisor.

Keywords Web 2.0 • Customer reviews • Classification

1 Introduction

Web 2.0 applications transformed the Internet from an information source to an opinion source (Dippelreiter et al. 2007; Schmallegger and Carson 2008). Every piece of information, whether it is a product offered in an online store or a post in a social network, can be commented or rated in some way (Litvin et al. 2008; Xiang and Gretzel 2010). In an economy heavily based on customer experience, such as tourism, individual decisions are strongly influenced by the written evidences of the experiences others already made—a.k.a. reviews (Pang and Lee 2008; Zehrer et al. 2011; Ye et al. 2011).

From an IT perspective the automated exploitation of these opinions in order to provide advice and decision support led to tremendous research efforts in fields such

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_4

as Machine Learning (ML) and Semantic Web (SemWeb). ML focuses on the construction and study of models that learn regularities and patterns from known data in order to best possibly predict unknown data without a principal need to understand the semantics of the data. In contrast SemWeb focuses on capturing and modelling the semantics of the data on the web and tries to derive "unknown data" by principles of reasoning and logics. In this paper we propose the application of the topic model method (Blei et al. 2003) to the task of analysing user reviews. The topic model method is an approach that is clearly rooted in statistical ML and automatically extracts sets of terms with a coherent meaning (called topics) from document corpora such as reviews. Thus, although the method is agnostic of the semantics of the terms occurring in the documents themselves it automatically groups those terms where most presumably semantic ties exist between them. Therefore, it has the potential to, at least partly, bridge the gap between the two aforementioned principal research directions towards processing the data harvested from the Web.

The aim of this paper is to explain the topic model method and describe its applicability to the tourism domain. Furthermore, we extend the method to derive interpretable user and item models that can be analysed and exploited for deriving predictions and recommendations.

Section 2 illustrates our contributions with a motivating example and continues with a more technical description. Section 3 presents empirical evidence for the practical utility of our propositions by giving results from experimental evaluations. Finally, Sect. 4 discusses and concludes the work.

2 The Topic-Criteria Model

2.1 Motivating Example

The work presented in this article is motivated by the idea that reviews express different viewpoints or dimensions of the experience that a user made with an item and therefore extracting and interpreting these dimensions can be exploited to increase the accuracy of systems that automatically process these reviews in order to improve users' experience on such platforms or to extract some form of business value from this review data. In the following we illustrate the propositions of this paper with a fictitious example on reviews on accommodation services.

Let's assume Alice is a young woman who likes to travel around on a budget. She wrote the following two reviews on hotels she stayed at:

> ***Hotel 1:*** *The hotel was right in the centre of the city, at walking distance from the city centre! Huge breakfast with nice food!* ***Rating: 5***
> ***Hotel 2:*** *I stayed in this hotel with my friends, the room was cheap, but the shower was broken and the mattress was very hard!* ***Rating 2***

From these reviews we can get an idea of Alice's taste and the "topics" she cares about, when staying in a hotel. In the literature a topic model (TM) (Blei 2012) is a

Table 1 An example of potential topics extracted from hotel reviews

Topic "Location"	Topic "Food"	Topic "Rooms"	Topic "Business"
Walking_distance	Breakfast	Shower	Executive_lounge
Station	Service	Bathroom	Floor
City_centre	Restaurant	Tub	Executive_floor
Metro	Bar	Bed	Hilton
Close	Food	TV	Conrad

statistical machine learning approach that tries to extract thematic information from large corpora of natural language documents. Topics are defined as sorted lists of words with a coherent semantic meaning that can be extracted from documents. In Table 1 we provide examples for such lists of terms.

Now Alice's reviews can be mapped on these (pre-extracted) topics based on what she mentioned in the reviews. Note, that we are building user profiles solely based on the content of the user's reviews that indicates what are the topics the user likes to talk about and ignore the specific rating values. In this small example Alice seems to care about the topics Location, Food and Rooms because the conditional probability of occurrence of the terms related to these topics are rather high in her reviews.

Another hotel (***Hotel 3***) received the following reviews from different users:

> ***User 1:*** *The staff in the executive lounge is very professional and the location is very close to the metro station.* ***Rating: 5***
> ***User 2:*** *The room was nice, with a flat tv, but the breakfast was so poor! I didn't have enough food.* ***Rating 3***

Now, given these reviews and ratings, we can compute scores for each topic and map items and users in the same "topic" space. Based on these two reviews the Hotel 3 might achieve a high rating w.r.t. the topics "Location" and "Business", but only a low one for "Food" and "Rooms".

How can the tourism domain benefit from applying this approach? First, when Alice is looking for a hotel recommendation, the item profile of Hotel 3 can be matched against Alice's profile in order to check if this item would be a plausible proposition. As Alice is, amongst others, interested in the topics "Food" and "Rooms" on which Hotel 3 is not scoring high on it might not be a formidable recommendation.

Second, the automated extraction of topics and the building of item profiles with scores on each topic is an opportunity to assess the strengths and weaknesses of each item as they are perceived by the users. This way item profiles based on collected reviews allow tourists to compare different service providers as well as provide a source for business analytics for management.

Third, based on analysis of what the user is writing we can estimate the rating the user would probably assign to the item. Such a scenario could either help to make rating values more consistent with reviews or enables a business analytics application to derive numeric scores from text, where no rating value is given (e.g. in posts on social networks or email feedback).

2.2 Topic Model

As already mentioned in the previous section the topic model method summarizes natural language documents based on thematic information a.k.a. topics. Historically, the first technique that tried to extract thematic information from text documents was the *Latent Semantic Indexing technique (LSI)* (Deerwester et al. 1990), which consists of the factorization of the *TF-IDF* matrix. This model was extended by the *probabilistic LSI (pLSI)* (Hofmann 1999), which introduced a probabilistic generative approach for the text. The main contribution to the topic model approach happened with the introduction of the *Latent Dirichlet Allocation technique (LDA)* (Blei et al. 2003), which describes a full generative model for topics and text. Every topic corresponds to a probability distribution over the corpus dictionary (i.e. a controlled vocabulary of terms) and every document is associated with a probability distribution over topics. The generative process of a generic document d consists in the following steps:

- a topic distribution θ_d is randomically generated;
- for each word position in d:
  - a topic k is extracted from θ_d;
  - a word w is extracted from topic k.

The aim of the LDA model is to invert the generative process: the occurrences of words in the documents are the observed variables, while the topic structure is hidden. By exploiting techniques of statistical inference and sampling, these probability distributions are inferred by observing the frequency of words within documents. Since then topic model was extended in several ways, i.e. for dealing with topics evolution over time (Blei and Lafferty 2006b), topics correlation (Blei and Lafferty 2006a) and networks of correlated documents (Chang and Blei 2010).

Topic model was also adapted and introduced in recommender systems for recommending items that have a natural bag-of-word representation. Agarwal and Chen (2010) introduced a matrix factorization method for recommender systems where items have a natural bag-of-word representation, called *fLDA*. Topics extracted from item descriptions and user metadata are used as priors for regularize item and user latent factors. Wang and Blei (2011) defined an extension of LDA for recommending scientific articles called *collaborative topic regression (CTR)*. Topic model and matrix factorization are merged in a single method, where item latent factors are obtained adding an offset latent variable to the item topic distribution. Rossetti et al. (2013) applied topic model to item's descriptions with the purpose to provide explanations for latent factors obtained with matrix factorization techniques.

In the tourism domain, topic model was used to analyse textual reviews associated to ratings, as it is done in this work. Wang et al. (2010) proposed a probabilistic generative model similar to LDA applied to textual reviews on hotels to estimate aspect ratings, a problem defined as *Latent Aspect Rating Analysis (LARA)*. Each review is split in sentences and each sentence is supposed to be about a specific aspect. The proposed generative model assumes that for each sentence a user decides about which aspect he/she wants to write and choose the words to write

carefully based on the decision taken. Recently, McAuley and Leskovec (2013) merged matrix factorization and topic model in order to estimate the ratings from textual reviews on different datasets. The *Hidden Factors as Topics (HFT)* consists of two steps: first, latent factors for rating prediction are fitted, and second, topic assignments are updated binding item topic distributions and item latent factors. The proposed approach is different from the cited works because it applies the standard LDA, available in many software implementations, and combine topic model outputs in order to address the defined tasks.

2.3 The Topic-Criteria Model

In this article we propose the *Topic-Criteria (TC)* model, which exploits the topic model method to extract latent features from textual reviews and discuss its application for several application scenarios in tourism. The difference between this approach and other approaches which use or extend topic model methods for recommender systems is that in this case the classic LDA is applied to process reviews and the extracted topics are exploited to define user and item profiles. This particular step makes the method very intuitive in its formulation as well as in the meaning of the computed information.

Let us define R to be the set of ratings, and D to signify the set of textual reviews. r_{ij} is the rating given by user i to item j, while $d_{ij} \in D$ is its associated review. For simplicity, let R_i be the set of ratings given by user i, while let R^j be the set of ratings given to item j. The analogous notation is defined for reviews, i.e. D_i denotes the set of reviews given by user i and D^j reviews about item j. The probability of the topic z given the document d_{ij} is indicated with $P\left(z|d_{ij}\right)$. Finally, we reserve the letter i to indicate users, j to indicate items and Z to define the number of topics.

The user profile is constructed by aggregating the topic distributions of all the reviews written by the user, without considering the associated ratings. The main idea is that to profile a user we are only interested about what aspects of an, for instance, accommodation the user writes. Therefore, the user model consists of those topics that the user seems to care about in her/his reviews. The rating values are not needed for this purpose. The user profile is computed by aggregating the topic distributions of the user's reviews, as shown in Fig. 1. The user profile (UP) for user i is a numeric degree on each topic z (from 1 to Z) that defines the relevance of topic z for user i [see Eq. (1)].

$$UP(i,z) = \frac{\sum_{d_{ij} \in D_i} P\left(z|d_{ij}\right)}{|D_i|} \tag{1}$$

Item profiles are built by using both: topic distributions and numeric ratings, because the topics signify the aspects the user cared about in her/his review and the rating values indicate how satisfied the user was with respect to these aspects. Thus, the main idea is that if an item has reviews that frequently mention a specific

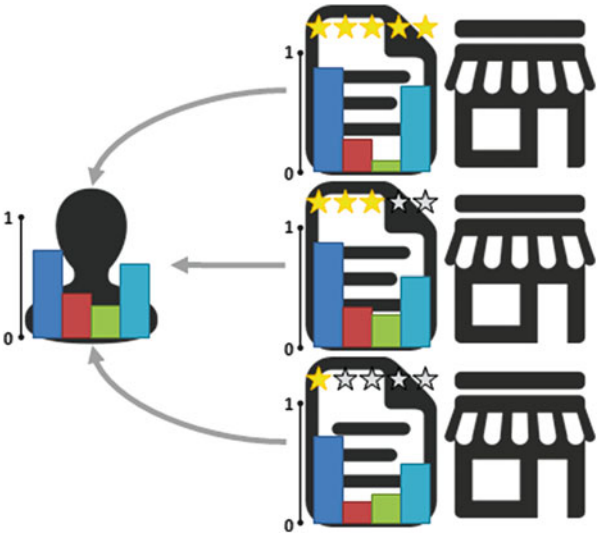

Fig. 1 User profile creation from topic distributions

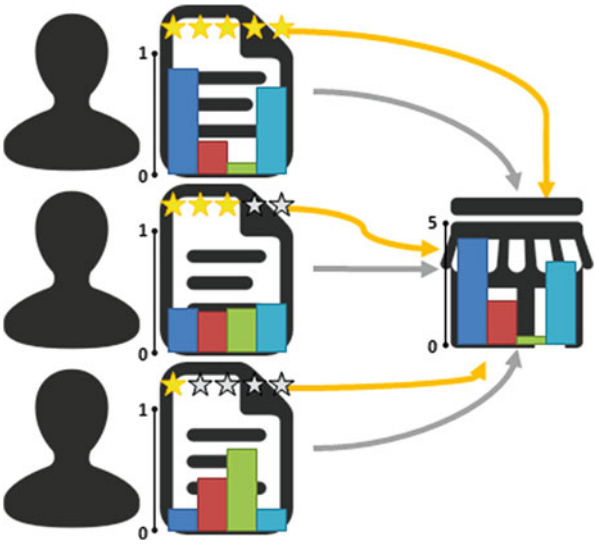

Fig. 2 Item profile creation from topic distributions and ratings

topic, we have to consider the ratings to understand if this topic is a strong or a weak point of this item. The item profile can be built as a numeric score from 1 to 5 for each extracted topic aggregating the topic distributions and the related ratings, as illustrated by Fig. 2. As in the previous case, the item profile (IP) for item j can be computed as defined in Eq. (2).

$$IP(j,z) = \frac{\sum_{d_{ij} \in D^j} P\left(z|d_{ij}\right) \cdot r_{ij}}{\sum_{d_{ij} \in D^j} P\left(z|d_{ij}\right)} \tag{2}$$

Since user profiles define the interest of the users in different topics and item profiles indicate how well an item does with respect to each topic, the combination of both profiles should allow us to estimate a user rating for an unseen item.

The match between a user and an item profile is computed by the sum of the products for each topic, as defined in Eq. (3). In order to improve the prediction accuracy of the approach, a topic weight is added to assign more value to those topics that are more influential for the estimation of rating values.

$$\hat{r}_{ij} = \sum_{z=1}^{Z} UP(i,z) \cdot IP(j,z) \cdot w_z \tag{3}$$

These weights are optimized by minimizing the loss function with the gradient descent approach, as shown in Eq. (4). Note, that λ is a regularization parameter that punishes more complex models in order to avoid data overfitting.

$$\min_{w} \sum_{r_{ij} \in R} \left(r_{ij} - \sum_{z=1}^{Z} UP(i,z) \cdot IP(j,z) \cdot w_z \right)^2 + \lambda \|w\|^2 \tag{4}$$

In this article we propose three different application scenarios for our approach and provide empirical evidence based on available data:

1. *Rating Prediction and Recommendation*: User profiles represent the degree of interest of users in extracted topics. Item profiles express an item's scoring on each topic. Thus, the match between both profiles indicates how appropriate an item might be for a user.
2. *Analytics and Interpretation*: The topic model method provides a natural characterization and interpretation of user and item profiles. By interpreting (selected) topics as item features or characteristics a system can transparently display to a user the model that is internally used for personalizing content. Furthermore, items can be compared to each other from several perspectives as if multi-criteria ratings from users would be known, where each item is assessed according to different dimensions such as quality of service, value for money, rooms, cleanliness or location (Jannach et al. 2014).
3. *Suggest Ratings for Review*: The proposed approach can also be exploited to suggest a rating given a textual review and a user profile. For instance, the system can propose a rating given what the user is writing in the review, or assess the coherence of the review and the rating given to the item.

3 Empirical Evaluation

For assessing the proposed approach in the three scenarios two datasets were used: the Yelp dataset and the TripAdvisor dataset. The Yelp dataset is provided by Yelp for the Yelp Dataset Challenge[1] and it contains reviews and ratings given by users of the Yelp website to local businesses such as restaurants. The TripAdvisor dataset (Jannach et al. 2014) was crawled from the popular travel website and it contains reviews about hotels in different cities. The TripAdvisor dataset contains also more fine-granular user feedback that not only encompasses an overall rating but also ratings on more specific dimensions such as value for money, cleanliness or rooms.

In order to experiment with different levels of data sparseness (i.e. the share of unknown entries in the full user-item rating matrix) we identified data subsets that have at least n known ratings for each user and each item. This processing leads to the datasets described in Table 2.

3.1 Scenario 1: Rating Prediction and Recommendation

The rating prediction accuracy was evaluated with the classic ML measure, the Root Mean Squared Error (RMSE), defined as in Equation 5.

$$RMSE = \frac{1}{|R|}\sum_{r_{ij} \in R} \left(r_{ij} - \hat{r}_{ij}\right)^2 \tag{5}$$

The proposed model was tested without considering topic weights (TC) and alternatively with optimizing topic weights (TC-W). In the TC-W method we also kept track of the user average rating, subtracting it from the original rating in Eq. (2) and adding it to the estimated rating in Eq. (3). TC and TC-W were evaluated against three classic Collaborative Filtering (CF) algorithms: the K-Nearest Neighbor User Based (KNN-UB), the K-Nearest Neighbor Item Based (KNN-IB) and the Probabilistic Matrix Factorization (PMF).

Table 2 Dataset summary

	YELP-5-5	YELP-10-10	TA-3-3	TA-5-5
#Users	9,382	3,802	13,048	1,850
#Items	3,733	2,413	12,342	1,774
#Ratings	145,735	101,416	83,395	14,656
Sparsity	0.0042	0.0111	0.0005	0.0045

[1] http://www.yelp.com/dataset_challenge

Table 3 RMSE values for the different methods on the four datasets

	YELP-5-5	YELP-10-10	TA-3-3	TA-5-5
KNN-IB	1.0709	1.0249	1.0531	0.9601
KNN-UB	1.1088	1.0424	1.0715	0.9447
PMF	1.0956	1.0389	1.0373	0.9946
TC	1.0706	1.0247	1.0625	0.9719
TC-W	1.0599	0.9955	1.0916	0.9776

Neighbourhood models, also known as memory-based models, are the most common approach to CF (Herlocker et al. 1999). The idea is to suggest items which are liked by users with similar tastes. The user-based algorithms exploits similarities between users based on similar rating behaviour, while the item-based variant identifies similarities between items based on co-ratings from same users (Sarwar et al. 2001).

Probabilistic Matrix Factorization (Mnih and Salakhutdinov 2007) is a model-based approach which tries to factorize the user-item matrix with a probabilistic perspective. Although several extensions of this model have been developed, the classic PMF is still a good baseline for CF.

Table 3 shows RMSE values for the baselines and the two TC models. The proposed approach has a RMSE comparable to the classic CF approaches: on the YELP datasets the TC models achieve lower RMSE values than CF approaches, while on the Tripadvisor datasets they are not able to perform so well. However, the advantage of the approach does not solely lie in being as accurate as or slightly better than other CF approaches, but in employing user models that are only based on review content and therefore offer ways to be made transparent to users or better explain users why a specific item is recommended.

3.2 Scenario 2: Analytics and Interpretation

The approach can be used to explain which topics are important to users or to analyse where the relative strengths and weaknesses of items are lying when compared to each other. Based on the Tripadvisor dataset we identified exemplary topics that can be related to the dimensional rating values. For instance, in case of low rating value for the "cleanliness" dimension, the topics associated with that dimension can provide hints about the reasons. On the other hand, in case of high ratings we can explore which topics the users particularly appreciated. To find the topics which are important for a particular rating dimension we performed a non-parametric test to compare the overall rating distribution and the rating distribution of the top-k reviews strongly associated with a topic. A test rejecting the null hypothesis means that the presence of the topic has a positive (or negative) impact on the rating. We applied a two-sample Kolmogorov–Smirnov test with significance level equal to 5 %.

Table 4 Illustrative examples for selected topics related to multi-criteria dimensions

Topic related to	
Cleanliness in reviews on Orlando hotels	Business in reviews on New York hotels
Dirty mold bugs smelled smell filthy carpet musty stained disgusting bed_bugs black mildew moldy stains bites dust musty_smell refund	Internet free free_internet access wireless internet_access wireless_internet business_center computers free_wireless business boarding gym center print free_internet_access printer bottled passes

Table 5 RMSE values for the Scenario 3

	YELP-5-5	YELP-10-10	TA-3-3	TA-5-5
TC	1.0718	1.0258	1.0663	0.9783
TC-W	1.0600	0.9976	1.0932	0.9826

Table 4 shows two illustrative examples of topics strongly correlated with a rating dimension. For this analysis we split reviews based on a specific destination for the purpose of reducing the fragmentation of topics. Other subsamples can be extracted by dividing the reviews by specific hotels or by user segment such as "senior couples" or "families on a budget" in analogy to (Jannach et al. 2014).

3.3 Scenario 3: Suggest Ratings for Review

The third scenario refers to the ability of our approach to predict a rating given the textual review, for instance, interactively when the user just entered the review text. Such an approach can be used to propose a rating right after the user finished writing his/her review. To estimate the rating of a review, topics are extracted from the text and the topic distribution is multiplied with the item profile.

Since the CF methods considered in Scenario 1 cannot predict ratings based on textual input, we only compute accuracy results (i.e. RMSE) for our proposed methods (see Table 5). It is interesting to notice that the RMSE values are only slightly higher than the ones already obtained for Scenario 1. The small difference can be explained by the fact that a user profile is more informative (aggregates several reviews) than the topic distribution of the single review and therefore better represents user's interests. Even in this Scenario the TC method without optimized weights achieves a lower RMSE on the Tripadvisor datasets.

4 Discussion and Conclusions

This paper explores the application of the topic model method in the tourism domain. The paper's contribution is twofold; first, a novel Topic-Criteria model is proposed that includes an original way to model users based on their usage of

different topics in their textual reviews that discloses their preferences or the criteria which seem to be important for assessing a tourism product or service. In addition, also items are modelled by a numeric degree for each topic that indicates how well they are doing with respect to each topic in the eyes of their customers.

Such an approach shows not only the potential to increase the accuracy of different prediction mechanisms due to the exploitation of the content from textual reviews, but it also promises to deliver additional semantics and meaning when analysing the big heaps of data that are continuously collected in present time.

Second, we also contribute empirical evidence for the practical relevance of the proposed technical approach by describing the three usage scenarios: Rating Prediction and Recommendation, Analytics and Interpretation and Suggest Ratings for Review and exploiting available datasets to compute the prediction accuracy of the approach. It remains to note, that the presented results constitute only a first step of our work agenda that will include hybridizing the method with other well-known techniques and developing the application scenarios further. Another possible extension of this work can be the extension to the supervised LDA machine learning technique (Mcauliffe and Blei 2008) and selecting reviews as learning input based on user features or rating values. In this way the identification of topics will be guided by predefined criteria such as specific rating dimensions and will therefore be even better interpretable. Finally, another extension can also be the joint application of topic model and sentiment analysis (Lin and He 2009) in order to extract topics explicitly based on the sentiment.

Acknowledgements The first author wishes to acknowledge the financial support provided by the Australian Government Department of Education through the 2014 Endeavour Research Fellowship awarded for the visiting period at the Advanced Analytics Institute, University of Technology, Sydney, Australia, under the supervision of Prof. Longbing Cao.

Furthermore, authors acknowledge the financial support from the European Union (EU), the European Regional Development Fund (ERDF), the Austrian Federal Government and the State of Carinthia in the Interreg IV Italien-Österreich programme (project acronym O-STAR).

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Listen to Your Customers! How Hotels Manage Online Travel Reviews. The Case of Hotels in Lugano

Silvia De Ascaniis, Alessia Borrè, Elena Marchiori, and Lorenzo Cantoni

Abstract Given the increasing influence of online hotel reviews on travellers' decisions, hotels need to develop management strategies, in order to monitor their business' online reputation and to take advantage of customers' comments. In the paper, the communicative practices taking place in the online interaction between guests and hotels are analysed, in order to pursue a descriptive goal—that is to characterize the phenomenon, and a prescriptive goal—that is to provide guidelines and a framework to develop strategies to effectively reply to online customers' reviews. Three kinds of analyses were performed on a sample of online reviews and the respective hotel responses: (1) a typology of the online interaction guest-hotel was elaborated and validated; (2) the arguments used by reviewers to support their recommendation were identified, to verify if and to what extent hotels address them; (3) rhetorical moves (i.e. communicative strategies used by a speaker to persuade the audience) employed by hotels to appeal to their customers were classified.

Keywords Online hotel reviews • Online reputation • Review management • Rhetorical moves • Arguments • Typology of communicative actions • Customer–hotel interaction

1 Introduction

The Internet provides increasingly new sources of information to travellers, who surf the web to get an idea about the next holiday and to organize logistic aspects, as to find accommodations. The reputation of a tourism organization is influenced by a number of factors, among which an important role is nowadays being played by discourses developing online between past and future customers (Marchiori and Cantoni 2012). There is, in fact, an overall tendency of web users to be familiar with

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_5

the concept of reputation, and an overall attitude to search online for the main opinion of other web users regarding a destination. The participation in the reputation creation process (either by contributing to the word of mouth or just looking at the comments) represents the verbalization of the opinions of a group of stakeholders, and eventually influences their prior beliefs (Marchiori et al. 2013). Among the different types of User Generated Contents, a leading role in image and reputation construction is played by Online Travel Reviews (OTR) (Xiang and Gretzel 2010). OTR were calculated to have a growth rate of 800 % in the last 4 years, reaching an amount of 92,870,000 in 2012 (Tapinassi 2013). Recent studies report that 43 % of people who use the Internet to plan a trip read reviews of others, that 16 % declared they wrote a review, and that OTR are the form of advertising deemed more reliable, second only to recommendations from friends and relatives (Bennet 2012). OTR are, indeed, particularly persuasive because they have an inherent argumentative structure that is because they provide opinions on the reviewed tourism product supporting them by reasons (De Ascaniis and Gretzel 2013).

Hotels can no longer ignore online reviews, and many of them are struggling to find a way to manage as well as to take advantage of OTR. The management of reviews implies a change in the attitude of the hotel and a greater awareness of the importance and impact that reviews can have on their business. The tangible benefits of managing OTR are widely discussed in the literature: it improves the quality of services through the active listening of what guests say, it helps benchmarking competitors by reading the reviews they receive (Tapinassi 2013), it allows having a direct relationship with customers and, thus, enhance their confidence (Johnston and Mehra 2002; Davidow 2003). All these potentialities may strongly affect companies' revenues: a hotel with a good reputation can afford to raise prices, as a good reputation tends to lower the price sensitivity of customers (Farinelli 2013). Therefore, it appears crucial for hotel managers to develop strategies to manage online reviews, considering its own characteristics and resources (Levy et al. 2013).

This study aims at understanding if and how hotels manage online reviews. The case of 3, 4 and 5-star hotels in Lugano (Switzerland) was taken; both all the positive (ranked 4 or 5) and negative reviews (ranked 3, 2 or 1) published on TripAdvisor in English, Italian and German languages were collected and three kinds of analysis were performed in order to answer to the question: which communicative practices are employed by hotels located in Lugano to respond to online reviews? First, a typology of reviews and hotels' answers was built, based on the constitutive aspects of the communicative interaction between customer and hotel. Second, an argumentative analysis allowed to point out if the point made by the customer about his/her hospitality experience was caught and addressed by the hotel in the response. Third, the rhetorical moves employed by hotels to reply to reviews were identified and classified. Contribution to the literature on hotel online reviews and managerial implications were discussed in the conclusion.

2 Literature Review

2.1 Online Travel Reviews as Decision-Making Drivers

As an emerging massive phenomenon in the eTourism field, in the last few years OTR have been investigated under different respects. One of the first extensive study on the role and impact of OTR dates to 2007 (Gretzel et al. 2007) and received financial support from TripAdvisor. It came out that looking at consumers' comments or other posted materials is the activity that people using the Internet take part the most in during their trip planning. Studies on when and how OTR are used by travellers in their trip planning process, then, pointed out that they inform different stages, with different aims: at the beginning of the trip planning for getting ideas, in the middle of it to narrow down choices, later on to confirm decisions, and even after the trip to compare and share experiences (Yoo and Gretzel 2008; Lee et al. 2011; Zhang et al. 2009).

Consumers' reviews are perceived as trustworthy and reliable because they are written from a consumer's perspective, and as more credible than information provided by marketers (Dickinger 2011; Arsal et al. 2010), because mostly produced for a benevolent reason, that is for spreading an information which is thought to be beneficial for the reader. In the case of travel related products, reviewers' credibility is perceived to be based, above all, on the fact that they personally had the travel experience and have no reason to lie. If compared with the information provided by travel service providers, then, information posted online are considered more up-to-date, enjoyable and reliable (Gretzel et al. 2007). The arguments used by the supply side to promote a productmay often differ from those which might be selected by a consumer (Fedele et al. 2011). The prominent motivation driving people to write reviews seems to be the need to reciprocate positive experiences provided by travel and tourism companies, followed by the concern for other consumers (altruistic reason) and the wish to share personal experiences and show expertise (hedonistic reason) (Yoo and Gretzel 2008). People writing OTR propose a reasoning chain to the reader, to support the recommendation they make. OTR, thus, can be seen as invitations by the reviewer to reason in a certain way, leading this way the reader to form an opinion about a tourism product/service and, hence, make a travel decision.

2.2 Online Hotel Reviews

Considered the impact of online reviews on travellers' decisions concerning accommodation, both the academy and the industry have investigated the phenomenon, with an understanding as well as a managing aim. Vermeulen and Seegers (2009) conducted an experimental study to assess the role and impact of online hotel reviews (OHR) on decision-making. Results showed that exposure to either positive

or negative OHR increases consumer awareness that is the possibility a consumer recalls the hotel under given circumstances. An increased awareness enhances, in turn, hotel consideration, that is the probability that a hotel is included in the small set of options a person is willing to consider. Positive reviews proved to enhance positive attitudes toward hotels and, also, it came out that reviewer expertise has only a minor influence on review impact. Why, then, some reviews are rated by users more helpful than others? Lee et al. (2011) crossed "Review Helpful" ratings of OTR from TripAdvisor.com related to top-ranked hotels with reviewers' socio-demographic attributes and behavioural factors, to understand if the authors of helpful reviews share similar characteristics. The identikit of the helpful reviewer outlined a person who travel to many destinations and who tends to continue posting as the number of her reviews increases. Readers, from their side, tend to perceive reviews with a low rating as more helpful than reviews with a high rating, and to consider more helpful those reviews, which do not provide personal information. The two studies point out that OHR, no matter if positive or negative, enhance the visibility of a hotel, and because visibility enhances customers' awareness, they need to be systematically monitored.

Suggestions and models to manage OHR come both from scholars and from the industry. The most of them agree on that the management strategy should be divided in two parts: first monitoring and listening, second respond to comments. For each of these two moments, lists of elements to be considered or steps to go through are suggested (Levy et al. 2013; Rivera 2013; ReviewPro 2011), the most reported comprising the following ones:

- allocate dedicated internal resources to monitor reviews and to respond to them;
- interact with guests and solicit those who had a good experience to write a review;
- acquiring automated listening systems to monitor what is being said of the hotel online (not only on OTR, but also on other types of social media);
- answer in a customized fashion, but not to all the comments in order to avoid creating a sense of little authenticity;
- pay particular attention to negative comments, to demonstrate that guests' opinion is worth to the hotel;
- engage into actions to improve the service accordingly.

3 Research Design

In order to create a response strategy to online hotel reviews, the dialogue between the two actors (hotel managers and online customers) needs to be considered, and the strategy to be developed accordingly. The response strategy should be able to give both a personalized answer to customers by hotel managers, and to preserve the hotel reputation in the public online arena. In order to do so, the constitutive elements of the hotel-customer online interaction have to be outlined. A sample of

online hotel reviews was collected, with the double aim of analysing the response practices adopted by hotels and developing response guidelines. The sample comprised reviews and the respective responses of 3, 4 and 5-star hotels located in Lugano (Switzerland) and posted on TripAdvisor between 1st February 2013 and 31st January 2014, in English, Italian and German languages.

The study comprised three stages: (1) construction and validation of a *typology of the online interaction guest-hotel*, where the aspects of the travel experience stressed by the guest in his/her review were outlined, to allow a classification of reviews into types and, consequently, an assessment of hotels' responses. The typology was based on the constitutive factors of a communicative event, according to Jakobson's Model of Communication (1960); (2) *argumentative analysis*, where the main argument put forward by the reviewer supporting his/her evaluation of the hotel was identified, in order to see if it was addressed in the hotel response and to which extent; and (3) *rhetorical analysis*, where the rhetorical moves employed by the hotel were annotated and classified, to provide a base for considering their adequacy to the different types of responses. Rhetorical moves are communicative strategies used by a speaker to make his/her point or to strengthen its persuasive effect.

3.1 Construction and Validation of a Typology of Guest-Hotel Online Interaction

According to Jakobson, "language must be investigated in all the variety of its functions" (Jakobson 1960, p. 66). The model of communication he proposed is, in fact, based on a functional idea of language: to communicate needs language, and communication is a complex event, which arises in order to accomplish a certain function, like to describe an aspect of reality, to make sure to be understood by the interlocutor, to explain the meaning of a word. The model starts from an identification of the constitutive factors in any speech event, and each factor is then associated with a proper communicative function. Since Jakobson wanted to discuss the function of poetics among other functions of language, core of the model was poetics.

If the model is applied to analyse online hotel reviews as communicative interactions between customers and hotels, the constitutive factors can be described as follows:

- *addresser*: the customer who wrote the review, on the base of a personal hospitality experience at the hotel;
- *message*: the review itself posted online, constituted by textual and pictorial elements (e.g. pictures and rating);
- *addressee*: the hotel receiving the review and possibly responding to it, which is deemed responsible for the reviewer's experience;

- *context*: the customer's experience at the hotel, which fulfilled or not fulfilled his/her expectations;
- *channel*: the review platform, which allows hotels to reply to customers' reviews;
- *code*: a natural language.

On this base, a *typology* of reviewers' communicative actions and respective hotels reactions can be outlined. The main aspects of a tourism experience the reviewer can speak about/can refer to in his/her review are: (a) the experience in the hotel, (b) the expectations/he had about the hotel, (c) the responsibility of the hotel for the experience s/he had, (d) and the satisfaction (that is the ratio between experience and expectation). On its turn, the hotel may either (1) acknowledge what the guest reported or (2) deny it. In case of acknowledgement of a positive comment or praise, the hotel might reinforce it, or just show gratitude/pleasure. In case of acknowledgement of a negative comment or a complaint, the hotel might just regret, or give justifications. If the hotel denies what the guest stated, it may advance one of the following counter-statements: (a) doubt that the reviewer actually stayed at its place (i.e. the reviewer never had the experience), (b) hold that the reviewer's expectation was improper or unreasonable, (c) reject the accusation of being responsible for the reviewer's experience. Satisfaction cannot be denied, in that it is a personal feeling, but it can be attributed to an unreasonable expectation. The sample was analysed to validate and refine the typology, classifying each communicative exchange between the guest and the hotel according to the types just mentioned, as represented in Fig. 1.

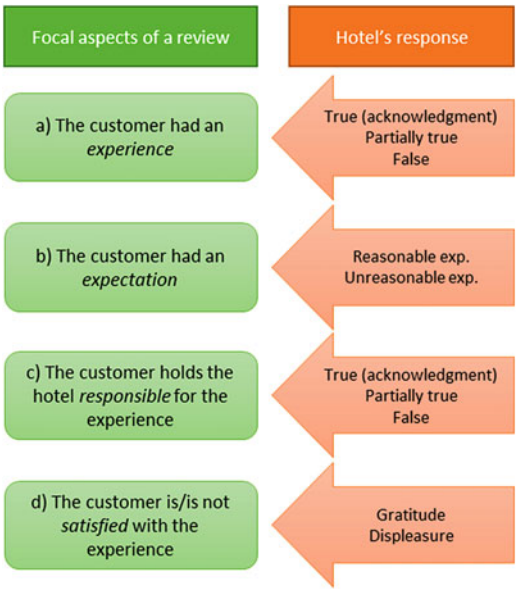

Fig. 1 Typology of the online interaction guest-hotel

3.2 Argumentative Analysis

Argumentation is an attempt to reasonably persuade a person about an opinion with the support of arguments. Arguments are a particular type of information that is opinionated information based upon the arguer's reflection on his/her experience (De Ascaniis and Gretzel 2013). Argumentative analysis consists in identifying the standpoint and arguments put forward by a speaker to make his/her point. 'Standpoint' is the analytical term used to indicate the position taken by a party in a discussion, for whose acceptance by the addressee the speaker intends to argue (van Eemeren 2001).

In the study presented here, the argumentative analysis was apt to understand if and to what extent the hotel paid attention to the main argument put forward by the reviewer to make his/her point about the hospitality experience. Each review in the sample was analysed to identify the main *argumentative move*, that is the unity of standpoint and arguments used by the customer as the core of his/her report. Most of the times, argumentation is not explicitly expressed in all its elements, so that the reconstruction of its deductive schema is left to inference. It needed, therefore, to make explicit the unstated parts of the inference that might be either the standpoint or part of the argument [see Cantoni et al. (2008) for an extended presentation of the types of logical inference—i.e. syllogism]. In a second step, the response by the hotel was considered to see if there was a clear reference to the main argumentative move of the review text, and what was exactly said. The assumption, in this kind of analysis, was that if the hotel does not deal in a focused way with the main reviewer's argument, the overall online perception of the hotel might be strongly influenced, given the persuasiveness of arguments as opinionated information.

To do that, all the responses have been carefully read and the main argument were identified. Then, hotels' answers were analysed to see if the main argument was recalled and addressed or ignored. The hotel category was taken into account, to see if it influences the level of attention paid to reviewers' arguments.

3.3 Rhetorical Analysis

Rhetoric is the art of conveying a message in a convincing, eloquent, and effective way. The study of rhetoric allows to point out the techniques employed by a speaker to make his/her discourse effective and persuasive (Bitzer 1968). Concerning the kind of communicative interaction considered here, a rhetorical analysis of hotels' responses was apt to highlight the practices adopted, and assess their appropriateness/effectiveness to reach the communicative goal. The goal of a hotel in the online environment is to keep a good image of its business and to promote it. The rhetorical analysis consisted in the identification of the rhetorical moves used by hotels to respond to guest's reviews. The different parts of each

response were classified, according to the communicative function they played with respect to the text communicative goal, that is, each statement or group of statements were asked the question: how does this piece of text contribute to give an answer to the customer's comment, which safeguards the hotel's image and/or promote it? Following a saturation approach, every time that a new rhetorical move was recognized, it was classified in a new category, until no new categories were found. The final list of rhetorical moves was not suggested a priori by the literature (and then tested on the sample), but emerged empirically from the analysis.

4 Results

The data collection resulted in 27 hotels, which received at least one review during the considered period. Table 1 shows the number of reviews divided by hotels' category, the number of responses given by the hotel, and the ratio between the total number of responses and the total number of reviews received (the percentage was been calculated taking into account also the 16 hotels that never answered, in order to get an idea of the overall behaviour of the different categories).

Of the 27 hotels identified, 11 answered to at least one review, distributed as follows: 3 out of 4 5-star hotels; 4 out of 8 4-star hotels; 4 out of 15 3-star hotels. The total number of responses is 259, which constitutes the sample of analysis.

A closer look at the data suggests that five star hotels are the most concerned about visitors' online comments. Indeed, nearly half of them (42.8 %) provided response to online comments. The ratio between the total number of reviews received by the three categories of hotel and the total number of answers (17.5 %), shows that reviews management is still an uncommon practice.

Table 1 Response behaviour of 3, 4 and 5-star hotels in Lugano

Hotel category	No. of reviews received between 01.02.2013 and 31.01.2014	No. of answers to reviews given between 01.02.2013 and 31.01.2014	Relation between answers given and reviews received (%)
Five-star hotels	264	113	42.8
Four-star hotels	657	72	10.9
Three-star hotels	561	74	13.2
Total	1,482	259	17.5

4.1 Construction and Validation of a Typology of Guest-Hotel Online Interaction

Goal of the first analysis was to validate and refine the typology proposed in Sect. 3.1, which derived from the characterization of the online communicative interaction between customers and hotels, based on Jakobson's Model of Communication. The analysis confirmed that the interaction can be characterized according to four main categories: (a) the experience in the hotel, (b) the expectation the customer had about the hotel, (c) the responsibility of the hotel for the customer's experience, (d) the customer's satisfaction (that is the ratio between experience and expectation). The analysis allowed, then, to further elaborate on the categories, specifying sub-types of communicative actions used by guests in their reviews, and types of communicative reactions used by hotels in the respective response. Figure 2 presents the refined typology of the online interaction guest-hotel. The occurrence in the sample of each type of interaction is reported below, and examples are given.

The customer had an *experience* only in 4 responses out of 259 (1.5 %) hotels denied the veracity of what the reviewer had stated. For instance: [review] ". . .room was clean but without A/C"; [response] "Please note that all rooms in our hotel are provided with Air-Conditioning". The aspects of the hospitality experience tackled were, in the sample analysed: price, air conditioning and censorship of accessible websites.

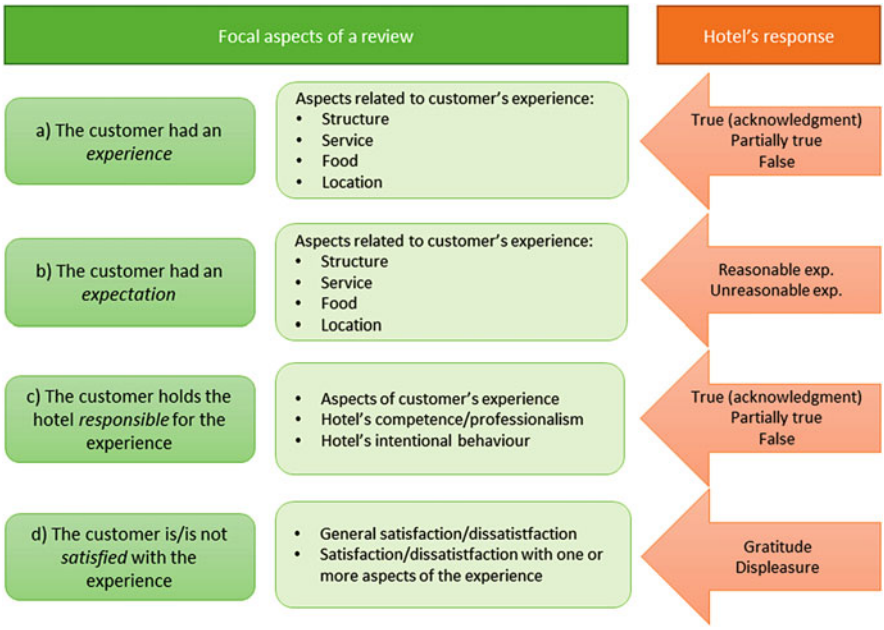

Fig. 2 Revised typology of the online interaction guest-hotel

The customer had an *expectation* the reasonableness or appropriateness of a customer's expectation was called into question by the hotel in 12 responses out of 259 (4.6 %). The expectations reported in the analysed reviews argued mainly about the following topics: room, lake view, price, service and breakfast. Regarding the hotel doubts towards the reasonableness of the customer's expectation presented in the reviews, four main reasons emerged. These reasons were: the hotel clearly stated beforehand that guests shouldn't expect certain services (e.g. "I noticed you booked a Quality room (...) and it's useful to precise that tea/coffee facilities, as also clearly explained on our website, are only included in the upper categories."); the hotel category did not include certain services (e.g. "It's a pleasure to read that you would like us to be ranked as a 5 star hotel. We wish to remind you, however, that we are a 3 star hotel.") the expectation was unreasonable if compared to the competitors (e.g. "As I'm quite used to travel a lot in Europe for business reasons, I would appreciate if you could let me know where to find, at the mentioned rate of 75.00 €or less, hotels located in the very heart of the old cities and with similar facilities."); the expectation was unreasonable at all (e.g. "Unfortunately, after many searches, the object was not found in the room. Thus, it must have been forgotten somewhere else hotel").

The customer holds the hotel *responsible* for his/her experience hotels were deemed responsible for a positive hospitality experience in 188 reviews out of 259 (72.5 %), because of the hotel's competence/professionalism, because certain actions were undertaken which pleased the customer (like giving upgrades), or because of the excellence of specific services which enhanced the experience. The responsibility of the hotel for the customer's experience was declined in 11 negative reviews (22 %). In most of the cases—that is 48 out of 259 (18.5 %)—the rejection concerned specific aspects of the experience, such as the dimension of the room or the noise. In the other cases, it concerned a lack of capacity or expertise (23 reviews, i.e. 8.8 %, made this accusation, which was rejected 6 times), or a supposed intentional behaviour of providing a negative experience (the accusation was made in four reviews and was rejected three times).

The customer is/is not *satisfied* with the experience since satisfaction is a personal perception, it cannot be deemed true or false by hotel managers, but it can only be attributed to something else, in this case, to unreasonable expectations.

4.2 Argumentative Analysis

The argumentative analysis revealed that in most of the cases hotel's response: (i) either completely ignored the main argument advanced by the customer in the review, (ii) or supplied a generic thanks for the review, (iii) or even report a generic apology for the unsatisfactory performance. The tendency of 5-star hotels was to pay a higher attention to the main customer's argument in negative reviews. In fact, they gave a direct response to the main argument in 56 out of 113 cases (49.5 %),

and of these 41 responses concerned positive reviews (91 in total, that makes 45 % of the cases), while 17 responses concerned negative reviews (22 in total that makes 77.3 %). The 4-star hotels referred precisely to the main argument in 35 responses out of 72 (48.6 %). For this category, there was a tendency to respond more precisely to negative reviews. The same trend can be seen in 3-star hotels: they referred directly to the main argument in the response to nine negative reviews out of 11 (81.9 %), and only in seven positive reviews out of 63 (11.2 %).

It has to be noted, however, that in many cases it was difficult to identify one main argument, since reviewers reported different aspects of their experience, which were valuable to them and could not be ranked just reading the text. In negative reviews, on the contrary, one main argument usually clearly emerged, in that the complaint or disappointment of a guest generally related to a specific service provided by the hotel or to a specific event. Therefore, hotels tended to tackle the main argument in a more structured form when responding to negative reviews.

4.3 Rhetorical Analysis

Table 2 shows the 13 types of rhetorical moves that have been found to be used by hotels to answer to customers' reviews, which are characterized through exemplary statements (second column in Table 2), together with the respective occurrence for positive and negative reviews. When answering to positive reviews, Lugano hotels, with no distinction according to their category, in more than half of the cases used six main rhetorical moves. The most frequent rhetorical moves were: allocution (97.4 %), which usually consisted of a not-customized greeting; invitation to return (92.7 %); gratitude (92.2 %), which were usually referred to a general "thanks" for posting the review. The following rhetorical moves were: salutations, acknowledgment of the reported good service of the hotel, integration, where the hotel attempted to point out its hospitality approach.

Six rhetorical moves dominated the responses to negative reviews: allocution occurred almost always (in 66 cases out of 67), and was usually expressed with a standard statement (e.g. "Dear guest"); integration (89.5 %) was used mostly to highlight the goal of the hotel and its hospitality approach; hotels tended, then, to thank customers for the time they spent writing the review (86.6 %). Other frequently occurring moves were: salutations, invitation to return, apology. If the rhetorical moves employed to reply to the main reviewer's argument are considered, it comes out that Lugano hotels, in general, used mainly acknowledgement when answering to positive reviews, while they used above all integration and clarification when replying to negative reviews.

Table 2 Rhetorical moves used by hotels to answer to customers' reviews[a]

Rhetorical move	Exemplary statement	Occurrence in positive OTR (192)	Occurrence in negative OTR (67)
Allocution	Dear guest	187 (97.4 %)	66 (98.5 %)
Gratitude	Thank you for your review	177	58
Acknowledgment	We are happy that you liked your stay at our hotel	149 (77.6 %)	12 (17.9 %)
Invitation to return	Looking forward to host you again	178	51 (76.1 %)
Salutation	Your sincerely	149	56
Integration	I inform you that our hotel is provided with service x at guests' free disposal	96 (50 %)	60 (89.5 %)
Clarification/ correction	The price is in line with Swiss category standards	23	31 (46.3 %)
Apology	We regret for the inconvenience	33 (17.2 %)	44 (65.7 %)
Request for more details	We kindly ask you to contact us to better explain what happened	2 (1 %)	6
Compensation	We will be happy to offer you an extra service on your next visit	0	1
Notify to the proper person	We will relate your praises/complaint to the addressed person	18 (9.3 %)	9
Denial	The fact you are reporting cannot be due to our service	0	7
Understanding	We understand that a hotel located in x might make transfers more difficult	1	7

[a]In the table only percentages, which are significant for the discussion of the results are reported

5 Discussion

The study analysed the online interaction between customers and hotels published on the most popular platform for hotel reviews: TripAdvisor.com. The analysis was conducted using a communicative approach, where three kinds of analysis were performed on a sample of online hotel reviews about 3, 4 and 5 star hotels of a Swiss city, in order to pursue a descriptive as well as a prescriptive goal on the communication practices among customers and hotels online interactions.

Descriptive Goal The practices characterizing this type of communicative interaction were described in terms of:

(a) the types of actions performed by customers and hotels when reporting about, respectively replying to, hospitality experiences. A typology was build, which classifies communicative actions according to four aspects: customer's experience, customer's expectation, hotel's responsibility to fulfil the expectation, customer's satisfaction;

(b) the tendency of hotels to address the main argument advanced by the reviewer to support his/her opinion. Results of this study show that only 5-star hotels were found to take care of this aspect;
(c) the rhetorical moves employed by hotels to reply to customers. Allocution, that is the greeting opening almost all the responses, resulted to be rarely customized, rather to make use of generic and standard formulas, like "dear guest". Giving thanks (expressions of gratitude) for having written the review constitutes also a common polite move. In the responses to positive reviews, then, often an invitation to return is made, while in the responses to negative reviews, integrations are given to point out additional services and best practices of the hotel, or to underline the hotel's approach to hospitality.

Prescriptive Goal On the base of these results, guidelines can be derived to develop management strategies for online hotel reviews. Therefore, the following suggestions are foreseen for hotel managers' interest to manage their response to online customers' review:

- monitoring: it is suggested to constantly monitor and classify reviews, following the typology proposed, in order to have a snapshot of the hotel online reputation;
- identification of the main argument: it is suggested to identify the main argument expressed in the review, in order to address it in the response in a more efficient way;
- create standard reply formats: it is suggested that hotel managers take advantage from the identified the rhetorical moves, to reply to the type of communicative action dominating the review. For example, to answer to a complain regarding an expectation that was not fulfilled, adequate rhetorical moves are suggested to be integration and clarification, which allow the hotel to point out its hospitality characteristics and justify its choices;
- customize standard reply formats: it is suggested that hotel managers adapt the content of rhetorical moves according to their own business. For instance: stating the customer's name in the allocution.

Finally, this study intended to contribute on literature on online contents analysis in the hospitality sector, providing a powerful framework to reply to online customers' review. Future research should consider to enlarge the sample in order to validate the proposed framework. Moreover, hotel manager's perspective should be further investigated, in order to better understand hotels' actual strategies, and internal management when it comes to reply to online customers' review.

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Information Gathering by Ubiquitous Services for CRM in Tourism Destinations: An Explorative Study from Sweden

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Abstract The paper introduces various concepts of ubiquitous (i.e. mobile) services which especially serve to collect customer-based information from tourists during their destination stay. The latter information source has been identified as a vital input for electronic Customer Relationship Management at the level of tourism destinations. The proposed mobile service concepts are prototypically visualized and qualitatively assessed by destination suppliers from Sweden and by a sample of potential customers from Germany. The gained empirical results suggest that the proposed concepts of an Electronic Customer Card, Detailed Slope Information, Avalanche Warning, and Quick Response code/NFC-tags show the potential to gain customer-based information and benefits for both, customers and destination suppliers.

Keywords Ubiquitous services • e-Customer relationship management • Data warehousing • Destination

1 Introduction

Customer Relationship Management (CRM) has become a vital component for the travel and tourism industry (Vogt 2011). CRM typically applies ubiquitous (i.e. mobile) technologies which directly respond to travellers' communication and service needs (Sinisalo et al. 2007; Möhlenbruch et al. 2010), thereby also showing the potential to enhance tourists' experience quality (Wang et al. 2012). More precisely, electronic Customer Relationship Management (e-CRM) uses information technologies to integrate organization resources and intra-organizational collaboration to better understand and more effectively fulfil changing customer needs (Park and Kim 2003; Sigala 2011). By showing a clear front-end focus, e-CRM applications are designed on the basis of customer needs and for customer-use, thereby

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_6

typically interacting with data warehouse systems (Höpken et al. 2013). However, although information technologies are already adopted in the tourism domain, the effective use of e-CRM at tourism destinations is hampered by the lack of contextual customer information (Pyo et al. 2002; Pike et al. 2011). Ubiquitous (i.e. mobile) final-user applications can overcome this problem and provide this information during tourists' destination stay (Rasinger et al. 2009; Fuchs et al. 2012).

Thus, the goal of this paper is to conceptualize, prototypically visualize, and to qualitatively evaluate ubiquitous (i.e. mobile) tourist services, such as an Electronic Customer Card, a Social Media Guide, and various Location-based services, regarding their potential to gain information on tourists' needs during destination stay, considered as a vital input for successful e-CRM applications (Vogt 2011; Canadi et al. 2011). For this purpose, graphical prototypes (i.e. Mock-Ups) are built and an evaluation by tourism managers and potential final users is conducted. The paper is structured as follows: Section 2 gives a short overview of the research background and major research requirements. Section 3 describes the prototypical concepts in the areas of Electronic Customer Card, Social Media Guide and various Location-based services. Section 4 presents explorative evaluation results from both, destination suppliers and potential final users. Different operational scenarios and insights about collecting information and possible benefits for the destination and the customer are revealed. The conclusion section summarizes the results and provides a brief outlook on future research.

2 Study Background and Research Requirements

According to the literature, e-CRM applications typically interact with Data Warehouses and Enterprise Resource Planning (ERP) systems (Pyo et al. 2002; Höpken et al. 2013). Although, data warehouse systems at the level of tourism destinations are still a rarity, the study at hand is part of a pilot project aiming at the development and prototypical implementation of a data warehouse serving as a homogenous data source for a Business Intelligence-based destination management information system (DMIS). As discussed in more detail in Höpken et al. (2013), the prototypically implemented destination data warehouse, at the Swedish mountain destination of Åre, integrates customer data which reflect: (a) *economic performance* (e.g. bookings, overnights, prices, turnover, etc.); (b) *customer behaviour* (e.g. web-navigation and search, information and booking behaviour, consumption behaviour, movement patterns, customer profiles, etc.); and (c) *customer perception and experience* (e.g. brand awareness, perception of destination value chain areas, value for money and customer satisfaction, loyalty, etc.); (Höpken et al. 2011, p. 422; Fuchs et al. 2013, p. 130; Fuchs et al. 2015). Finally, legal aspects and privacy protection issues are secured through a responsible data handling process as sensitive customer data (i.e. name, exact address) are either left out during data extraction or obfuscated (Hastie et al. 2009). Thus, sensitive data is stored to a minimal extent and access to such data is handled as restrictively as possible. For the e-CRM study at hand, the focus lies on customer needs, movement patterns and

Table 1 Indicators and feasibility of generating Transaction (T), Navigation (N) and Feedback (F) data before conceptualizing ubiquitous services

	Feasibility				*Feasibility*		
Indicators	T	N	F	Indicators	T	N	F
Future turnover of the destination	52 %	20 %	20 %	Type of travel (travel group)	52 %	20 %	60 %
Sources of information requests during stay	20 %	20 %	20 %	Purpose of visit	68 %	68 %	68 %
Cross-sales potentials	68 %	20 %	36 %	Main/Transit destination	20 %	20 %	20 %
Type of transportation	20 %	20 %	36 %	Social Media Presence	20 %	20 %	36 %
Visitation week number	68 %	20 %	36 %	Knowledge about the destination	20 %	20 %	36 %
Type of accommodation	68 %	20 %	36 %	Travel motivation	20 %	20 %	52 %
Length of stay (Ø overnights/visitor)	52 %	20 %	20 %	Non-ski winter activities	20 %	20 %	36 %
Customer movement & place attachment	20 %	20 %	20 %	Summer activities	20 %	20 %	20 %
Home region	68 %	52 %	28 %	Quality of services	20 %	20 %	52 %
Age	36 %	20 %	52 %	Atmosphere	20 %	20 %	36 %
Gender	52 %	20 %	52 %	Social environment	20 %	20 %	52 %
Skiing behaviour	36 %	20 %	36 %	Overall guest satisfaction	20 %	20 %	52 %
Customer life time	60 %	20 %	36 %	Loyalty of customers reg. destination	68 %	20 %	52 %

general consumption behaviour, while the respective customer data stem from sources, like, tourists' *Feedback* (*F*) (i.e. surveys, social media, etc.), *Navigation and web-search* (*N*), and *Transactions* (*T*), respectively. Table 1 summarizes the indicators considered in the DMIS prototype (Höpken et al. 2011), and also displays the managers' initial assessment of the feasibility to gain this type of customer data during customers' destination stay. Through the ubiquitous applications proposed in this paper, the respective values should be increased after a repeated final evaluation by tourism managers of the Swedish mountain destination Åre.[1]

3 Collecting Information by Ubiquitous Services

The conceptualization of the proposed ubiquitous services is based on the general information gap as described in Sect. 2. More concretely, the requirements and potentials for the generation of customer data during tourists' destination stay are

[1] The group of managers comprises CEOs from the destination management organisation Å*re Destination AB*, *Copperhill Mountain Lodge*, *SkiStar* Å*re*, *Tott Hotel*,and *Holiday Club*.

Table 2 Requirements and their assignment to the main concepts

Requirements	Electronic customer card	Social media guide	Location-based services
Guest count	×	×	
Factors affecting turnover	×	×	×
Information sources during stay	×	×	×
Activities		×	
Type of accommodation	×	×	
Type of events	×	×	×
Pattern of movement & place attachment	×	×	×
Destination image and quality	×	×	
Overall satisfaction/loyalty	×	×	
Behaviour on slope	×	×	×
Customer life time	×	×	×
Length of stay	×	×	×
Brand awareness/promise	×	×	
Winter and non-winter activities	×	×	×
Social interaction	×		×
Country of origin, region, age, gender	×	×	
Social media		×	×
Attractiveness of various services	×	×	

mapped for an Electronic Customer Card, a Social Media Guide, and various Location-based services. Moreover, these proposed ubiquitous services were, subsequently, evaluated in terms of technical feasibility. These assessments were made against the background, that today no physical customer card exists in Åre, except the digital service of MySkistar, available through the ski pass which is mostly focused on ski statistics, but also includes discounted offers (https://www.skistar.com/en/MySkistar/). Table 2 shows data generation requirements which can potentially be fulfilled by the proposed concepts of ubiquitous services.

3.1 Electronic Customer Card

An Electronic Customer Card is a business card which is based on a QR-code or NFC (Canadi et al. 2011; Höpken et al. 2012). With an Electronic Customer Card, on-site information about the customer can be collected as follows:

- Information on *customer behaviour* and *customer consumption* is collected via feedback, redeeming coupons and bonuses, discounts on purchases, and minimal amounts to pay in shops

Fig. 1 E-Customer Card: GPS-based map with coupons (*left*). Selection of different coupons (*right*)

- Information on *movement patterns* is collected by paying minimal amounts in shops, using the card as a ski pass, and by getting free entrance to special areas (Fig. 1).

3.2 Social Media Guide

The Social Media Guide, conceptualized as an app for mobile devices of tourists on-site, connects guests at the destination with friends and family members. Designated promotion channels are the web-portals of the DMO and destination suppliers, electronic billboards and printed brochures. In order to use the Social Media Guide, tourists have to register by creating a user profile, including gender, age, sending country, major interests and planned activities during destination stay. The profile can be complemented by existing accounts in social networks, like Facebook. As integration in the Social Media Guide, the function of the Buddy & Date Finder supports localisation and communication between friends and family members during destination stay, messages can be exchanged, and dates agreed via chat functions. For instance, guests find fellow travellers on an interactive map showing the ski area and relevant destination facilities. Single vacationers can also meet new people. This application also comprises a check-in function to be used in destination facilities, like restaurants, to share the current position via GPS/WLAN. Finally, also textual and visual feedback can be given by customers after check-in, or before entering a tourism facility. Similarly, information about customers' behaviour and movement patterns can be gained (Fig. 2).

3.3 Location-Based Services

Location based services (LBS) are defined as services that integrate a mobile device's location or position with other information so as to add value to users (Kühn 2004). The awareness of the current, past or future location forms an integral part of LBS, thus, especially LBS in tourism typically require mobile multimedia

Fig. 2 Social media guide: GPS-based map of Buddy and Date-Finder

interfaces, internet and positioning technology (Chang et al. 2006, p. 1114). The destination can make use of QR codes and NFC tags in order to provide customers with the following location based information (Canadi et al. 2011; Höpken et al. 2012):

- *Detailed map-based slope information* including the current GPS position and relevant slope information
- *Current avalanche warnings* and the position of the customer is shown on a map. Additionally available are avalanche reports and avalanche predictions
- *QR codes & NFC tags in the destination* can be set-up, for instance, in restaurants displaying QR codes on receipts, menus, and coasters. By scanning it, the user can provide instant feedback or, e.g. request further information about regional food. QR codes/NFC tags can be further implemented outdoor, e.g. in ski-lifts: the menu, opening, recommendations and reservation-functionalities are integrated. Finally, QR codes/NFC tags can be implemented on POIs (e.g. hiking paths) containing relevant texts, photos, videos or audio guides (Fig. 3).
- *QR code- & NFC geocaching*; customers need to find QR codes printed on cards (QR code geocaching) to complete a route on hiking paths or in town. Alternatively, customers have to go through POIs to find NFC tags
- *Virtual Shopping*; grocery products as well as ski/snowboard equipment can be bought or rented electronically. QR codes contain a product which can be rented or bought and will also be delivered to the accommodation

Through the above conceptualized services information on, the behaviour, needs and movement patterns of tourists during destination stay can be gained as follows:

- *Customer behaviour*, i.e. information on tourists activities during destination stay, is gained by avalanche warning, QR codes & NFC tags in the destination, virtual shopping
- *Customer needs* are deduced from QR codes & NFC tags in the destination, virtual shopping
- *Movement patterns* and tourists position is reflected by slope information, avalanche warning, QR codes & NFC tags in the destination, QR code & NFC geocaching

Fig. 3 Visualisation of the information when scanning a QR code or NFC tag

4 Evaluation

Destination suppliers from the Swedish tourism destination Åre, as well as students of the University of Applied Science Weingarten (i.e. potential final users), represented the sample for this explorative evaluation. On the suppliers' side, the evaluation consisted of focus group interviews. After the discussion, the destination suppliers provided pros and cons relating to the proposed service concepts, and they also evaluated a set of given statements. Due to a relatively high number of participants on the side of the student sample, after an introduction to the service concepts, only a quantitative evaluation took place. The interviews with suppliers and customers were conducted in November and December 2012. The evaluation goal was to find out which of the proposed ubiquitous service concepts is most suitable to gain customer data as valuable input for e-CRM applications at the level of tourism destinations.

4.1 Supplier Evaluation

4.1.1 Evaluation Setup

In sum, 9 suppliers ($n = 9$) attended the explorative evaluation. 8 of the suppliers were employees of the DMO Åre Destination AB, and one interviewee was the CEO of SkiStar (the lift operator and provider of accommodation and ski school services). After the focus group interviews, individuals were asked to rate 78 assessment statements relating to the conceptualized ubiquitous services on a five-point Likert scale. One third of the interviewees are male, while 44 % are aged between 40 and 49, and 90 % hold a high-school degree.

Table 3 Pros and Cons of the mobile services

Mobile Service	*Pros*	*Cons*
Electronic Customer Card	• Useful for micropayments • Animation for buying s.th. because of coupons, bonuses, discounts etc.	• Being familiar with the handling • Durability of the mobile device's battery • Lack of trustworthiness of e-payment
Social Media Guide	• Seeing the number of checked-in people in facility • Easy process checking-in	• Coupling with social media channels • Marketing activities are necessary • Implementation of Wi-Fi Hotspots
Detailed Slope Information	• Better coordination of the slope traffic	• Difficult to collect information regarding skiing and snowboard behaviour • Losing focus on skiing/ snowboarding.
Avalanche Warning	• Increasing security awareness	Decreasing danger recognition
QR codes & NFC tags in the destination	• Alternative to information points, POIs, restaurants, and tourist information brochures	Users have less knowledge of QR code/NFC technology Permanent information update
QR code- & NFC Geocaching	• Offering different variants of geocaching	Extension of the hiking paths is necessary
Virtual Shopping	• Inspection of the customers' expenses	Differencing the turnover between suppliers

4.1.2 Evaluation Results

The qualitatively described advantages and disadvantages relating to the proposed ubiquitous services are summarized in Table 3.

In the course of the quantitative evaluation, the benefit for the destination, the usability, the feasibility of implementation, and the capacity to gain guest information by the proposed concepts of ubiquitous services are assessed. Table 4 summarizes the respective results: on average, the suppliers agree that the proposed services represent a general benefit for the destination (i.e. only the virtual shopping performs relatively low). Moreover, the suppliers think that the *Avalanche Warning*, the *Electronic Customer Card*, the *Slope Information* and the *QR codes/NFC tags* provide an additional benefit to their destination. Furthermore, these services also show the potential to gain information about the behaviour and tourists' movement patterns during their destination stay, and also provide customers with an additional benefit. Interestingly, also the usability of the conceptualized services was rated relatively high. Finally, the interviewed suppliers think that the implementation of all these services is generally feasible from a technical perspective.

Table 4 Quantitative results of each mobile service

Mobile services	General benefit	Additional benefit	Usability	Implementation	Information collection
Electronic Customer Card	4.44	4.56	4.22	4.56	4.50
Buddy- & Date-Finder	4.22	4.00	4.33	3.78	4.61
Check-in	4.33	4.22	4.56	4.33	4.44
Feedback	4.39	4.22	4.11	4.00	4.22
Detailed Slope Information	4.06	4.56	4.33	4.22	4.22
Avalanche Warning	4.28	4.67	4.56	4.22	4.22
QR codes/NFC tags for the destination	4.33	4.56	4.33	4.33	4.39
QR code- & NFC-Geocaching	4.28	4.44	4.67	4.33	4.28
Virtual Shopping	3.78	3.89	4.00	3.67	3.61

Interestingly, the interviewed destination suppliers think that the implementation of the *Electronic Customer Card* is inevitable, while the expected gain of customer information is highest for the *Social Media Guide* (i.e. Buddy- & Date-Finder, Check-in, and Feedback). Finally, all proposed *Location-based services* seem to provide a general and an additional benefit for the destination beside the *Virtual Shopping* service.

4.2 Customer Evaluation

4.2.1 Evaluation Setup

Representing potential final users, a sample of 21 students of the Business Informatics Department at the University of Applied Science Weingarten, Germany, ($n = 21$) provided quantitative assessments. 86 % of the participants are male, while the age range falls between 21 and 25 years.

4.2.2 Evaluation Results

Interestingly, the evaluation shows that potential customers would use most of the proposed ubiquitous services in a destination context. The evaluators, however, are not convinced to use the *Buddy & Date-Finder*, as well as the Check-in service of the *Social Media Guide*. Similarly, the interviewees state that *Geocaching* would not support them on the vacation. However, they think that the usage of the *Electronic Customer Card* is inevitable. The remaining mobile services were seen as supportive features. Moreover, interviewees stated that all services could be

Table 5 Quantitative results of each mobile service

Mobile services	Usage	Support	Understanding	Implementation	Anxiousness about information collection
Electronic Customer Card	3.37	3.14	4.33	3.95	4.14
Buddy- & Date-Finder	2.97	3.00	4.33	3.57	4.10
Check-in	3.00	3.14	4.38	3.86	3.71
Feedback	3.25	3.24	4.43	3.90	3.38
Detailed Slope Information	3.30	3.19	4.48	3.86	3.24
Avalanche Warning	3.37	3.29	4.38	3.71	2.86
QR codes/NFC tags in the destination	3.08	3.19	4.14	3.71	3.24
QR code- & NFC-Geocaching	2.98	2.76	4.19	3.81	3.24
Virtual Shopping	3.11	3.24	4.00	3.43	3.24

easily and intuitively used (i.e. $Ø = 4.30$). Also, the technical implementation is seen as feasible. However, potential customers state that especially the *Electronic Customer Card* and the *Social Media Guide* tend to generate too much (i.e. private) information about them (Table 5).

4.3 Overall Result

Table 6 illustrates the aggregated opinion of suppliers and potential customers:

In general, each of the proposed ubiquitous service concepts, gain respectable credence. However, some functions of the *Social Media Guide* (i.e. the Buddy- & Date-Finder, Check-in), *QR code/NFC Geocaching* and *Virtual Shopping*, are not that relevant for both, suppliers and potential customers. Nevertheless, both sub-samples are in complete agreement that all presented concepts will lead to an additional benefit for the destination, and are, thus, fully supportive. Moreover, the interviewees have concurred that the usability of the Mock-Ups was extremely high and the proposed concepts are easily comprehensible. Similarly, both sub-samples agree that an implementation of the proposed mobile services is very realistic. Besides the *Virtual Shopping*, also information about movement patterns and customer behaviour can be gained. Table 7 shows the indicators as already displayed in Table 1 (i.e. feasibility assessment in %). This time, however, the indicators are evaluated by 9 employees of the DMO Åre Destination AB and the CEO of SkiStar after having participated in the focus group interviews, where

Table 6 Aggregated opinions about the mobile services

	Suppliers				
	General benefit	Additional benefit	Usability	Implementation	Information collection
	Customers				
Mobile services	Usage	Support	Under-standing	Implementation	Anxiousness about information collection
Electronic Customer Card	3.80	3.68	3.68	4.06	3.63
Buddy- & Date-Finder	3.47	3.50	4.33	3.67	4.44
Check-in	3.53	3.68	4.47	4.10	4.20
Feedback	3.71	3.73	4.27	3.95	3.94
Detailed Slope Information	3.60	3.87	4.40	4.04	3.89
Avalanche Warning	3.73	3.98	4.47	3.97	3.77
QR codes & NFC tags in the destination	3.58	3.87	4.24	4.02	4.01
QR code- & NFC-Geocaching	3.50	3.60	4.43	4.07	3.93
Virtual Shopping	3.38	3.56	4.00	3.55	3.49

the ubiquitous services for e-CRM presented in this paper were thoroughly discussed. To sum up, with the conceptualiziation of the proposed ubiquitous services, especially customer-based transaction (T), as well as feedback (F) data will lead to an increase of information about customers' (i.e. tourists') needs during their destination stay. By contrast, according to the previous explorative assessment, with the proposed service concepts navigation (N) data can only be marginally gained.

Major implications for destination suppliers from the above conceptualizations and evaluations are:

- *Electronic Customer Card*: Its usage implies the ownership of a mobile device (i.e. smart phone) by the final user. Therefore, an alternate customer card should be offered at the destination (Canadi et al. 2011)
- *Detailed Slope Information*: The already existing mobile application of the Swedish mountain destination Åre, MySkiStar, could be extended by the presented function
- *Avalanche Warning*: A local avalanche research for a permanent monitoring of the avalanches is a necessary precondition for this basic information input
- *QR codes and NFC tags in the destination*: The destination as well as destination guests should be familiar with these techniques. Moreover, only a small number of codes/tags should be set up in the destination

Table 7 Indicators and feasibility of generating Transaction (T), Navigation (N), Feedback (F) data after the conceptualizing of mobile services

Indicators	Feasibility			Indicators	Feasibility		
	T	N	F		T	N	F
Future turnover of the destination	8 %	0 %	0 %	Type of travel (travel group)	8 %	0 %	40 %
Sources for information requests during stay	50 %	0 %	0 %	Purpose of visit	12 %	0 %	32 %
Cross-sales potentials	12 %	0 %	4 %	Main/Transit destination	0 %	0 %	0 %
Type of transportation	40 %	0 %	64 %	Social Media Presence	80 %	0 %	44 %
Visitation week number	12 %	0 %	64 %	Knowledge about the destination	60 %	0 %	44 %
Type of accommodation	12 %	0 %	64 %	Travel motivation	40 %	0 %	48 %
Length of stay (Ø over-nights/visitor)	28 %	0 %	80 %	Non-ski winter activities	80 %	0 %	4 %
Customer movement & place attachment	80 %	0 %	0 %	Summer activities	80 %	0 %	20 %
Home region	32 %	0 %	72 %	Quality of services	60 %	0 %	48 %
Age	64 %	0 %	48 %	Atmosphere	60 %	0 %	64 %
Gender	48 %	0 %	48 %	Social environment	60 %	0 %	48 %
Skiing travel behaviour	64 %	0 %	0 %	Overall guest satisfaction	20 %	0 %	48 %
Customer life time	20 %	0 %	44 %	Loyalty of customers reg. destination	80 %	0 %	48 %

- *QR code/NFC Geocaching* can be offered additionally. Implementation effort and costs are minimal (Höpken et al. 2012).

5 Conclusions and Outlook

The paper at hand presented explorative evaluation results of prototypically visualized concepts of ubiquitous (i.e. mobile) services for collecting information from customers' (i.e. tourists) during destination stay. The latter information is defined as valuable input for e-CRM at tourism destinations (Vogt 2011). The initially posed research questions can be tentatively answered in a confirmative way as a group of technology affluent lead users have evaluated the tools predominantly positively: mobile (i.e. ubiquitous) services show potentials to gain information on customer needs and behaviour as input for an e-CRM system at tourism destinations. More precisely, different mobile service concepts, an *Electronic Customer Card*, a *Social Media Guide* and several *Location-based services*, seem to fill existing information gaps related to customer behaviour, customers' needs and movement patterns. In order to verify potential final user acceptance as well as the implementation and

operational feasibility of the proposed concepts, assessments by destination suppliers and potential customers were conducted in the form of a qualitative evaluation (i.e. focus group interviews). To conclude the empirical results, the concepts of *the Electronic Customer Card*, *Detailed Slope Information*, *Avalanche Warning and the QR codes/NFC tags* show the strongest benefits for potential customers and destination suppliers. Therefore, both, information gaining and targeted e-CRM measures will be supported. In the course of a future project, the discussed ubiquitous (i.e. mobile) services will be prototypically implemented in order to empirically validate (a) final user acceptance, (b) the potential of information gathering for knowledge creation, and (c) the provision of knowledge to customers and suppliers in a real-time e-CRM context at tourism destinations.

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An Analysis of Consumer Search Patterns in the German Airline Market Using Panel Data

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Abstract Consumer search patterns in the airline industry are analysed using online panel data from ComScore, a world leader in the provision of consumer analytics data based on its worldwide panel of two million users. The search process is modelled in terms of direct research with the airline websites and the use of online travel agents. It is shown that 40 % of the German online population only conduct direct research, 35 % only use an online travel agent, and that 25 % use a combination of both methods. The online consideration set based on direct research is 2.58. The interaction effect from using a combination of direct research and online travel agents is analysed using set theory. It is shown that the use of an online travel agent increases the propensity to conduct more direct research.

Keywords Consumer search behaviour • Price comparison • Online travel agents • Airline • Panel data

1 Introduction

Price comparison engines have become important intermediaries in a range of consumer markets. The main function of a price comparison engine is to offer a fast and efficient method for consumers to search and evaluate a range of competing offers that satisfy the specific requirements of an individual purchase such as an airline ticket or a new mobile phone contract, in other words: to provide market transparency (Buhalis and Licata 2002). In this paper, the term online travel agent is used to mean a website that has a price comparison engine and booking functionality. The travel industry has been at the forefront of developments in this area, and has an established and well-documented history of technology disruption and

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_7

distribution going back to Computerized Reservation Systems (CRSs) in travel agents (Inkpen 1998). The airlines have also invested heavily into online marketing so that consumers can search and book flights online, and also buy related travel services such as hotels, car hire and holiday packages, directly from an individual airline. The focus of this research is to model and analyse the search process in terms of: (1) direct search with the airline websites; (2) use of online travel agents; (3) analyse the interaction effects between (1) and (2).

An airline ticket constitutes a personalized contract specifying the carrier (i.e. airline offering the service), an origin: destination pair, a time and date of travel, and a price. These characteristics are important because they make it possible to compare offers from competing airlines easily, quickly and in a systematic manner. There is also an incentive for the airlines to vary pricing and encourage demand in order to sell excess capacity which would otherwise be wasted or capture travellers' willingness to pay in case of high demand connections.[1] From a consumer perspective, online research is a crucial part of the customer journey and it is reasonable to assume that consumers would tend to conduct extensive search processes in order to find convenient flights, and to minimize the price.

2 Literature Review

Our literature review covers (a) the construct of the 'consideration set' and (b) studies on online price comparison. An important concept in marketing is the 'consideration set' (Brown and Wildt 1992). The consideration set concept has received relatively limited empirical attention pre-Internet, with only 22 studies that report empirical results (Hauser and Wernerfelt 1990). A summary of the relatively few published studies into online consideration sets is shown in Table 1. Table 2 shows an overview of the key literature on price comparison web sites.

The Internet and online intermediaries improve access to information and dramatically lower search costs (Laffey and Gandy 2009; Dickinger and Stangl 2012; Lee et al. 2007). However, price and product dispersion still exist, which encourage a more intensive search process (Baye et al. 2003). In the airline industry, Collins et al. (2009) demonstrate significant heterogeneity of search preferences, which implies that the effects of the Internet and price comparison engines on search behaviour will be uneven (Dickinger and Stangl 2012). In the hotel market, Anderson (2011) used panel data to explore the interaction between a hotel price comparison website and direct research with individual hotels, and found that 75 % of used the comparison engine in combination with direct research. There appears to be no research that models the interaction between direct search

[1] Airline capacity on any single connection is fixed in the short term given numerous constraints of fleet management in a complex network.

Table 1 Online panel data research results into consumer behaviour

Authors	Research title	Reported online consideration sets
Johnson et al. (2004)	On the depth and dynamics of online search behaviour	Online consideration sets in the US are 1.2 for books, 1.3 for CDs and 1.8 for travel sites
Zhang et al. (2006)	Online consumer search depth: Theories and new findings	Online consideration sets in the US are 2.1 for CDs, 3.3 for airline tickets and computer hardware
Meyer and Stobbe (2010)	Majority of bank customers in Germany do research online: Findings of a clickstream analysis	Consideration set size is on average 3.8.
Holland and Mandry (2013)	Online search and buying behaviour in consumer markets	Average consideration sets are in a very narrow range between 2.40 and 2.77 (UK) and 2.13–2.60 (US)
Holland and Jacobs (2013)	The relationship between market structure and the online consideration set	Online consideration sets for six sectors between 2.31 and 2.60

Table 2 Literature overview on comparison web sites

Author and year	Theory focus	Methodology	Product type	Nature of the sample data
Baye et al. (2003)	Price dispersion	Online data collection	Electronic products	1 Price comparison site
Kamakura and Moon (2009)	Price efficiency and quality of products	Hedonic regression	Airline	3 Online travel agents
Bilotkach (2010)	Economic pricing models	Online data collection	Travel	1 PC website1 airline website
McDonald and Wren (2012)	Advertising effectiveness and price strategies	Online data collection	Insurance	1 Website
Law et al. (2010)	Information and price display	Online data collection	Airline	5 Price comparison websites
Laffey and Gandy (2009)	Relation between price comparison and purchase	Case study	Financial services	3 Price comparison sites
Jung et al. (2014)	Product type, price and value perceptions	Laboratory experiment	Notebook, jeans	160 Resp.
Chung (2013)	Intermediaries and price dispersion	Survey	Digital cameras	258 Students
Christodoulidou et al. (2010)	Examination of the intermediaries' role with the suppliers	Case study	Travel	4 Price Comparison Web Sites
Kracht and Wang (2010)	Evolution of the tourism distribution channel	Theoretical general review	Travel	No data

(continued)

Table 2 (continued)

Author and year	Theory focus	Methodology	Product type	Nature of the sample data
Tan (2010)	Search cost, market structure and performance	Laboratory experiment	N/A	168 Students
Chatterjee and Wang (2012)	Search dispersion and duration related to purchases	Online panel data and clickstream analysis	Travel	Panel size: 50,000
Janger (2010)	Price comparison, search and switching rates	Survey	Banking, insurance, trades, food, etc.	2,000 Resp.
Collins et al. (2010)	Search and choice	Survey	Airline	462 Resp.
Anderson (2011)	Search process and its relationship to online sales	Online panel data and clickstream analysis	Hotel	1,720 Hotel reservations
Breuer et al. (2011)	Advertising effectiveness and consumer behaviour	Ecommerce data from a single company	Books	1 Web site and 2.8 million purchases
Robertshaw (2011)	Customer acquisition and retention	Theory	Insurance	No data

using the online consideration set concept and the use of price comparison engines, and a method for exploring this problem is set out in the next section.

3 Research Framework and Hypotheses

Three generic search models that are shown diagrammatically in Fig. 1 define the online customer search process.

In model 1, consumers search airline websites only. In model 2, consumers only investigate online travel agents. In model 3, consumers search a mixture of online travel agent and airline websites. Note, in model 3, no distinction is made between whether the consumer starts or ends on an airline or travel agent website. The detailed sequence of whether customers start on an airline or a travel agent website, and the order of the airline search is an important but separate research topic. The consideration set concept is only applied to the primary search with airline websites, whether this is done on its own as in model 1, or in conjunction with online travel agents as shown in model 3.

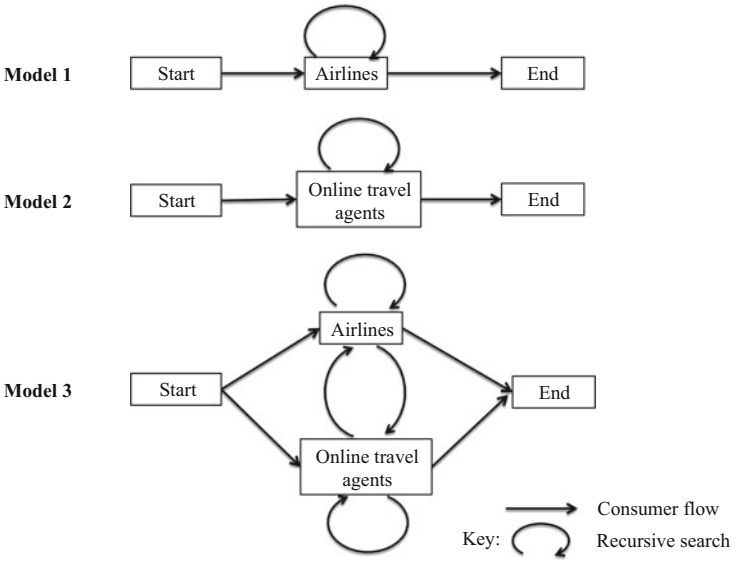

Fig. 1 Generic online search models for airline flights

Hypothesis 1 The online consideration set based on primary search with airline websites only will be relatively small and in the region of 2.5–3.0 based on the earlier results from Johnson et al. (2004), Zhang et al. (2006), Holland and Mandry (2013), and Holland and Jacobs (2013).

Hypothesis 2 The majority of consumers will use online travel agents, either on their own or in combination with primary research using the airline websites. The logic is that online travel agents help users achieve an extensive search process.

Hypothesis 3 The use of an online travel agent website is a substitute for extensive direct research with airline websites. It is therefore expected that online users of an online travel agent will have a lower propensity to conduct further search with a second airline compared with users that do not use online travel agents.

4 Methodology

Clickstream data is generated from online users as they surf across different websites (Bucklin and Sismeiro 2009). ComScore is a world leader in online digital analytics and their research data has been used in previous research (Lohse et al. 2000; Johnson et al. 2004; Zhang et al. 2006). It has been used to analyse online consideration sets (Holland and Mandry 2013; Holland and Jacobs 2013). It is a powerful source of information because it provides massive scale; international scope; very detailed granularity; and the ability to measure surfing patterns of very

large groups of individuals across multiple websites. The worldwide online panel is approximately two million users. See Comscore (2014) for a commercial overview of their operations.

4.1 Measurement of the Online Consideration Set

The audience duplication report gives the total number of visitors to a set of airlines, the number that visit one airline only and the number that visit two or more airlines. An assumption is made that customers visiting one website only are more likely to be conducting some form of e-service rather than actively searching for a flight and are excluded from the online consideration set calculation. Those customers that visit two or more websites are active searchers. This approach to measuring the online consideration set is consistent with the definition of the consideration set (Brown and Wildt 1992). The online consideration set is calculated by: (a) summing the number of different airline websites visited by all searchers; and (b) dividing by the number of searchers (Zhang et al. 2006).

4.2 Distribution of Users Across the Generic Online Search Models 1–3

Audience duplication reports of the airlines and the online travel agent were used to calculate the distribution of users across the search models as shown in Fig. 2. A refers to the set of all major airlines in the market, {airline 1, airline 2, airline 3, . . ., airline n}. B refers to the set of all of the major online travel agents, {agent 1, agent 2, agent 3, . . ., agent n}. A, B and A ∪ B are measured empirically from the ComScore audience duplication reports for (1) all airlines, (2) all online travel agents, and (3) all airlines and online travel agents.

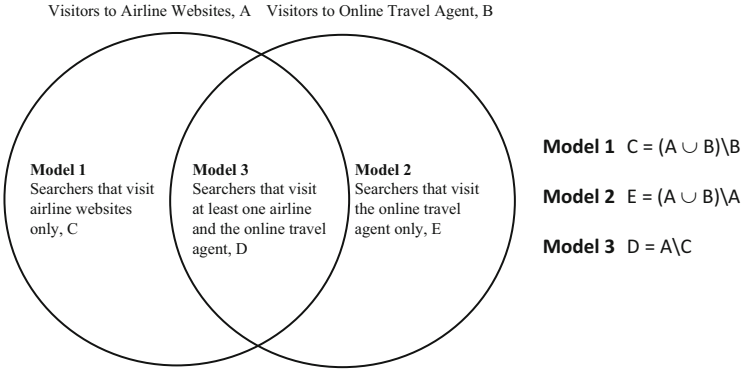

Fig. 2 The calculation of visitors to each of the generic search models

4.3 Calculating the Probability of Additional Search

Three websites are shown in Fig. 3: Airlines 1 and 2 and the Online Travel Agent. Sets A to G can be calculated directly from the intersections of the two airlines and the travel agent website. $X \cap Y \cap Z$ is given empirically in the audience duplication report for {X, Y, Z}. Similarly, $(X \cap Y)$, $(X \cap Z)$ and $(Y \cap Z)$ are given empirically in the three separate audience duplication reports for {X, Y}, {X, Z} and {Y, Z}.

The customers of Airline 1 are divided into two groups: those that do not use the online travel agent web (group 1), and those that use the online travel agent website (group 2). The probability of the customers in each group of visiting the second airline can then be calculated as follows.

Airline 1 Customers *Group 1*: Customers of Airline 1 that do not use the online travel agent website. Probability $(\text{visiting Airline 2}) = \frac{B}{B \bigcup F}$.

Group 2: Customers of Airline 2 that use the online travel agent website. Probability $(\text{visiting Airline 2}) = \frac{A}{A \bigcup C}$.

Airline 2 Customers *Group1*: Customers of Airline 2 that do not use the online travel agent website. Probability $(\text{visiting Airline 1}) = \frac{B}{B \bigcup G}$.

Group 2: Customers of Airline 2 that use the travel agent website. Probability $(\text{visiting Airline 1}) = \frac{A}{A \bigcup D}$.

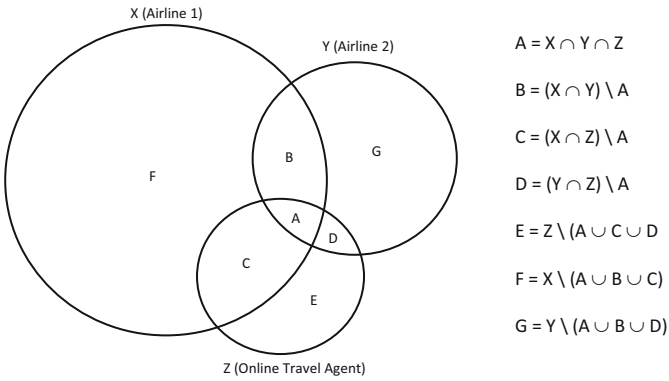

Fig. 3 The visiting patterns of users from a specific country to two airlines and one comparison engine

5 Results

5.1 Hypothesis 1

The unique visitors for the sample are shown in Tables 3 and 4. An analysis of all online visitors to the airlines (regardless of whether or not they use an online travel agent) is shown in Table 5.

The total airline visitors is the number of consumers that look at any airline website. If an individual visits two or more airline websites, they are only counted once. This is the number of unduplicated, unique visitors in the sample. The total number is divided into two groups, those that look at one website only (e-service), and those that look at two or more websites (searchers). The logic of this approach is that if a consumer is only looking at one website, then they are much more likely to be conducting an e-service transaction rather than searching. The searchers are those looking at two or more websites, and this approach is consistent with the marketing definition and use of the term consideration set. The total number of websites visited by the searchers (2,995) is divided by the number of searchers (1,147), which gives the consideration set result of 2.58. The online consideration set falls within the range of 2.5–3.0. ***Hypothesis 1 is therefore accepted***. This means that most consumers must look at just two or three websites, with very few conducting a more extensive search process. This is a striking result given that there are 18 major airlines operating in Germany.

Table 3 Unique visitors for each airline

Airlines	Unique visitors (000s)
airberlin.com	1,057
lufthansa.com	956
germanwings.com	924
ryanair.com	729
tuifly.com	492
condor.com	423
easyjet.com	282
wizzair.com	241
turkishairlines.com	162
britishairways.com	150
emirates.com	123
swiss.com	98
klm.com	95
vueling.com	91
flypgs.com	87
austrian.com	60
iberia.com	45
qatarairways.com	33

Sources Key Measures Reports, May 2014, ComScore

Table 4 Unique visitors for each online travel agent

Online travel agents	Unique visitors (000s)
fluege.de	2,241
expedia.de	1,524
billigfluege.de	1,260
opodo.de	1,236
kayak.de	315
skyscanner.de	273
flug24.de	231
skycheck.com	145

Sources Key Measures Reports, May 2014, ComScore

Table 5 General search model results

Measurement	Unique visitors (000s)
Total airline visitors	4,240
E-service, i.e. visit one airline website only	3,092 (73 %)
Searchers, i.e. visit two or more airline websites	1,147 (27 %)
Number of airline websites visited by searchers	2,955
Online consideration set	**2.58**

5.2 Hypothesis 2

The results for generic search models are shown in Table 6. The unduplicated visitors to all airlines is the total number of individuals that visited one or more of the airline websites within the time period of 1 month, in this case May 2014. The unduplicated visitors to all of the online travel agents is just less than 3.9 million, which shows the very high level of use of these websites. Based on the empirical results from the three unduplicated visitor reports, the distribution of searchers across the three search models is calculated, as shown in section 4.2. In total, 60 % of all the unique visitors use an online travel agent, either just online travel agent(s), or a combination of online travel agent(s) and airline website(s). ***Hypothesis 2 is therefore accepted***.

However, the results show an interesting pattern that is not fully described by the formal hypothesis. A very large proportion, 40 %, of all customers, only conduct

Table 6 General search model results

Measurement	Unique visitors (000s)
Unduplicated visitors to all airlines (set A in Fig. 2)	4,240
Unduplicated visitors to all online travel agents (set B in Fig. 2)	3,878
Unduplicated visitors to the airlines and online travel agents (A ∪ B)	6,491
Model 1 (Airlines only)	2,613 (40 %)
Model 2 (Online travel agents only)	2,251 (35 %)
Model 3 (Combination of airlines and online travel agents)	1,627 (25 %)

primary research with the airlines, and do not use online travel agents at all. This means that there are two distinctive groups of online users that visit airline websites: those that don't use online travel agents; and those that do use online travel agents. This presents an opportunity to analyse the generic search models in more detail to test hypothesis 3 by comparing the search behaviour of these two groups in more detail.

5.3 Hypothesis 3

A sample of the top four airlines measured by online size was taken in order to investigate the propensity to search for a further airline within this group. The results are shown in Table 7. The probabilities shown for groups 1 and 2 represent the probability for a user of the airline in column 1 also visiting the airline shown in column 2, within the sampling period of 1 month. For each airline pair, group 2 users are significantly more likely to conduct search in both airline websites. The third column shows the ratio of the probabilities to conduct further search for group 2: group1. The results show very clearly that the online travel agent is acting as a catalyst for the consumer to conduct direct research with two airlines rather than just one. ***Hypothesis 3 is therefore rejected.***

Table 7 Probability of search with second airline for users and non-users of online travel agents

From	To	Probability of online users of the first airline also visiting the second airline in the month sample period		Ratio of Group 2: Group 1 to measure the effect of the online travel agent
		Group 1: Don't use online travel agent (%)	Group 2: Use online travel agent (%)	
Airberlin	Ryanair	2.7	26.7	9.9
Airberlin	Lufthansa	11.1	25.4	2.3
Airberlin	Germanwings	11.0	38.5	3.5
Germanwings	Ryanair	8.0	28.5	3.6
Germanwings	Lufthansa	12.0	35.3	2.9
Germanwings	Airberlin	12.7	43.2	3.4
Lufthansa	AirBerlin	13.6	24.0	1.8
Lufthansa	Germanwings	12.3	29.6	2.4
Lufthansa	Ryanair	3.5	17.2	4.9
Ryanair	Airberlin	4.6	31.2	6.8
Ryanair	Germanwings	11.6	29.6	2.6
Ryanair	Lufthansa	5.3	17.8	3.4

N.B. Similar analyses were also conducted with the Opodo online travel agent, and the results were consistent with those shown above

The sample in our research is of the order of magnitude of 100,000 online users. This sample is two orders of magnitude larger than traditional research samples in academic surveys. In addition, the differences between the two groups are measured in multiples of between 2 and 10, i.e. these are not small differences in mean values. Statistical tests are therefore not applicable because at this level of sampling differences of this magnitude are real differences and cannot be attributed to large variances or sampling error.

6 Discussion

These results have several important implications for search theory and management practice. Taking the airline websites separately, the consideration set is relatively small and this result is consistent with earlier studies that used online panel data to accurately measure real behaviour of very large samples of users (Holland and Mandry 2013; Zhang et al. 2006; Johnson et al. 2004). The most obvious possible explanation for a relatively narrow search pattern is that price comparison engines are being used in place of primary research with the airline websites. This explanation is partly supported by the high level results about the generic online search patterns shown in Fig. 1, and reported in Table 5. The results show that 35 % of all users look at online travel agents only, and that 25 % look at both online travel agents and airline websites. However, this also means that 40 % of the online population only conduct primary research with the airlines.

The generic search pattern results mean that the population of users that look at airline websites can be divided into two groups, those that don't use online travel agents, and those that do use online travel agents. The more detailed analysis of these two groups shown in Table 7 demonstrates conclusively that the online travel agent acts as a catalyst to increase the level of primary research. That is, the use of the online travel agents *stimulates* primary research with the airlines rather than acting as a substitute for primary research. Relating this result to the generic search model results shown in Table 6 another important implication is that if users of online travel agents are more likely to conduct additional research with a second airline, then the average online consideration set of model 1 searchers (those that only use airline websites) must be lower than that of model 3 searchers (those that use both online travel agents and conduct primary research). The average online consideration set reported in Table 5 is based on the union of model 1 and model 3 searchers. Model 1 searchers must therefore have an average online consideration set lower than 2.58.

7 Conclusions

The methodology developed in this research illustrates a novel use of the use of online panel data to explore more detailed aspects of search behaviour, in particular the interaction effects between different types of websites, in this case online travel agents and airline websites. The use of set theory to analyse audience duplication reports is a novel methodology to measure and analyse Venn diagrams of overlapping search behaviour between groups of websites. This approach made it possible to measure the high level generic search patterns that are shown in Fig. 1, and also provided a mechanism to analyse model 3 searchers in more detail. The marketing concept of the consideration set was applied in an online context and operationalized using airline websites only (i.e., primary research). The result of 2.58 is consistent with earlier studies. The average online consideration set can be expanded to estimate the distribution of searchers which shows that very few consumers, only 14 % of the total, look at four or more websites. This raises the question about why consumers should only consider, on average, a relatively small number of options, and why so few should follow what ought to be a rational, extensive search strategy. The most obvious explanation for the small online consideration set is that online travel agents have price comparison functionality and that this is used as a substitute for extensive primary search. To an extent this is true because 60 % of all users use an online travel agent. However, the propensity to conduct more direct research is higher for those users that include an online travel agent in their search process than those users that do not and only look at the airline websites. The conclusion therefore is that online travel agents are a catalyst for further direct research, rather than a simple substitute. In a more general sense, the empirical evidence reported here does not support the rational consumer model, where one would expect consumers to either conduct extensive primary search with the airline websites, or use a combination of airline and online travel agents. An explanation for the apparently irrational behaviour of consumers in their search for airline tickets must therefore be found elsewhere. Bounded rationality (Simon 1955), brand loyalty (Jacoby and Kyner 1973), lack of perceived competition in pricing and flight choice and repeat buying behaviour are all rich areas for future research.

Acknowledgements This research is supported by the Fonds National de la Recherche, Luxembourg (7842603). The authors would like to acknowledge ComScore for providing the research data for this paper. Please see http://www.comscore.com/About-comScore for further information about ComScore. The authors have conducted the analysis and interpretation of the data, and any errors in the paper are the sole responsibility of the authors.

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Behaviour of Virtual Visitor Based on E-Shop and DMO Websites: A Comparative Study by Means of Data Mining Techniques

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Abstract Meeting the needs of virtual visitors is important to engage them. So far literature has helped assessing website's efficiency and making it adaptive. However, virtual visitor's navigation behaviour and web topology duality makes this a challenging task. Few studies have gone in depth on Destination Management Organization websites. This paper performs a comparative study by means of clustering techniques looking for understanding the difference between an E-Shop's and DMO's virtual visitors' behaviour through their digital footprint. Once the visitors have been clustered and the observations classified, a comparative analysis by website is performed on the visitors' distribution within the clusters. Results established that users' features differ from website to website and can be clearly distributed. As a result, a holistic view of virtual visitors' habits will be available for tourism stakeholders. This will allow to adapt the websites to virtual visitors' needs better.

Keywords Classification • Virtual visitor behaviour • Digital footprint • Tourism • Business intelligence

1 Introduction

The breakthrough on information and communication technologies (ICTs) has immersed society into the cyber-world, where the convergence between the physical and the virtual spheres is tight. The Internet has provided a "worldwide infrastructure for data sharing and information retrieval, enabling computers to control everything anytime and at a large-scale" (Koubâa and Andersson 2009, p. 1). In this cyber-physical world (CPW) information flows from the physical to the virtual systems and vice versa (Conti et al. 2012). Likewise, the irruption of the internet has fully changed the information obtaining process and, also, the way in which services and products are showcased and acquired. Due to that, Internet can

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_8

be considered a new channel for communicating, informing and purchasing and therefore e-Marketing and e-Commerce activities must be adapted to it.

Travel and tourism industry has taken advantage of ICTs, and so have done *Destination Management Organizations* (DMOs), the organisms in charge of promotion, coordination and enhancement of tourism destinations. For these organizations, the website is an inherent part of their online marketing strategies (Wang and Fesenmaier 2006), and it has become a key showcase of the territory they are promoting.

However, websites differ from more traditional media channels, mainly in two areas:

- The web is anonymous: users go in and out without any witness. However, the information is gathered by the web server
- The web is interactive: it is an information transmitter and also a receiver

These facts allow studying the analysis of the network traffic (webpages visited by users, the time spent onsite, view pages, actions taken onsite, etc.).

Nowadays, the Internet has become one of the most treasured ways for connecting travellers and destinations. With the increasing diffusion of the Internet, DMOs need to understand the web user's behaviours in order to adapt their online marketing strategies to the prospective customers' preferences and requirements and by doing so, having an impact on the traveller decision making process and engagement. Thus, destinations websites become an important marketing channel through which the DMO can communicate and persuade potential visitors on the pre-trip planning stage. Additionally, they also act on the post-trip phase whereby travellers may remember their experiences lived onsite, thus constructing long-lasting relationships and engagement (Xiang and Gretzel 2010).

Lately, most of the DMOs are including products and experiences for sale on their web portals, providing the final consumer contact with private operators that want to have presence on the DMO portal. In the case of public organizations (Spain.info,[1] Turismo de Tenerife[2]) or entities a mix of private and publicly managed tourism products (Barcelona Turisme,[3] I Amsterdam,[4] Visit London[5]) is been used. In this context, DMO are aware of the relevance of online presence and invest resources (time, effort and money) on that matter. Despite that, few of them carry out further studies about management, maintenance, improvement and exploitation of information, not obtaining all the possible benefit from their online presence (Gretzel et al. 2006). This fact stimulates the development of studies aiming at understanding and prompting the online consumer behaviour in order to adjust competitive strategies to demand preferences and needs.

[1] http://www.spain.info/

[2] http://www.webtenerife.com/

[3] http://www.barcelonaturisme.com/

[4] http://www.iamsterdam.com/

[5] http://www.visitlondon.com/es

In another note, e-Consumer behaviour research has mostly been developed in the subject of e-commerce and e-Marketing but few studies have been conducted in the field of tourism, and more specifically, in the area of DMOs websites. By means of Web Mining techniques this research performs a comparative study between the virtual user behaviour of an e-shop and a DMO web portal in order to know whether the behaviour of both websites' users is identical. It seems clear that certain factors such as the primary objective of the online portal, being it merely commercial or rather informative and persuasive, differences the visitor's behaviour.

Web Mining techniques have been defined as the discipline used to move forward in discovering and analysing useful information from websites. The techniques can be used to extract and analyse online customer behaviour. When an individual is visiting a website (s)he leaves a trace of data, called the digital footprint, that can be analysed to understand the customer needs, desires and demands as well as to improve the website's design.

This article starts with a brief summary of other author's works relating the web user behaviour based on different types of online portals (DMO's and e-Shop web). Next, the methodology that will allow discussing the results is specified. Later, clustering techniques for grouping individuals will be applied in order to verify whether the behaviour of both platforms' users is identical or not. Finally, the conclusions will be elaborated out of those results.

2 Related Work

The use of clustering techniques on websites dates back to 1990, when Leouski and Croft (2005) made a comparative between different algorithms in order to group various web pages. Later studies went more in depth in these techniques applying snippets on the complete texts appearing on web documents (Zamir and Etzioni 1998). After the previously mentioned papers, the problem has been redefined as a salient phase ranking problem (Zeng et al. 2004). On later works, Zhang and Feng (2008) invented a co-occurrence based hierarchical method clustering. On another note, the web snippets clustering has been enhanced by using an accommodate suffix tree algorithm in which authors combined the advantages of vector space model (VSM) and suffix tree clustering (STC) documents models (Han et al. 2009).

In the same vein, web personalization through clustering techniques has been dealt in some research by using Web Usage Mining in order to discover patterns that are useful to categorize users with similar interests (Castellano and Torsello 2009). In this sense, relations between the e-shop and the informational website' users' behaviour has been mentioned in some studies (Lee et al. 2007). This research declares a positive relation between the consumer intention to search online information in depth and the execution of online purchases. Besides this, other studies focus on discovering user's interest on an e-commerce site using clickstream data and these value the variables of navigation: category visiting path, browsing frequency and relative length of access time (Chen and Su 2013).

However, clustering has not been performed to understand the differences between users of different types of websites. Therefore, it is of special relevance to conduct a research that analyses the behaviours of different websites in depth and thus comparing them to deduce whether there are exponential differences that may lead to integrate distinct elements on each web in order to engage both categories of users. In this concern, whether the behaviours differ from each other, the techniques to be used shall be different in each of the contexts.

3 Methodology

One of the most important criterion when working with clusters the selection of the adequate variables that allow giving an answer to the formulated questions. The data obtained through digital footprint is firstly cleaned in order to disregard out-layers that may distort results.

3.1 Assumptions

In this piece of work the following assumptions are made:

- Every user has preference characteristics when he/she visits a website every time
- The sequence of the web pages visited by the user is related to his/her interest. Note that it can also be influenced by the interface of a website as well as by the promotions
- The frequency of a user visiting a web page and the time that a user spends on a web page is positive relevant to his/her interest
- Users with similar interest should have similar browsing patterns (Chen and Su 2013)

3.2 Criteria for Variable Selection

The authors of this study take four variables into account for clustering: connection time, number of visits at a given time of connection, time length of connection, number of pages/views or actions taken. These variables have been selected as the most representative of the virtual user behaviour on a website. Other variables such as: (a) location, as it would highly depend on the international projection of the DMO or e-Shop; (b) devices or browser, as it would depend on technology and the platform for which the portal is developed; (c) type of traffic, as it is closely linked to marketing campaigns carried out on social networks; (d) bounce rate number, as bounces are directly consequence of visits were distorted.

Furthermore, the introduction of new variables is not dismissed regarding different clustering methods, aiming at obtaining more enriched groups once the obtained results are analysed. Thus, it should be noted that attributes of the clusters are a constraint on clusters that specifies a requirement on the clusters possibly to use data mining concepts and techniques (Han et al. 2006).

3.3 Consolidated Process for Obtaining Variables

Web Usage Mining and Web Content Mining will be used to obtain information about variables related to navigability. Web Content Mining and Web Structure Mining procedures will allow obtaining variables associated to design. With the use of Web Usage Mining techniques, the user's navigation profile can be obtained by inferring imperceptible inputs from perceptible inputs left by the users' digital footprint (Iváncsy and Vajk 2006). Therefore, it can be stated that these techniques are founded on discovering web usage patterns schemes, and that further value can be added by discovering infrequently tracked paths and their relation with the most frequently followed paths.

Authors mentioned on the reviewed literature on Web Mining methods for tourism destinations state that the information extracted about visitors' behaviour permits tailoring the website to visitors' navigation patterns. More up to date researches have applied scripts instead of previous analyses based on log servers where the website is located (Arbelaitz et al. 2013). Regarding the other methods, Web Content Mining technique is defined as the processes carried out to learn about the content introduced on websites' pages (Srivastava et al. 2005). Current research focuses on Web Multimedia Mining techniques; these methods aim to obtain remarkable sections from movies and images (Ocaña et al. 2002). Techniques dealing with Web Structure Mining focus on extracting knowledge from the structures present on the websites and their internal links. The links often refer to other website zone or other sites (Piazzi et al. 2011).

In this study, previously mentioned Web Mining techniques are applied to obtain the data values of the selected variables. The process is carried out through a system developed by the authors, called *Destination Web Monitor* (DWM). DWM is defined as "a system to measure, analyse, and model the behaviour of visitors in different virtual areas in which a destination is promoted and with the objective of providing benchmarking ratios that facilitate strategic surveillance and intelligent marketing policies" (Alzua-Sorzabal et al. 2014, p. 6). These authors agree on that the design of the DWM fulfils the five levels of the *Web Analytics Maturity Model* (WAMM) (Gassman 2008); a group of good practices including the whole lifecycle of a service or product that goes from the formation to the delivery and maintenance. The DWM's research lines cover the creation of a model to analyse the efficiency of the online presence of the DMO such as marketing channels. The DWM allows obtaining a holistic image of the destination by contributing with explicit and inferred knowledge obtained through a network system formed by

different websites and based on relations between them and visitors interactions with each site.

3.4 Cluster Selection Software

The formulation of the problem to be solved is related to a considered set of visits (V_1,. . ., V_m), a set of visits features (F_1,. . ., F_n) and how they are distributed between the two websites of analysis: DMO and e-Shop.

Let $M = [w_{ij}](1 \leq i \leq m, 1 \leq j \leq m)$ be the continuous cluster. Then, w_{ij} is defined as

$$w_{ij} = \frac{|V_i \cap V_j|}{|F_{\max}|} \tag{1}$$

The objectives are:

- the maximum number of w_{ij} values and
- the minimum number of non-w_{ij} values

Constraint C_1: Empty properties between two visits are allowed
Constraint C_2: The number of visits in a cluster is below upper bound
Constraint C_3: The number F divide by T is greater than the quantity of visits features divide by the quantity of visit types and divide by $2 \times \left(\frac{F}{T} \geq \frac{F_{all}}{T_{all}} \times \frac{1}{2}\right)$. To avoid too much difference between the numbers of visits features a visit types, limiting the value $\left(\frac{F}{T}\right)$ between 1 and 2.

When selecting the technology or software tool that will be in charge of applying the cluster model algorithm, the statistical language R has been chosen. This language provides many advantages in the areas of portability, computational efficiency, memory management, and scoping (Ihaka 2009). Furthermore, R supports several kinds of clustering techniques. Once this has been identified, it is crucial to know that R can be used together with some IDE (Integrated Development Environment), such as an open source and friendly and easy way of use called RStudio or the non GUI (Graphic User Interface) and little tool called R Console.

4 Results and Discussion

The starting data set contained 3,512 observations, collected from the 1st of January 2014 to the 1st of April 2014. Out of the 3,512 observations 1,379 were gathered from the e-shop website and 2,173 from the DMO. Two ratios per visit were stored for each observation: the number of pages viewed (page-ratio) and the time spent on the site (time-ratio). The reason why per visit ratios were used instead of the raw

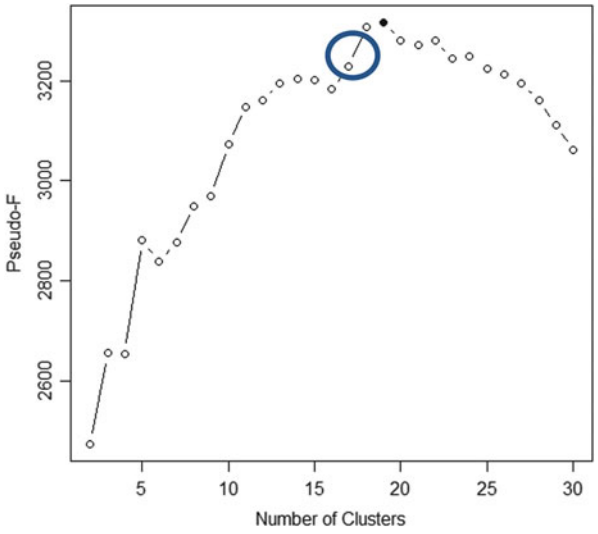

Fig. 1 Graphic of Pseudo-F value

Cluster	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total
e-shop	2	54	50	30	176	56	209	55	20	108	4	52	113	9	1	71	177	158	34	1379
DMO	2	883	60	10	3	6	12	312	0	3	0	567	80	4	3	2	181	5	0	2133
Total	4	937	110	40	179	62	221	367	20	111	4	619	193	13	4	73	358	163	34	3512

Fig. 2 Contingency table highlighting biggest cluster value

Cluster	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
e-shop	0,5	0,06	0,45	0,75	0,98	0,9	0,95	0,15	1	0,97	1	0,08	0,59	0,69	0,25	0,97	0,49	0,97	1
DMO	0,5	0,94	0,55	0,25	0,02	0,1	0,05	0,85	0	0,03	0	0,92	0,41	0,31	0,75	0,03	0,51	0,03	0
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Fig. 3 Table highlighting the clusters with high e-Shop observation proportions

variable values is that the observations would have been characterised by the website's volume observations rather than by an underlying behaviour.

Aiming to cluster the observations a K-means clustering process was performed. The criterion used to select the number of clusters was the Pseudo-F value (Calinski and Harabasz 1974). The maximum Pseudo-F value was achieved for a 19 cluster partition as shown in Fig. 1.

The contingency table provided by the solution for each of the clusters given the origin website is shown in Fig. 2.

Three of the 19 clusters account for 83 % of the observations gathered from the DMO as can be seen in Fig. 3. This means that the DMO visitors are highly concentrated in three categories. Also, it must be noted that three of the clusters do not contain DMO observations at all. This supports the idea of DMO users and e-shop users being different from each other.

Cluster	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total
e-shop	0	0,04	0,04	0,02	0,13	0,04	0,15	0,04	0,01	0,08	0	0,04	0,08	0,01	0	0,05	0,13	0,11	0,02	1
DMO	0	0,41	0,03	0	0	0	0,0	0,15	0	0	0	0,27	0,04	0	0	0	0,08	0	0	1

Fig. 4 Table highlighting the clusters with high DMO observation proportions

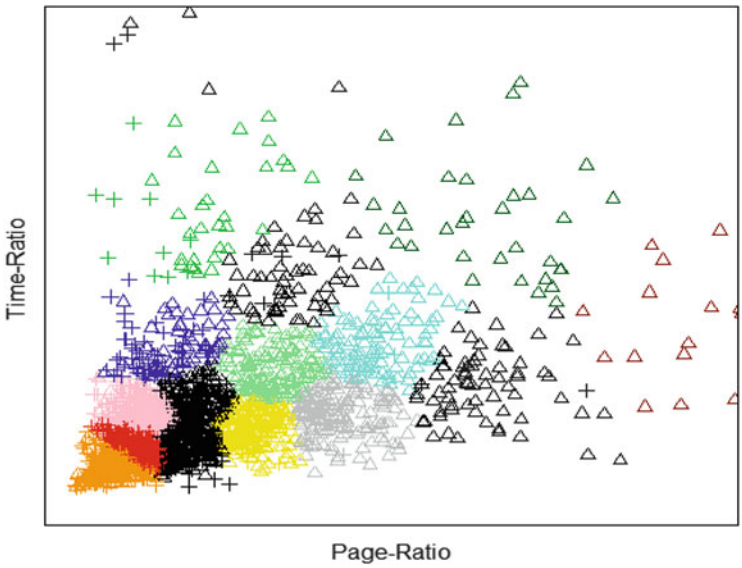

Fig. 5 Cluster distribution by web origin. The DMO is *triangle* shaped and the e-Shop is cross shaped

On another note, the e-shops are more dispersed over the 19 clusters as shown in Fig. 4. The group of e-shop observations was smaller than the one with DMO observations. However, they accounted for more than 60 % of the group in 12 of the 19 clusters. This suggests that there is a wider variety of users in an e-shop.

Besides this, the data representation shown in Fig. 5 suggests, on one hand, that the DMO users (triangle shaped) tend to visit more pages than the e-shop users. On the other hand, DMO users often have a balanced time usage per visited page whereas the e-shop users show time usage behaviours that are more extreme, very low or very high, per visited page.

5 Conclusion and Future Work

By using the data obtained through the digital footprint of two different websites, an e-Shop and DMO, and applying a clustering technique over the data, it could be checked that the visitors' behaviour in both platforms is different. This implies that

appropriate e-marketing policies should be developed targeting each of the detected behaviours differentiating the website they should be directed to. It is not the same to establishing a communication within an e-shop and in a DMO. In the first case the users have extremer time behaviour whereas in a DMO the users have a time usage more related to the performed actions. However, the number of users of an e-Shop does not experiment a pronounced renovation, so the audience is more loyal than the one in a DMO. This means that a more balanced behaviour can be related to lack of familiarity with the website.

Future works should look for using the detected users' Typologies and categorizing them depending on the behaviour of the user and the kind of web the user is navigating on. Moreover, the typologies should be generalised to find more universal patterns, to be able to show what special cases are outside of the rule. With this knowledge the web owners would find out to whom, to what, to how and to when to refer to the visitor, ergo, to know the "consumer decision journey" and strengthen their engagement. Additionally, future research should aim to validate the drawn conclusion. To do so a pilot development with a little volume of e-shops and DMOs should be gathered. Furthermore, an exhaustive analysis of visitors' typology would facilitate more enriched information.

Acknowledgements The authors would like to thank the managers of Basque Tourism Agency (BASQUETOUR) and Computer Society of Basque Government (EJIE) for their excellent cooperation and Basque Government for its ETORTEK program. Authors' appreciation is also expressed to the managers of Atlas Stoked for the cession of the data.

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An Auto-Coding Process for Testing the Cognitive-Affective and Conative Model of Destination Image

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Abstract Current research on online contents analysis relies mainly on human coding procedures, and it is still under research the creation of automatic tools for content analysis in the eTourism domain. Thus, considering the current research gap in the field of automatic coding procedure for content analysis, this study aims at contributing to the auto-coding analysis of the three image components: the cognitive, the affective (feelings expressed), and conative ones (behavioral intentions towards a destination) which might be reported in the tourism-related online conversations. Hence, an ad-hoc software has been developed and tested for the auto-coding analysis of online conversations, together with a human-coding procedure used for coding unclassified entities. The image of the Basque Country has been used as case study and data have been collected from Minube, a popular travel experience community. Results of this study show that the proposed approach can be apt for the analysis of cognitive-affective and conative components of destination image, and in turn help destination managers in their web marketing strategies.

Keywords Destination image • Image model • Content analysis • Natural language processing • Text mining • Online experiences • Social media analysis

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_9

1 Introduction

The opinions and experiences are central to almost all human activities and are key factors in influencing our behavior. Our beliefs and perceptions of reality, and the decisions we make, are largely conditioned by how others see and evaluate the world. For this reason, when we have to make a decision often seek the opinions of others (Liu 2012). The user-generated content UGC (User Generated Content), and in particular, the online comments have allowed substantial changes in the dynamic of entire sectors. Previous studies underlined how visitors tend to take into higher consideration UGC rather than official sources as those online conversations are based on experience and less related to potential commercial interests (Pan et al. 2007). This way consumers may obtain a more complete image of the destination and its products (Pang et al. 2011).

UGCs and social networks become a valuable source to get insights about the image of the destination. The analysis of the discourses on the web provides an approach to extract information and knowledge associated with how destination is perceived, motivations and underlying discourses. Several works have concluded that this content analysis may assist to understand the positioning of destinations, their products, services and their industries (Ortiz et al. 2010; Popescu and Etzioni 2007). Hence, a proper management of perceptions or images that a potential visitor can have on a destination contributes to create a different positioning. Accordingly, the destination image is presented as a key factor (Echtner and Ritchie 1991, 1993; Chon 1991).

Despite the great importance of the destination image (Gartner 1986), there is not a universally accepted and validated model (Crompton 1977; Baloglu and McCleary 1999a). Moreover, the majority of the studies on destination image have so far mainly focused on the cognitive and affective components, and there is still a lack of research on the conative component of destination image (i.e., the declaration of a behavioral intention) (Agapito et al. 2013).

A prior study on auto-coding analysis about online contents related to tourism destination, conducted by Serna et al. (2014), referred to Gómez et al. (2013) cognitive image dimensions: natural and cultural resources, infrastructure and socio-economic environment, social and atmosphere constraints. Results from this study demonstrated the powerful role of an auto-coding technique in online topics identification. However, as a considerable numbers of entities remained unclassified with the proposed process, a revision of the literature has been suggested in order to integrate the actual destination image categories. Moreover, as the current auto-coding technique was mainly related to topic-identification (cognitive component), it has been decided to test the other two image components: the affective (feelings expressed), and conative ones (behavioral intentions towards a destination), which might be reported in the online conversations. Therefore, this study aims at contributing to literature on online content analysis in tourism.

Indeed, online contents analysis relies mainly on human coding procedures and the creation of automatic tools for content analysis is still under research. Moreover, this research aims at testing the proposed auto-coding process for the analysis of cognitive-affective and conative components of destination image. Finally, this research has also marketing and managerial implications: destination managers might find useful an auto-coding system for monitoring the online contents related to their destinations in order to better plan their marketing strategies. Knowing the sentiment expressed online related to specific topic categories and the related conative components might help destination managers to predict tourists' behavioral reactions to destinations.

2 Related Work

The understanding of destination image was introduced into tourism studies in the early 1970s by Hunt (1971, 1975), Mayo (1973), and Gunn (1972), but since that date there have been several attempts to provide an overview of the previous destination images studies. However, destination image research (Gallarza et al. 2002; Pike 2002; Stepchenkova and Mills 2010; Tasci et al. 2007) have been assessed using structured surveys, mixed-methods (Echtner and Ritchie 1991, 1993), and, more recently, data from social media and Internet.

Most tourism scholars generally agree that destination image holds at least two distinctive components—cognitive and affective. The cognitive, or perceptual, element refers to one's knowledge and beliefs about a destination, while affective element refers to a traveller's feelings towards a destination (Baloglu and Brinberg 1997; Baloglu and McCleary 1999a). However, other authors proposed that destination images are formed by four components which are distinctly different from each other but hierarchically interrelated: cognitive, affective, evaluative and behavioural (Boulding 1956). In this direction, besides the cognitive and affective components, Um and Crompton (1990) defined the third destination image component as conative, relating that aspect to behavioral/attitudinal components (i.e. how one acts on the information and how he or she feels about it). Gartner (1993) advocates that the cognitive, affective, and conative dimensions of destination image are hierarchically interrelated, and the influence of the cognitive component on the conative dimension is higher when mediated by the affective component (Agapito et al. 2013).

From the cognitive perspective, Gómez et al. (2013) purpose destination image model based on four dimensions: natural and cultural resources, infrastructure and socio-economic environment, social and atmosphere constraints. However, the relative importance of each of these dimensions in the process of forming the image of the destination also varies among different studies (Baloglu and McCleary

1999a, b; Beerli and Martin 2004; San Martín and Rodríguez 2008). Accordingly, to measure these multi-components researchers need to use a combination of structured and unstructured methods. In the past scholars had a strong tendency to use only structured methods to measure destination images (Jenkins 1999). By using structured methods a researcher asks tourists to rate a set of attributes and applies sophisticated statistical methods to explain a certain group of tourists' destination image.

With the arrival of new media and communication technologies in recent years, user-generated content on the Internet has increasingly been considered a credible form of word-of-mouth. It is important to underline which media has influence on the image, in order to determine the basis of their analysis. Andrade (2010) considers that the image is formed, among other factors, to information from the media or external to the individual (Gunn 1972; Fakeye and Crompton 1991; Baloglu and Brinberg 1997). The literature considers the amount and variety of secondary data sources as an external variable that contributes significantly to the formation of the image (Gartner and Hunt 1987; Um and Crompton 1990; Bojanic 1991; Gartner 1993; Font 1997; Baloglu 1999). Depending on the amount and quality of information available to the tourist is exposed, it will develop a certain type of image in its cognitive aspect, since affective image will be generated based on the own characteristics of the consumer (Baloglu and Brinberg 1997). Seeing the importance of this external variable, (Andrade 2010) purposes the most prominent destination websites (either by volume or quality of data), as a data source to build the destination image by the tourist. A contribution to online discourses classification has been done by Marchiori et al. (2011), providing a rank of the most relevant topics which might influence the decision-making process of a prospective travelers, and were: value for money, culture, overall image of the destination, weather and safety at the destination.

Online content analysis sees an increase in the creation of professional tools for data harvesting and data classification. Methods used are mainly frequency analysis of keywords, coverage and sentiment analysis, semantic analysis, and topic association with brand values. However, the methodological issue in this approach is still open (Marchiori and Cantoni 2012, p. 148); in fact, there are not standard models and procedures, and the analysis of the contents online is still time consuming and related to human-coding procedures, and/or with a heavy delegation to technology.

Therefore, having this theoretical background, an application of auto-coding techniques is proposed in this study for the analysis of tourism-related online contents. Table 1 shows how the main three image components discussed previously can be found online (second column in the table), and the actual Information Communication Technologies (ICTs) capacity for auto-coding with the related resources, as emerged from Serna et al. (2014).

Table 1 The proposed conceptual framework for auto-coding tourism-related online contents [adapted from Serna et al. (2014)]

Image components	Description of the data available online for content analysis	ICTs capacity for auto-coding	ICTs resources for auto-coding
Cognitive	Topics about a destination: Keywords identification	Ontology based	Ad-hoc software, integration with lexical and linguistic software: WordNet, FreeLing
Conative	Behavioral consequences: Intention to visit Meet my expectations Satisfying tourism experience Suggestions to other	Ontology based	
Affective	Sentiment (polarity) Judgments expressed on online contents	Semantic analysis based + statistical analysis	Ad-hoc software, integration with a lexical and linguistic software: WordNet, FreeLing, SentiWordNet

3 Methodology

This section explains the followed methodology to obtain the Cognitive-Affective and Conative destination image of the region of the Basque Country in Spain by visitors, based on data collected from different digital media: destination sites, social networks, travel blogs, reviewer sites, etc. To determine which sources are the most relevant and appropriate for the study a prior analysis was conducted (Serna et al. 2014). The present analysis is based on Minube that is a travel experience community with over 120,000 users focused mainly in Spain.

The analysis assessed the quality and quantity of the data from the perceived image by the visitor. In this way, 4,123 experiences written in Spanish were obtained, including contents until August 6, 2014. Note that about 70 % of the visitors in the Basque Country are Spanish speakers. Thus, an *Auto-Coding Process* for Testing the *Cognitive-Affective* and *Conative* Destination Image Model is implemented.

The methodology follows a process with three main steps:

- ***Phase A*:** Cognitive destination image model (Serna et al 2014). The model leaves 1,107 entities unclassified.
- ***Phase B*:** Manual content analysis of the unclassified entities into the new categories emerged from the literature (nine dimensions), and creation of categories emerged from the data.
- ***Phase C*:** Auto-coding process to re-analysis of the 4,123 reviews with the new dimensions. Identifying categories from the reviews, and classifying the categories into a Cognitive-Affective and Conative model.

3.1 Phase A

The categorization is aided by a text-mining tool developed by CICtourGUNE and Mondragon Unibertsitatea based on Freeling and the Wordnet[1] lexical database. Freeling[2] is a free software program for linguistic analysis (Padró 2012). The first level of categorization is provided by Freeling recognizing four basic top level categories for the nouns that are Person, Place, Organization and Others. Furthermore, in WordNet, nouns, verbs, adjectives and adverbs are grouped into sets of cognitive synonyms named synsets. This process is important because in natural language text, people often write the same entity in different ways. The level of categorization provided by Freeling is coarse grained and in order to have a more detailed classifier the categorization process is refined by a domain ontology developed by the authors. This ontology is encoded in OWL DL[3] and covers several important aspects related to the tourism industry, including *tourism destinations* (i.e. cities and towns), *tourism sites* (i.e. accommodation, gastro, attraction, and infrastructure), *tourism events* (e.g. movie and show) and *transportation*. To expand domain-specific concepts to general terms, which are applicable to a wide range of domains, the ontology was aligned with two upper ontologies—WordNet[4] and SUMO,[5] which are widely used in the NLP field. In addition, to model the tourism destination domain, two tourism ontologies were used: ACCO[6] Accommodation Ontology provides detailed categorization of the accommodation concept and QALL-ME[7] ontology covers many aspects of the field of tourism, as tourism destinations (cities, towns), tourist attractions (lodging, attractions, dining), events (performances, sporting events) and transportation. Moreover, as we needed to add the feeling of the reviews, two ontologies were mapped: Marl[8] (subjective opinions domain) and SIOC[9] (online communities domain, see Phase C).

3.2 Phase B

This step proceeds in a manual content analysis of the unclassified entities into the new categories emerged from the literature (nine dimensions), and creation of

[1] WordNet Lexical Database: http://wordnet.princeton.edu

[2] FreeLing project: http://nlp.lsi.upc.edu/freeling

[3] OWL Web Ontology Language Overview: http://www.w3.org/TR/owl-features

[4] WordNet Ontology: http://www.ontologyportal.org/WordNet.owl

[5] Suggested Upper Merged Ontology (SUMO): http://www.ontologyportal.org/SUMO.owl

[6] Accommodation Ontology Language Reference ACCO: http://ontologies.sti-innsbruck.at/acco/ns.html

[7] QALL-ME Ontology: http://qallme.fbk.eu/index.php?location=ontology

[8] Marl ontology: http://marl.gi2mo.org/experiments/

[9] SIOC Ontology: http://sioc-project.org/ontology

Table 2 Dimensions of the model

Dimension and image component	Most recurrent related keywords (translated in English)	Ontology categories
REC: Natural and cultural resources	Nature, architecture, cultural, attractions, traditions, cultural activities, site attractions...	[Building], [Museum], [GeopoliticalArea], [Icon], [Music], [Plant]...
(Cognitive)		
INF: Infrastructure and socio-economic environment	Leisure, shopping, development, low prices, value for money, accommodation, events, transportation, infrastructure	[Room], [Currency Measure], [TransportationDevice], [Shop]...
(Cognitive)		
SOC: Social determinants	Hospital population, hospitable residents, cleaning, reduced pollution, eco-awareness	[SocialRole], [Expressing, welcome, hospitality, shabby]...
(Cognitive)		
ATM: Atmosphere	Tranquility, rest (break)	[Smelling], [StateOfMind], [EmotionalState]...
(Cognitive)		
F&B: Food and beverage	Food, beverage, gastronomy, typical products, cuisine	[Meat], [Food], [Beverage], [Fish], [TasteAttribute]...
(Cognitive)		
SFT: Safety	Safety, Safe (environment), unsafe, dangerous	[holdsRight, safe], [danger], [police], [protection]...
(Conative)		
TTW: Trip conditions: time and weather	Time, duration, departure, weather, forecast, atmospheric conditions, climate	[Water, rain], [Motion, wind], [TimeInterval], [Day], [device, coat]...
(Cognitive)		
PFM: Performance	Meet my expectation, satisfying tourism experience	[Process, experience], [pleasure], [complaint]...
(Conative)		
STO: Suggestion to other	Recommendation, suggestions	[recommend], [deserves], [detract], [suggestion]...
(Conative)		

categories emerged from the data. Cognitive and conative dimensions are shown in Table 2.

3.3 Phase C

This phase involves an auto-coding process to re-analyse the 4,123 reviews with the new dimensions, identify categories from the reviews, and classify the categories into a Cognitive-Affective and Conative model. At this stage, the affective component (see Sect. 3.3.1) and the nine dimensions model is automatically obtained. The association of terms is crucial to understand the discourses. The text mining tool implements an algorithm for learning generalized association rules supporting the concept hierarchy for categorization and the concept pairs for association. Once

the recognized entities are classified a list of categories, entities and number of occurrences is obtained.

3.3.1 Sentiment Analysis

An opinion (or regular opinion) is simply a positive or negative sentiment, view, attitude, emotion, or appraisal about an entity or an aspect of the entity (Hu and Liu 2004; Liu 2006) from an opinion holder. The sentiment orientation of an opinion can be positive, negative, or neutral (no opinion), it is also called *opinion orientation*, *semantic orientation or sentiment polarity*. In topic-based text classification (e.g., museum, sport, shop), topic words are important. However, in sentiment classification, opinion/sentiment words are more important, e.g., wonderful, great, excellent, horrible, bad, worst, etc. The greatest force in polarity is given by words such as adjectives, adverbs, ergo opinion/sentiment words that express desired or undesired states or qualities. This process is aided by ad-hoc software, integrated with a lexical and linguistic software: WordNet, FreeLing, SentiWordNet for obtaining the reviews' sentiment orientation.

3.3.2 Subjective Opinions Ontology

In order to obtain the affective component adding the feeling of the reviews, two ontologies were mapped: Marl[10] to describe subjective opinions and SIOC[11] (Semantically-Interlinked Online Communities) to describe information from online communities. Marl enables to publish raw data about opinions and the sentiments expressed in them, compare opinions coming from different systems (polarity, topics, features) and interconnect opinions by linking them to other ontologies.

4 Results

The data extraction process returns 4,123 comments written in Spanish from minube.com regarding to tourism experiences in the Basque Country. The type of the discourse is elaborated (22 entities average) and 89 % of the reviews are positive. The process has identified a number of entities and classified into a category and a dimension. The sentiment analysis process provides a polarity rating to the entities depending on the related adjectives and adverbs in the comment. A separate analysis for positive and negative comments provides a raking of the most

[10] Marl Ontology Specification: http://marl.gi2mo.org/experiments/

[11] SIOC Ontology: http://sioc-project.org/ontology

Table 3 Sentiment analysis

Dimensions and total entities	Top positive entities (% polarity, n° occurrences)	Top negative entities (% polarity, n° occurrences)
REC 543	Village '*caserío*'(80.7 %, 37), theater (79.3 %, 74), restaurant (77.7 %, 321), panoramic (77 %, 191), castle (73.6 %, 28), environment (72.9 %, 73)...	Picnic area (77 %, 2), temple (70 %, 6), architect (69.7 %, 7), exhibition (66.3 %, 13), construction (66.2 %, 15), restaurant (63.4 %, 46)...
INF 235	Quality-price (89.5 %, 146), service (81.3 %, 111), care (79.6 %, 35), couples (78.9 %, 29), quality (78.4 %, 121), dining room (76.2 %, 50)...	Cabinet (70.6 %, 2), living (68.7 %, 8), 65.9 %, 13), rooms (64 %, 28), service (63.7 %, 21), parking (62.8 %, 11) shop (62 %, 15), bus (61.5 %, 8)
SOC 120	Treatment (83.9 %, 44), care (80 %, 40), hospitality (84.10 %, 41), friend (76 %, 74), locals (76 %, 4), guest (75.3 %, 14)	Traveller (76 %, 3), neighbor (67 %, 3), visitors (66.9 %, 4), tourist (65.94 %, 3)
ATM 180	Treatment (84 %, 50), current time (81.9 %, 51), taste (79.2 %, 41), environment (78.7 %, 137), site (78.7 %, 198), calm (76 %, 28), charm (72.5 %, 46), friendly (72 %, 48), spectacular (71 %, 101)	Temptation (77.4 %, 2), ruin (70 %, 4), bad (70 %, 6), failure (68.5 %, 3), restoration (67.6 %, 2) smell (67.4 %, 3), cleaning (66.4 %, 4), problem (64.4 %, 19)
F&B 164	Food (79.8 %, 130), wine (79 %, 84), speciality (81.9 %, 35), sauce (80 %, 29), dessert (76 %, 32), coffee (72.9 %, 37), '*pintxos*' (70 %, 15)...	Spanish omelette (76.6 %, 4), hake (76.3 %, 2), black pudding (76.3 %, 2), bacon (73.7 %, 3) burger (71.4 %, 3), sauce (69.7 %, 4), food (62 %, 6)
SFT 8	Surveillance (72 %, 3), protection (65 %, 3)	Thief (80 %, 1), police (73.8 %, 2), danger (60.4 %, 3), accident (61.2 %, 5), safety (60.6 %, 4)...
TTW 64	Day (76 %, 218), week (69.9 %, 53), weather (72.8 %, 83), summer (hot summer day) (73 %, 42), season (73.9 %, 32), snow (82 %, 3), sunset (81 %, 19)	Cool (65.3 %, 3), fog (65.4 %, 4), wind (65 %, 7), weather (63.9 %, 17), cloud (64.5 %, 4)
PFM 17	Colophon (80.3 %, 3), jewel (in the crown) (80 %, 8), pleasure (79.2 %, 18), accommodation (71.6 %, 18), experience (77 %, 44), privilege (72.9 %, 5), discovery (70 %, 6)	Experience (71.3 %, 7), motive (63.4 %, 4), appear (62 %, 4)
STO 5	Worth (76.7 %, 85), excuse (70.8 %, 4), searching (70.3 %, 6), recommendation (67.9 %, 3)	Not advisable to visit (90 %, 1), never repeat (89 %, 2), not worth (67.7 %, 2)

relevant entities. Table 3 shows a summary of these results with four columns: dimension, number of entities, most relevant positive entities and most relevant negative entities (percentage of sentiment polarity, number of occurrences).

The categorization process based on the corpuses obtains as results the identified entities, number of occurrences, and the corresponding category. Table 4 is an

Table 4 Integration with the model

Entity	Number of occurrences	Category	Entity	Number of occurrences	Category
Place	425	REC	Menu	138	F&B
Restaurant	373	REC			
Area	334	REC	Accident	7	SFT
Day	260	TTW	Protection	6	SFT
Place	184	ATM			
...			Experience	62	PFM
Hotel	160	INF	Stay	26	PFM
Price	154	INF			
People	150	SOC	Worth	111	STO
...			Searching	6	STO
Food	139	F&B			

Table 5 Model results

REC	INF	SOC	ATM	F&B	SFT	TTW	PFM	STO
40.64 %	17.59 %	8.98 %	13.47 %	12.28 %	0.60 %	4.79 %	1.27 %	0.37 %

example of these results, showing some of the most relevant terms obtained from Minube classified according to the model.

Table 5 shows the results according to the nine dimensions that capture the conceptual structures of the cognitive-affective-conative image of the destination by the perspective of the visitor. The text mining tool discovered a number of interesting and important non-taxonomic conceptual relations, the atmosphere concept appears in many different and rich ways qualified as pleasant, charming, good, great, cosy, intimate, caring, lively, relaxed, disco, comfortable, enjoy the atmosphere, lively atmosphere, friendly, surfer, footballing environment, unique atmosphere, cosmopolitan, sailor, summery and festive.

The results of the model indicate that the dimension that has a major influence in shaping and determining the destination image is the first dimension (REC) covering natural and cultural resources. Only 2.24 % of the concepts in the discourses belong to the three dimensions that configure the conative image of destination. The second dimension with higher percentage is infrastructures (INF) with 17.59 %, showing the importance of the accommodation, events, transportation, infrastructure, in regards of the influence in the perceived image of destination. The atmosphere (relaxation, absence of mass), Food and Beverage, and Social Conditions dimension are quite similar with approximately 9 and 13 % respectively. These are relevant dimensions as well. Trip conditions: Time and Weather dimension has less than 5 % and the majority of the discourse are positive, there are few negative comments about the bad weather.

5 Conclusions and Future Research

The literature highlighted both the opportunity and the need to better understand the destination image formation in relation to UGC. This study was able to match and in some instances further enhance the findings from the previous literature. In fact, the study has revealed the feasibility of producing a method, which enables to obtain the perceived image by users. The affective component can be obtained by the polarity (positive, negative, neutral) of the extracted entities. These attributes help identifying positive and negative characteristics of the destination.

In order to validate the Cognitive-Affective-Conative model proposed, it is important to underline that the perceived Cognitive-Affective-Conative image based on user-generated content has a great impact on the first dimension. The dimensions that form the conative component have lower presence. Nonetheless, it is a critical component in choosing a destination, since the fact that an unsafe destination or an experience that has not met the expectations will influence the recommendation to visit. Most of the comments are satisfying experiences, meet the expectations and recommend strongly the destination, showing the intention to repeat the visit to the destination; something relevant for the destination image. In the TTW dimension there are hardly any negative comments about the weather. Therefore, the weather is not such a determining factor in the choice of the Basque Country as tourism destination.

Following the analysis of the dimensions, it is important to highlight that within the natural and cultural resources, which gastronomy becomes the most relevant category by the quantity of related terms and concepts (picnic area, pub, restaurant, grill house, cider bar, "sagardotegi", etc.) that appear especially in the user-generated content by visitors. Furthermore, most of the analysed sources put special focus on this concept. Besides, the food and beverage dimension (12.28 %) highlights the fact that the gastronomy is one of the biggest attractions of this destination. It can be stated that after the F&B dimension, the natural resources are the most commented, strengthening the great potential of the destination that offers in a small territory a great variety of natural resources (beaches, mountains, natural parks, etc.).

To sum up, the analysis of the user-generated content using domain oriented text mining tools provides a novel approach to understand the destination in the way what people say and perceive. Furthermore as future work, the purpose is to include new sources and languages to understand their relation with the perceived destination image.

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OpeNER: Open Tools to Perform Natural Language Processing on Accommodation Reviews

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Abstract Opinion mining is crucial for hoteliers and other tourism industries in order to improve their service from the analysis of services failures and recovery. The extensive use of the Internet and social networks has shifted the way tourism information is shared and spread. Travel agencies, hotels, restaurants, tourist destinations and other actors require the aid of new technologies to get an insight of the vast amount of customer generated reviews. Develop and integrate text analysis technologies is usually difficult and expensive, because it involves the use of Natural Language Processing techniques. This paper introduces the OpeNER European project, a set of free Open Source and ready-to-use text analysis tools to perform text processing tasks like Named Entity Recognition and Opinion detection. The paper also provides an example of a possible application of the OpeNER results in the geolocation of hotel reviews.

Keywords User generated reviews • Language processing • Sentiment analysis

1 Introduction

Opinion mining is crucial for hoteliers and other tourism industries in order to improve their service from the analysis of failures and recovery. The extensive use of the so-called Web 2.0 and social networks has issued a big change on the way tourism information is shared and spread (Liu et al. 2013). Travel agencies, hotels, restaurants, tourist destinations and any other service providers cannot control the immense data flow generated via thousands of online reviews, comments and interactions between past and potential customers. The classic and monolithic self-promotion techniques are losing strength against the social media and the word-of-mouth enabled by the information era.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_10

In order to keep track of what is going on over the Web about their brands (and their competitors), companies require tools to cope with the vast amount of content generated every day. This kind of tools should allow them to gain control over what is being said; to tackle negative opinions; to detect trends in user behaviour and, in general, to take smarter decisions.

Currently, there are many companies offering solutions to this problem. Most of them involve the automatic analysis of text coming from different online sources (e.g. websites like TripAdvisor, social networks as Twitter or Facebook, etc.). The automatic analysis of text requires Natural Language Processing (NLP) tools and techniques. Some of the existing tools and software libraries are Open Source and free, but the heterogeneity and diversity of technologies, output formats and system requirements make it difficult to integrate them to build a customized analysis system. To develop and maintain such a system requires both expertise and an investment of time and resources that may not be affordable by the tourism value chain.

This paper introduces the results of the OpeNER[1] European project, which aims at providing a set of Open Source and ready-to-use tools to perform NLP analysis in six languages, including English, Spanish, Italian, Dutch, German and French. The application of the results of OpeNER to the customer reviews in the tourism sector should enable the automatic extraction of textual feedback on the basis of NLP technologies specially focused on opinion mining. The remaining of this paper is structured as follows. Section 2 presents a brief state of the art describing some common NLP tasks, approaches and existing Open Source tools in each case. Section 3 describes the OpeNER project, explaining the motivations and a general overview of the objectives of the project. Finally Sect. 4 shows the conclusions.

2 State of the Art

Natural Language Processing (NLP) is a field of Computer Science that studies the use of automatic ways to process natural language. As it has been mentioned before, automatic processing of text is becoming more and more important in the tourism sector due to the large amount of content generated by users every minute. Thus, (semi) automatic ways of processing is needed to extract valuable information. NLP is a very wide research field, with many subfields addressing specific tasks, from breaking a text into basic units to ease further processing (i.e. sentence splitting, phrase chunking, tokenizing, etc.) to more complex ones like semantic analysis.

[1] http://www.opener-project.eu

2.1 Processing Text

In order to process a text, it is first necessary to determine its language. There are currently many Open Source language identification tools that implement state-of-the-art algorithms, achieving a precision over 99 % for tens of languages. The most popular approaches are based on statistical distributions and probabilities of character level *n*-grams (Řehůřek and Kolkus 2009), which are sequences of *n* characters. It is proven that every language has its own particular distribution of such *n*-grams.

Once the language has been identified, tokenization is commonly the following step of any text processing pipeline (Webster and Kit 1992). It is the process of breaking a text into its fundamental pieces (i.e. tokens), which are likely to be a word, a number, a punctuation mark, or a particular combination of them.

Part-of-Speech tagging (PoS-tagging) is the next step that assigns grammatical categories to words in a text. Basically, it states that a word in a particular context is a noun, a verb, an adjective, an adverb, etc. It can also provide more information, like the gender and number of a word, or the person in case of verbs. PoS-taggers are usually based on stochastic methods like Hidden Markov Models or Maximum Entropy, trained on sets of pre-annotated data (Brants 2000; Collins 2002). The accuracy achieved by state-of-the-art taggers varies from one language to another and relies heavily on available training datasets (Giesbrecht and Evert 2009).

Furthermore, Named Entity Recognition and Classification (also known as NERC) locate and classify rigid entity designators in text such as proper names (Nadeau and Sekine 2007). The concept of "entity" varies from one system to another. In the tourism field, the main entities are names of people, organizations and location names (countries, cities, or any other kind of geographical location). In other contexts, also dates, numeric expressions and/or currencies are detected.

The previously detected entities are disambiguated in order to distinguish the entities referred from a set of potential candidates using Named Entity Disambiguation and Linking techniques. When possible, detected named entities are linked to well-known ontologies or knowledge-bases (Sil et al. 2012) like the Wikipedia's page of that entity. This allows uniquely identifying that entity according to a certain namespace or vocabulary (Rao et al. 2013), and aggregating or manipulating more precisely all the mentions to the same entity in order to avoid confusions with other entities with similar names.

On the other hand, two different mentions in a text may refer to the same real-world entity. For example, in the following comment, "I stayed in NH in Brussels and Zurich and I really liked *them* because of *their* modern and stylish design and big rooms", the word *them* refers to "NH in Brussels and Zurich", and so does the word *their*. Detecting which mentions co-refer to the same entity is known as co-reference resolution (Bagga and Baldwin 1999). To solve co-referent expressions, both linguistic and domain knowledge are required. One of the best performing systems is a multi-pass sieve co-reference resolution system (Lee et al. 2011a).

Finally, sentiment analysis and opinion mining are closely related fields which refer to the application of NLP techniques to extract subjective information about how someone expresses a feeling (negative, positive or neutral) about something (Pang and Lee 2008). These tasks are increasingly important for determining the opinion about products and services, and brand reputation on the Internet. Usually, this information is the sentiment of the so-called "opinion holder" towards a particular "opinion target" (a topic, an entity or some part or feature of it) (Liu 2010). Ideally, this task is about retrieving "who" is opining "what" about "which entity" in each given piece of text. The time can be also important, especially when the opinions and sentiments change very quickly.

There are plenty of different approaches to perform sentiment analysis and opinion mining. Not all the available systems and techniques aim to extract the same type of information or with the same granularity. Some are oriented to just finding the overall polarity of a full sentence, paragraph or document, while others aim at finding the polarity on a product/service feature basis (e.g. distinguishing whether a particular opinion is about the rooms of a hotel or about the breakfast).

Furthermore, most of them involve machine learning techniques combined with specific language resources. Usually, those tools are language and domain dependent (i.e. they work better for the language and domain they were developed for and require minor or major adaptions to work in other languages or application domains).

2.2 Application to the Tourism Sector

The increasing growth and popularity of user-generated contents on the Web has led to a new area of research in the application of text mining techniques. Applications of sentiment analysis and opinion mining based on text reviews have grown very quickly during the last decade in the tourism sector.

The earliest approaches focused on sentiment analysis of product reviews, which were clustered as positive or negative on the basis of specific sentiment structures (Hu and Liu 2004; Lau et al. 2005; Popescu and Etzioni 2007). Four steps were defined for online text mining: definition of mining context and concepts; data collection; dictionary construction; and data analysis. Several analysis have been done related to the profile of the hotel or the price of the room.

More recently, sentiment classification of consumer reviews is addressing bigger challenges, since the opinion mining systems try to deal with more complex tasks and results, as customers may provide a mixed review, combining positive and negative aspects of the same product or service. Ghose et al. (2009) used a 4-grams Dynamic Language Model classifier to acquire a subjectivity confidence score for each sentence in a hotel review and derive the mean and standard deviation of this score. The analysis of the content focused on polarity classification, sentiment classification of customer reviews, or the automated extraction of product attributes. They have further used text-mining techniques to incorporate textual

information from hotel reviews in demand estimation models on the basis of the user-generated hotel reviews from Travelocity and TripAdvisor.

Ye et al. (2009) presented a study to analyse the existing approaches to perform automatic classifications based on the sentiment analysis of online reviews related to travel destinations. Furthermore, the study analyses different supervised machine learning algorithms and their effect on the different amount of training corpus to various performance measurements in terms of accuracy, precision, and recall in the sentiment classification of online reviews about tourist destinations. The algorithms evaluate the reviews about seven popular travel destinations in Europe and North America.

On the other hand, Xiang and Gretzel (2010) have applied text analysis to understand the queries extracted from a number of transaction logs from search engines. Although generally speaking accommodation and transportation were the most searched information, there were differences depending on the size of the destination and its tourist level. Furthermore, there were strong associations between keywords used and specific destinations, reflecting the knowledge about them.

Moreover, Lee et al. (2011) used text mining techniques to extract keywords from descriptive comments from hotel customers in order to identify areas of service failures and recovery actions. CATPAC software was used to classify algorithms and identify main topics based on the frequency of key terms. Furthermore, Kasper and Vela (2011) have implemented a service for hotel managers that collects customer reviews from various sites on the web; analyzes and classifies the textural content of the review; and presents the results in a precise way. Its main disadvantage is that it is only available in German.

Finally, Gräbner et al. (2012) have proposed a system that classifies customer reviews of hotels on the basis of sentiment analysis techniques. The study includes building a lexicon with a semantic orientation; the application of sentiment analysis to generate a classification of customer reviews; and the evaluation of the results with quantitative ratings.

3 The OpeNER Project

OpeNER is a European project which aims at providing a set of Open Source tools to perform text processing tasks like Named Entity Recognition, sentiment analysis and opinion detection. The objective is to offer a set of ready-to-use tools and software modules to process texts in six different languages, plus the capabilities to easily extend them to new languages and application domains. The Open Source nature of the project (i.e. the source code is open and freely available) should enable the potential community of users to take the existing OpeNER tools as a starting point, and extend and integrate them to build their custom text analysis systems.

During the OpeNER project, different text processing modules have been developed for six major European languages (English, Spanish, French, Italian, Dutch

and German). These modules include the following functionalities: language detection; sentence splitting and tokenisation; Part-of-Speech tagging; Named Entity Detection and Classification; Named Entity Linking; co-reference resolution; and sentiment analysis and opinion detection. OpeNER also provides some tools to perform domain adaptation of the existing resources (e.g. to adapt sentiment lexicons to a new domain, to train new models for opinion detection, etc.). Some of the provided tools are based on already available third-party tools, like Apache OpenNLP framework or DBpedia Spotlight that have been adapted and conveniently wrapped to achieve the versatility and modularity desired for the OpeNER modules.

One of the main features of the tools is the modularity of each component (i.e. understanding a component as the piece of software in charge of a particular NLP task). This modularity is achieved using a single yet expressive data representation format called KAF (Bosma et al. 2009).

The OpeNER project has been evaluated in the tourism domain. During the project, a manual annotation campaign allowed annotating a hotel review dataset for each of the six languages officially handled by OpeNER. These datasets were then used to train specific models to analyse hotel customer reviews, and also to evaluate the performance of the resulting system. Additionally a set of reference applications was built in order to analysis potential added value services in the tourism domain.

3.1 OpeNER General Architecture

OpeNER is built on an individual module basis. Each module receives a single input; performs a single text processing task; and returns a single output. Both the input and the output are documents in KAF format, which allows a very easy integration and chaining between different modules to build a full analysis pipeline.

Figure 1 shows a possible way of chaining OpeNER modules to perform different analysis. The output is always a document in KAF format that can act as the input to another module. KAF documents include all the information obtained in each analysis separated in individual layers. Each module works only on a single KAF layer (creating it from scratch or completing the information of an existing layer). OpeNER provides tools to parse and work with KAF documents and tools to convert them to a more human readable format like JSON.

The following text from a hotel review will be taken as an example.

> I have been at Albergo Acquarello hotel at Lugano and I liked the beautiful decoration. The rooms were very comfortable. On the other hand, the restaurant was really expensive.

First, the text to be analysed is sent to the language identifier which returns the language code corresponding to the language detected in the text. Secondly, the tokeniser module receives the text and the language code, and performs the tokenisation of the words outputting the result as a KAF document. Such document

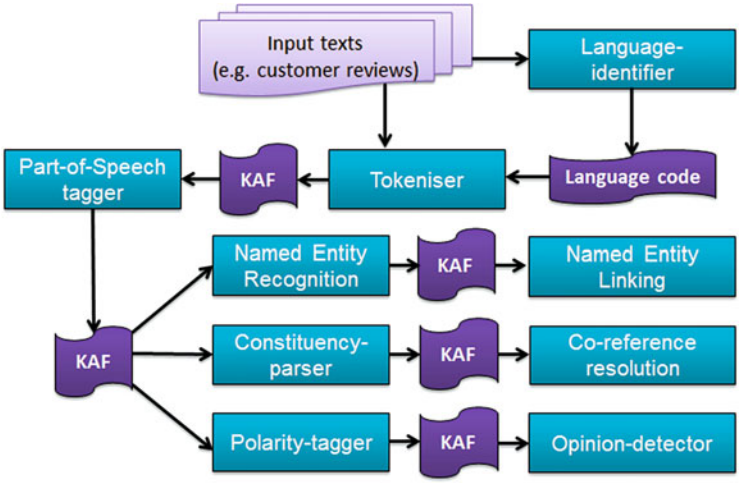

Fig. 1 A possible text analysis pipeline chaining OpeNER modules

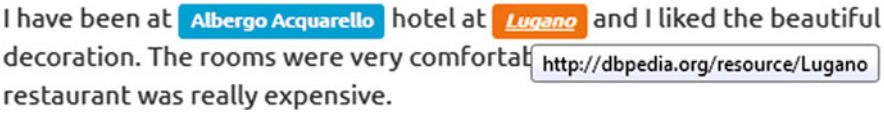

Fig. 2 Representation of the Named Entity Recognition result (Albergo Acquarello and Lugano as "organisation" and "location", respectively)

is the input for the Part-of-Speech tagger module, which outputs the same KAF document with additional information coming from the Part-of-Speech tagging process.

The language identifier correctly detects the language as English; the tokeniser breaks the text into individual sentences and tokens (i.e. separating words and punctuation marks); and the Part-of-Speech tagger annotates each word as being a noun, a verb, an adjective, etc. An illustrated representation of the result can be found at Fig. 2.

All this information is represented in KAF,[2] which is sent to the Named Entity Recognition module to detect entities. The analysis detects two entities in the text: *Albergo Acquarello* and *Lugano*. The former has been classified as an "organisation" (the *Albergo Acquarello hotel*), while the latter has been defined as a geo-spatial location (Lugano, Switzerland). After sending the result to the Named Entity Linking module, the mention to *Lugano* has been linked to its entry in DBpedia. This allows determining which "*Lugano*" entity is the text about (in case there is more than one possible "*Lugano*" in the world) and obtaining

[2] KAF documents are XML files too verbose to be represented in this paper. More information about KAF format and examples can be found at the OpeNER website.

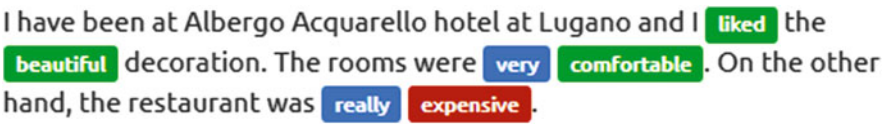

Fig. 3 Detected polarity of the words highlighted with *different colours*

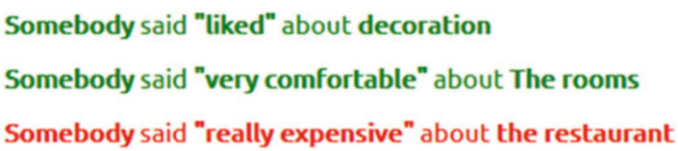

Fig. 4 An inline representation of the information obtained by the Opinion detector

additional metadata about the entity if available (e.g. the geo-coordinates, the population, the country, etc.).

If the Polarity-tagger module is invoked, the analysis of the sentiment and opinion-related information are obtained. The result is illustrated in Fig. 3. The module assigns a polarity (positive, negative) to the words in the text according to a sentiment lexicon (i.e. a dictionary that states the most probable polarity for a word inside the given domain). The detected positive and negative words have been highlighted with different colours, as well as the intensifiers (i.e. the words that intensify the polarity of the surrounding words).

The polarity information is a first step to get an insight about the sentiment of the review. The Opinion detector module goes further and detects whole expressions; classifies them as being positive or negative (e.g. some expressions may contain words of a certain polarity but the overall expression might not inherit it); and tries to find the target of that expression (i.e. the particular object or feature which the opinion is about).

For example, Fig. 4 shows the possible representation of the triplet of information the OpeNER opinion detector tries to fulfil. One is the "opinion holder" (i.e. the author of the opinion itself). In a standard hotel review, the opinion holder of all the opinions in that review is the author of the review implicitly. When there is an explicit opinion holder, it appears as "Somebody" in the example. The second part of the triplet is the opinion expression itself, which is the word or group of words that comprise an opinion or a particular sentiment towards something. An opinion expression can be positive, negative or neutral.

Finally, the opinion target is the object/feature being reviewed (i.e. the object being assessed in the corresponding opinion expression). The opinion target (also called aspect term, feature term, etc.) is very important to obtain a fine grained sentiment score. It is crucial to be able to aggregate the opinions on a per-feature basis to assess the strengths and weaknesses of a product or service (e.g. hotel rooms are positively perceived while the breakfast service is negatively evaluated).

3.2 Evaluating OpeNER in the Tourism Sector

One of the OpeNER project evaluation scenarios has been the tourism sector, more precisely, the hotel domain. During the customization of the platform to the tourism sector, a set of hotel reviews has been manually annotated with sentiment and opinion related information. The reviews were extracted from online customer review websites like Zoover.[3] Further factors were taken into account to avoid bias in the extracted content, apart from choosing reviews for the six languages involved in OpeNER (English, Spanish, French, Italian, Dutch and German). For example, the chosen reviews were equally distributed among variables like the home country of the reviewer, the motivation for the stay at that hotel (work or leisure), etc. Such data is usually available as metadata annexed to the reviews. The final set of hotel reviews included about 200 reviews per language.

The annotation campaign consisted on two or more people (native speakers or with a deep knowledge of the language they were annotating) tagging the reviews according certain annotation guidelines with the help of a customized annotation tool. Per each review, the annotations consisted on tagging the opinion expressions and when possible, the corresponding opinion holders and opinion targets. Also, other valuable information was manually tagged, like the polarity of the words or the general category of the opinion target (e.g. both "coffee" and "orange juice" belong to the "breakfast" category, while "towel" and "shower" belong to the "bathroom" category).

These annotated reviews were then used to train the models that enable the work of the Opinion detector module. It is based on different machine learning techniques like Conditional Random Fields (CRF) (Sutton and McCallum 2012) and Support Vector Machines (SVM) (Brereton and Lloyd 2010) that must be trained over a previously annotated dataset. A certain amount of the annotated hotel reviews was used for the training while the remaining subsets were employed to perform a formal evaluation of the resulting opinion detection models. The results of this evaluation are shown in Table 1. The results vary for each language due to the impact of the different number of annotated reviews among them. Additionally, not all languages have the same complexity; issues like morphology and sparse vocabulary affect performance.

OpeNER already provides these pre-trained models and also tools to perform further adaptation and annotation of more reviews. It should be noted that the amount of annotated reviews and the annotation quality have a direct impact on the performance of the Opinion detector module. There are other linguistic resources, like the opinion lexicon (i.e. the dictionary that holds the polarity of the words), that can be improved and tuned to better fit the target domain (e.g. a word may denote different sentiments in different domains).

OpeNER has also been tested by building different reference applications to serve as an example of potential best-practices of the OpeNER tools and

[3] http://www.zoover.com

Table 1 OpeNER opinion detector evaluation results

Tool	Language	Precision (%)	Recall (%)	F-Score (%)	Method	Dataset
Opinion detector	en	85.52	58.45	69.44	CRF + SVM	OpeNER manual hotel annotations
Opinion detector	nl	82.8	51.77	63.71	CRF + SVM	OpeNER manual hotel annotations
Opinion detector	de	75.64	48.88	59.38	CRF + SVM	OpeNER manual hotel annotations
Opinion detector	es	74.41	46.55	57.27	CRF + SVM	OpeNER manual hotel annotations
Opinion detector	it	65.47	40.39	49.96	CRF + SVM	OpeNER manual hotel annotations
Opinion detector	fr	70.94	46.28	56.02	CRF + SVM	OpeNER manual hotel annotations

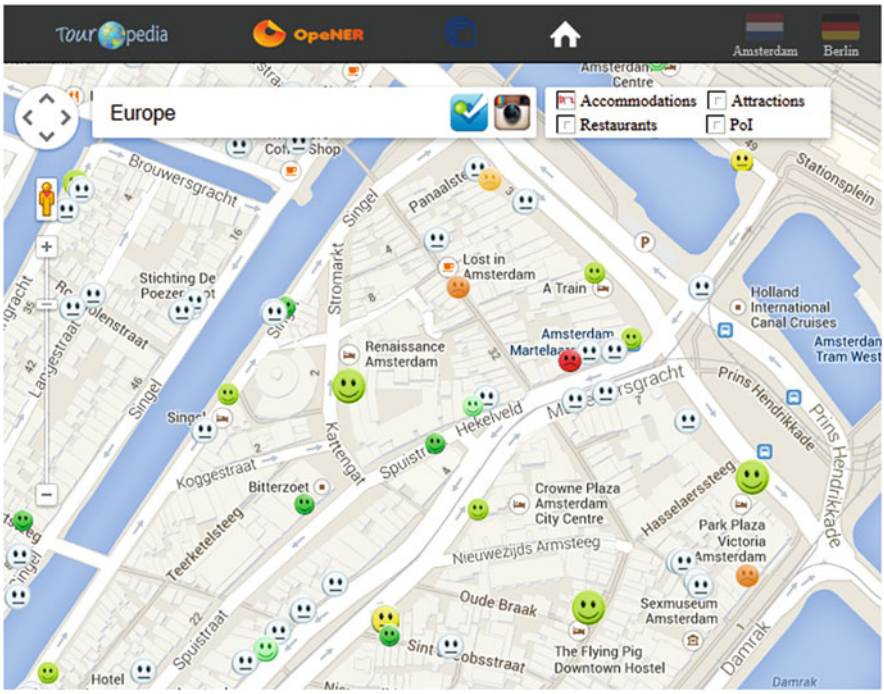

Fig. 5 A screenshot of Tour-pedia based on some of the OpeNER technologies

technologies. One relevant example is shown in Fig. 5. Tour-pedia (Marchetti et al. 2013) is an application that geolocates the sentiment analysis of hotel reviews using emoticons to provide a quick overview of the positive or negative feedback provided by customers in their reviews on the social media. Reviews and other

metadata (e.g. location metadata on a map) from customers have been extracted from different sources like Google Places or FourSquare. The content of the reviews has been processed with OpeNER tools to obtain a measure of the polarity and draw the appropriate emoticon. Tour-pedia is an illustrative example of how to build an added-value service on top of the text processing capabilities provided by OpeNER.

4 Conclusions

The large amount of text content generated everyday over the Internet is both a big opportunity and a challenge. There are many ways in which customers can provide their opinion and feedback about products and services. This also applies to tourist destinations, hotels, restaurants and other services. Currently, there are many specialized websites to write reviews and provide feedback, plus the omnipresence of the social networks to exchange information publicly. At the same time, there are many companies offering services to monitor this content and give an insight about what is being said about a particular service or brand.

This paper describes some of the outcomes of the OpeNER project which aims at bringing text processing technologies a step closer to SMEs and other kind of end-users interested in analysing textual content. OpeNER is an Open Source project which provides ready-to-use tools and modules to create a custom analysis pipeline with Named Entity Recognition, Sentiment Analysis and Opinion Mining capabilities. OpeNER is based on a single data representation format (KAF) to enable a simple integration between the different modules and ease the extension and development of new modules and components.

The evaluation scenario of the OpeNER tools was the tourism sector, more precisely hotel reviews written by customers. During the development and domain customization of the platform to the tourism sector, a set of hotel reviews has been manually annotated with sentiment and opinion related information.

These annotated reviews were then used to train the machine learning models that enable the work of the Opinion detector module. A certain amount of the annotated hotel reviews were used for the training while the remaining subsets were employed to perform a formal evaluation of the resulting opinion detection models.

OpeNER also provides tools to improve or further customise the system for the tourism sector or to extend some of the existing modules to new domains. This adaptation to a new domain requires the generation of some specific resources, like sentiment lexicons and opinion detection models trained on pre-annotated content of the target domain. Additionally, a set of reference applications was built in order to foresee potential uses of OpeNER technology. The Open Source nature of the project provides a good entry point to the language processing technologies and enables SMEs to extend the provided software and build their own analysers and products upon it.

Acknowledgements OpeNER has been funded by the European Commission under the FP7-ICT-2011-SME- DCL-296451.

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An Application of Apriori Algorithm Association Rules Mining to Profiling the Heritage Visitors of Macau

Shanshan Qi and Cora Un In Wong

Abstract Heritage tourism has become one of the dominant forms of tourism. It is particularly important for Macau as a means to diversify Macau's destination image from being exclusively a gaming city to a city of culture and events. Yet little is known about the success of the official re-positioning campaign. In particular what is attractive to cultural tourists remain understudied. This study adopts Apriori Algorithm Association Rules Mining to segment Macau's tourists and to predict tourists' preferences for the different local heritage attractions. User-generated data of TripAdvisor were the major source of data for the analysis. The findings of this paper show that the so-called "cultural tourists" who are interested in Macau heritage attractions appear to have profiles that are similar to those who are "non-cultural tourists". It appears that the "cultural tourists" visited only a few renowned heritage sites. It is suggested that Macau is not yet successfully attracting large amount of visitors who are interested in heritage and culture. This study showcases a use of data mining method in tourism studies.

Keywords TripAdvisor • Heritage tourism • Macau • Demographic characteristics • Association rules mining

1 Introduction

Heritage tourism has been recognised as the most significant and fastest growing forms of tourism (Hollinshead 1996; Kerstetter et al. 1998) and as such it has become an established research topic in tourism and heritage studies (Chandler and Costello 2002; Nyaupane et al. 2006). Popular research themes that have been widely investigated include tourists' motivations to visit and their behaviour while on heritage sites, followed by tourists' perceptions and interpretations of their visitations. Poria et al. (2003) report that the reasons for visiting heritage places can be categorized under search for "heritage experience", "learning history," and

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_11

"recreational experience". Mawson (1984) concurs that tourists are attracted to a destination primarily by the "atmosphere" and ambiance associated with the site rather than by the history of the destination or its heritage buildings. In Leiper's view (1979), tourists are "pushed" to visit attractions by their own motivations as well as by the influences of "markers", i.e. information conveyed about the sights/nuclei. A review of the literature suggests that the tour industry as well as the local authorities provide the important markers that often play a significant role in the support of tourism (Gunn 1972; Leiper 1979). Markers play the role of transmitting information related to the nuclei as well as creating an atmosphere that is perceived as attractive by tourists. In other words, it is not enough to simply have attractive iconic sites in a destination. To develop a destination's competitive edge, it is also useful to capture the profiles of the various types of tourists (Min et al. 2002). By understanding the tourists' preferences for certain types of nuclei and their possible motivations for visitations, markers involved in a destination's planning and promotion can contribute to develop appropriate strategies to make the destination attractive to desirable market segments (Carson 2008; Jacobsen 1997).

The importance of understanding the tourists' typology has been well researched in the tourism literature. Yet the research methods and techniques adopted are often conventional quantitative research with samples of limited size. Questionnaire is often the instrument used for data collection. Such a data collection method of course has merits and provides insights into the researched questions. Yet the questionnaire is a research instrument, which is pre-designed by the researcher based on his or her own worldview and with limited a priori knowledge. Respondents can only respond to the specific questions that are included in the questionnaire and often they have to answer within a short period of time. In this form of inquiry, respondents may fail to communicate their true understandings and they cannot express their meanings as shaped by social interaction with others. In other words, studies based on questionnaires designed by the researcher may fail to elicit the actual thoughts of the consumers of a destination. Though there is a growing number of studies which help reveal the in-depth meanings of a certain research topic as revealed by informants (Chandler and Costello 2002), the number of informants involved in a piece of qualitative research is often limited.

To address the limitation of having limited sample size and in order to capture the consumers' thoughts about a destination, spontaneously and voluntarily expressed in their own words, this study combines data mining method with tourism studies, that is, uses association rule mining to profile tourists' characteristics as well as their preferences on the basis of what they have actually volunteered to express. User-generated data of TripAdvisor from 2008 to 2013 were the main source for data analysis. The advantage of this new research method is that the process of data collection becomes much more neutral and minimizes the researcher's prejudice and personal intervention. Data mining is a useful research method, which helps segmenting, and profiling customers into different groups based on their own account of their characteristics and behaviour (Wang et al. 2002). Association Rule Mining is a popular data mining method, which has been widely applied in different academic disciplines (Han and Kamber 2006). It is particularly good at discovering interesting correlations, frequent patterns,

associations or casual structures among sets of items in the data repositories (Herawan et al. 2012).

This paper uses Macau as a research locus to investigate the profiles of its "cultural tourists". The official determination to dilute Macau's destination image as a "city for gambling" and to promote it as a cultural destination is evidenced since year 2005 in MGTO's annual press releases (MGTO 2005). Yet relatively little is known about the success of the official re-positioning campaign. In particular what is attractive to cultural tourists remain understudied. This study adopts Apriori Algorithm Association Rules Mining to segment Macau's cultural tourists, to reveal their demographic characteristics and to predict tourists' preferences for the heritage attractions in Macau. In particular, this paper has two goals: (1) to present the top heritage attractions of Macau and their attractiveness as seen by previous visitors and as spontaneously articulated by them and (2) to identify the existing cultural tourists and predict the demographic characteristics of future tourists who are likely to visit Macau's top heritage attractions.

2 Overview of the Heritage Tourism Literature

Much has been written in tourism and heritage studies to yield a more comprehensive understanding of heritage tourism. In particular, many studies focus on identifying those visitors who are interested in such form of tourism and finding out how different they are from the other segments (Chandler and Costello 2002). Christou (2005) reports that tourists who travel to heritage sites tend to be older, wealthier, and to be interested in partaking in activities that provide educational experiences. The well known 'cultural tourism typology' created by McKercher (2002, p. 32) indicates that there are different types of cultural tourists and that not all of them have the same level of interest and seriousness about heritage and culture. He used 'centrality of purpose' and 'depth of experience' as the core dimensions to construct his typology of cultural tourists. The model was empirically tested in Hong Kong, where 2,066 tourists were surveyed (McKercher 2002; McKercher and du Cros 2003). The test confirmed McKercher's hypothesis that there are different types of cultural tourists with various depths of interest in heritage and culture. McKercher and Ho (2006) assess the potential of smaller cultural attractions of Hong Kong and conclude that only the purposeful cultural tourists who intentionally seek in-depth cultural experiences will visit those sites. Hernández-López and Cáceres-Hernández (2007) emphasize the importance of analyzing the profile of existing tourists and of making prediction of possible future visitors. Hence, it is crucial to know the characteristics of tourists who have visited as well as the prospective tourists who intend to visit the heritage sites. Insights into tourists' profile will enhance accuracy in developing appropriate strategies for promoting heritage tourism at a destination.

Cultural tourism is a traditional form of tourism in Macau. Many cultural sites that are included in the UNESCO Historic Center of Macau, such as the Ruins of St. Paul, Monte Fortress, A-Ma Temple, Senado Square are the "must-visit" attractions of Macau that are included in the itineraries of package tours (Wong and McKercher

2012). The same is true for individual tourists who plan their own day tour itineraries for many of them follow the advice given by the staff who work at local governmental information centers (Wong and McKercher 2011). Ung and Vong (2010) conducted a survey in five major cultural sites of Macau, including (1) Ruins of St Paul's, (2) Senado Square, (3) A-Ma Temple, (4) Taipa Village, and (5) Carmel Garden and Taipa Praia. Their study shows that Macau's cultural tourists' travel satisfaction and experience can be influenced by four factors, (a) history and culture, (b) facilities and service at heritage sites, (c) heritage interpretation, and (d) heritage attractiveness.

While the above studies on cultural tourism of Macau provide important insights into how the cultural tourists experience, behave and react during their visitations to Macau's cultural and heritage attractions, none of them describes the cultural tourists' profiles, characteristics or preferences. Little is known about the type of people who are interested in Macau's heritage and culture as well as which cultural sites appear to be more attractive to them. Since cultural tourism is of high importance to Macau tourism industry, to be able to understand the in-depth details of "who are attracted?" and "what are attractive?" are important to the suppliers and markers involved, including the local authorities. This quantitative study adopts Apriori Algorithm Association Rules Mining to segment Macau's cultural tourists, to reveal their characteristics and to predict prospective tourists' preferences toward the heritage attractions in Macau.

3 Methodology

The core aim of this research is to identify the characteristics of tourists who have visited Macau's heritage attractions. In addition, based on the existing profile of visitors, a prediction of prospective tourists' preferences of heritage attractions is presented. User-generated data from TripAdvisor from 2005 to 2013 were the main corpus of the data. Such data are comments that are volunteered and then shared via online social media/information exchange platforms, by online users who use their own words and understandings to comment on a particular subject. Their comments are thus considered to be free of researcher's interference and controls (Creswell 2003). TripAdvisor was selected as it is an international online information exchange platform where tourists from all over the world give and receive comments on a particular subject related to travel (Filieri and McLeay 2013). In 2013, the traffic on TripAdvisor reached 60 million per month (www.TripAdvisor.com 2013). The users of TripAdvisor are requested to indicate their demographic information to the system, a fact that provides a good opportunity for researchers to collect profile information of tourists, although researchers may encounter difficulties in verifying users' profiles. This is nevertheless the same limitation, which exists in other quantitative research methods, such as self-administered questionnaires. Figure 1 shows the research design of this study.

The researchers first created a computer program to collect information from TripAdvisor. The output of the collected information is in Excel files. The target online reviewers are those tourists who posted comments about Macau's cultural

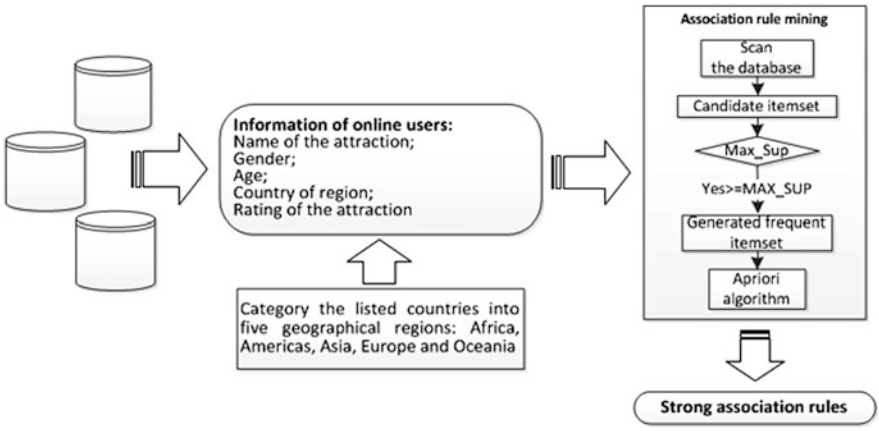

Fig. 1 Research design

attractions from 2005 to November of 2013. According to the UNESCO Historic Center of Macau listed on the MGTO website (http://gb.macautourism.gov.mo), 22 cultural sites and 8 squares are included in UNESCO Historic Center of Macau and they were the main targets for data analysis. The online reviewers' profile and their rating for each of the heritage attraction were collected. The reviewers who did not provide their demographic information online were excluded from the data. The collected data were processed by an Apriori Algorithm, a well-established algorithm for mining frequent item sets according to Boolean association rules (Bayardo and Roberto 1998). An Apriori Algorithm uses a "bottom up" approach that generates the candidate sets with high frequency from a large item set of the preceding level. It uses breadth-first search and a hash tree structure to count candidate item sets efficiently. Apriori algorithms can discover all the items that have frequency from transactional database. The data are then analyzed based on common association rules applied to the frequent items. The automated calculations of the Apriori algorithm are then analysed by the Matlab program through the entire calculation process.

Basic Variables and Functions in Apriori Algorithm

Let D be the Transaction database, which keeps all the collected data. T refers to transaction that contains a set of items ($T \in D$). An association rule is an implication in the form of $X \Rightarrow Y$, where X, $Y \subset T$ are the sets of items called "Itemsets", and $X \cap Y = \varnothing$. X is called antecedent while Y is called consequent; the rule means X has an implication on Y. *Support(s)* of an association rule is defined as the percentage or fraction of records that contain $X \cup Y$ to the total number of records in the database. $\text{Support}(X) = \text{Occur}(X)/\text{Count}(D) = P(X)$. *Confidence* of an association rule is defined as the percentage/fraction of the number of transactions that contain $X \cup Y$ to the total number of records that contain X. $\text{Conf}(X \rightarrow Y) = \text{Support}(A \cup B)/\text{Support}(A) = P(Y|X)$. *Candidate Itemset* is the itemset after Apriori merging operation; C(k) means a collection of Candidate Itemset which contains k

elements. *Frequent Itemset* refers to its support value greater than the minimum support; L(k) means a collection of *Candidate Itemset* that contains k elements.

Algorithm Processes

1. Locate C(1) from D
2. Scan D; identify C(k) in T; calculate its support; remove the items which do not meet the min support; save the result as L(k)
3. Generate L(k + 1) from L(k) until L(k + 1) $\in \varnothing$ (k starts from 1)
4. Produce L(k + 1); the first step is to merge L(k) to generate C(k + 1)
5. Any item contains kth subset that does not belong to L(k) is removed from C(k + 1)
6. Scan D; identify C(k + 1) in T; calculate its support; remove the items, which do not meet the min support; save the result as L(k + 1)
7. L (k + 1) is further divided into two itemset groups {X} {Y} with all the possibilities, where X comprises items p and Y contains (k + 1)−p items, $1 \leq p \leq (k+1) - 1$
8. Determine if P(itemset)/P(X) is greater than or equal to min confidence. If yes, there is an association rule between $X \Rightarrow Y$

4 Findings

A total of 1,422 data were collected. As shown in Table 1, the majority of reviewers are male tourists (54.4 %) who belong to two age groups: between 25 and 34 and between 35 and 49. The online reviewers who visited Macau in the past 8 years and are willing to share their comments on TripAdvisor are mainly from Japan, the Philippines, Malaysia, Australia, United Kingdom and U.S.A. In other words, most of the reviewers came from Asia, followed by Oceania, Europe, America, and Africa. Those demographic data are consistent with the tourists' arrival records provided by the Macau Statistics Department. There were 28,608,554 Asian tourists who visited Macau in 2013, which accounted for 98 % of the total tourist arrival in 2013. It is important to note that though the largest source of tourists is Mainland China, only 2.5 % online reviews were from Mainland Chinese tourists. It is possibly due to many Chinese tourists choose to reveal their travel experiences in other social media exchange platforms, such as DaoDao and Ctrip.com, where Chinese is the dominant language. Nevertheless the aim of this paper is to generate a global perspective of how much Macau is perceived as a city of culture and what are attractive to international tourists.

Evaluations of what cultural sites and how attractive they are to cultural tourists is shown in Table 2. There are only 20 out of 23 cultural sites and 3 out of 8 squares that were rated on TripAdvisor. In other words, a few cultural sites of the UNESCO Historic Center of Macau remained scantly visited by or unknown to tourists. Not all the cultural sites enjoyed the same level of popularity and appreciation as

Table 1 Online user's profile

Gender (n = 1,422)			Age (n = 1,422)		
	Female	45.50 %		18–24	4.90 %
	Male	54.50 %		25–34	31.70 %
				35–49	44.60 %
				50–64	18.80 %
Country of region (n = 1,422)					
Asia (1,025)	Japan	34.50 %	Europe (181)	UK	3.60 %
	Philippines	7.50 %		Germany	1.70 %
	Malaysia	5.80 %		Portugal	1.50 %
	Singapore	4.60 %		Italy	1.10 %
	Hong Kong	4.10 %		Russia	1.10 %
	Indonesia	3.90 %		France	0.80 %
	India	3.20 %		Ukraine	0.60 %
	Thailand	2.70 %		Switzerland	0.60 %
	China	2.50 %		Netherlands	0.40 %
	Macau	1.00 %		Ireland	0.30 %
	South Korea	1.00 %		Belgium	0.20 %
	Taiwan	0.60 %		Denmark	0.20 %
	Israel	0.30 %		Luxembourg	0.20 %
	Vietnam	0.10 %		Hungary	0.10 %
	Bahrain	0.10 %		Poland	0.10 %
	Saudi Arabia	0.10 %		Spain	0.10 %
	UAE	0.10 %		Romania	0.10 %
Oceania (92)	Australia	5.80 %	Americas (121)	USA	5.40 %
	New Zealand	0.70 %		Canada	1.80 %
Africa (3)	Algeria	0.10 %		Brazil	0.90 %
	Zambia	0.10 %		Mexico	0.10 %
				Colombia	0.10 %
				Ecuador	0.10 %
				Panama	0.10 %

evidenced in the rating of those sites. Most of the online reviews focused on the top three iconic attractions of Macau, which in total accounted for 76 % of the total online comments of the heritage sites. The top three cultural attractions are: the Ruins of St. Paul (588 reviews, rated 4.1), the Senate Square (363 reviews, rated 4.1), and the A-Ma Temple (130 reviews, rated 3.9). These three sites in fact are the primary nuclei (Leiper 1990), which are the compulsory components of all inclusive package tours (Wong and McKercher 2012). The fourth and the fifth most reviewed cultural sites are St. Domingo's Church (78 reviews, rated 4.0) and the Guia Fortress (67 reviews, rated 4.0). These two sites are often visited by individual tourists, in particular, the Guia Fortress, which is located on the highest hill of Macau peninsula at which tour buses are prohibited by law from going up to the hill. The inconveniences of going up to the hill discourage many travel agencies to

Table 2 Evaluation of Macau heritage attractions performance

Cultural attractions of Macau	ID	No. of reviewers	Ave. score
Ruins of St. Paul	1	588	4.1
Largo do Senado (The Senate Square)	2	363	4.1
A-Ma Temple (Ma Kok Miu)	3	130	3.9
St. Domingo's Church	4	78	4.0
Guia Fortress	5	67	4.0
Monte Forte (Fortaleza do Monte)	6	57	3.9
Mandarin's House	7	32	4.1
Leal Senado Building (Municipal Council)	8	24	3.8
St. Anthony's Church	9	10	3.5
Old Protestant Cemetery	10	9	3.3
Cathedral	11	8	3.5
Na Tcha Temple and Old City Walls	12	7	3.1
Sao Agostinho's Church	13	7	3.1
St. Joseph Seminary and Church	14	7	3.7
Teatro de Pedro V	15	7	3.7
St. Augustine Square	16	6	3.5
Sir Robert Ho Tung Library	17	5	3.6
Quartel dos Mouros	18	4	3.3
Casa de Lou Kau	19	3	3.3
St. Lawrence's Church	20	3	3.7
British East Indian Company	21	3	3.5
Lilau Square	22	2	3.5
Pagode Sam Cai Vu Cun (The Three Street Senate)	23	2	3.5

include the Guia Fortress in their package itineraries. There is no other attraction nearby the Guia Hill that tourists can visit for a convenience. It is thus worthy to note that there are some tourists in Macau who are deeply interested in knowing the history and culture of Macau by visiting a site such as the Guia Hill, which is comparatively remote, isolated and afar from the conventional tourist's nodes, though the number of those tourists accounted for only 4.7 %.

In general, the heritage attractions in Macau received above average score. The rating scale as defined by TripAdvisor is from 1 to 5 of which 1 represents "the site is terrible" while 5 represents "the site is excellent". Some cultural sites within the Historic Center of Macau were given relatively high score (above 4), which means "Very good" on TripAdvisor. These attractions are "Ruins of St. Paul (4.1)", "Largo do Senado (4.1)", "St. Domingo's Church (4.0)" and "Guia Fortress (4.0)" and "Mandarin's House (4.1)". Though "Mandarin House" was rated 4.1, representing the fact that tourists had very good visitation experience, the house received only 32 reviews. The findings suggest that the site is scantly visited and ignored by and large the majority of tourists. Tourists' online comments in general commend for the nice restoration and exhibits of a traditional Chinese mansion and that the house is "quite nice to walk with", "quiet", "away from the crowd" and "to

know how Chinese people lived". Yet its well hidden location that "the house is not easy to find" perhaps helps to explain why such a highly rated cultural site is scantly visited by tourists.

On the other hand, some cultural attractions received low scores that were lower than 3.5, meaning that those sites are perceived as "average". Those are the "Protestant Cemetery (3.3)", the "São Agostinho's Church (3.1)", the "Quartel dos Mouros (in English: Morrish Barracks) (3.3)" and the "Casa de Lou Kau (3.3)". By analyzing the tourists' online comments, it seems the reasons for those sites to have rated lowly are because of their inconvenient location as well as the fact that the sites appear to offer "little to see". The "Protestant Cemetery" is an example for both reasons.

While the Protestant Cemetery is mostly criticized for its inconvenient location, the "Moorish Barracks" site was severely criticized by reviewers for its inaccessibility to tourists. The building is not open to the public. Tourists can only take photos of the outside of the building and at the most, can walk along the outside corridor, which is the only area open to the public. The reviewers' negative comments focused on the remoteness of the site and the disappointment that they could not enter the building.

In addition to the issue of inaccessibility, "having not much to see" is another main concern for tourists and this particular comment is applicable to the two most lowly rated sites within the UNESCO Historic Center of Macau, namely, the São Agostinho's Church (3.1) and the Na Tcha Temple and Old City Walls (3.1). The former is located in the St. Augustine Square while the latter is located next to the Ruins of St. Paul. It is interesting to compare the São Agostinho's Church with the St. Joseph Seminary and Church (3.7), Sir Robert Ho Tung Libray (3.6) and the Teatro de Pedro V (3.7), because they are adjacent to each other as all are located on the same square. Unlike the latter three cultural sites, the São Agostinho's Church was the site received the lowest score. By referring to the tourists' quotes, it seems that the core reasons for its low score are the fact of having "little to see inside the church", "no interpretation of the site" as well as its physical outlook and interior decoration are not aesthetically attractive which makes it easy "to pass-by it without noticing it". The lack of interpretation appears to also be a problem for the Na Tcha Temple and the Old Section of the City Wall. To many tourists who know little of the local military history and the historical evolution of the city, the Old Section of the City Wall is "just a wall and there is nothing special about it".

The second aim of the current study is an application of an association rule mining algorithm to analyse the collected dataset with an aim to generate the profiles of visitors and to reveal what cultural sites will be attractive to them. The expected output of the analysis is a set of association rules in form of "characteristics of visitors' profile and attractions" $\Rightarrow$ "Characteristics of visitors' profile or attractions name." The analysis was conducted with the support threshold setting at 1 %, and 0.8 as the confidence level. This means the candidate item sets with support greater than 1 % with confident level over 0.8 are considered as a candidate item with strong association rules. In other words, the candidate items with low support and confidence level are excluded. Table 3 shows the selected strong

Table 3 Selected strong association rules

ID	Strong association rules	Support (%)	Confidence
1	Man 35–49 Europe ⇒ A-Ma Temple (Ma Kok Miu)	1.69	0.86
2	Guia Fortress 25–34 Asia ⇒ Man	1.06	1.36
3	Guia Fortress man 25–34 ⇒ Asia	1.06	1.36
4	Guia Fortress 50–64 Asia ⇒ Woman	1.09	0.88
5	Guia Fortress woman 50–64 ⇒ Asia	1.09	0.88
6	Man 50–64 Asia ⇒ Largo do Senado (Senate Square)	1.97	1.33
7	Largo do Senado (Senate Square) 50–64 Asia ⇒ Man	1.97	4.67
8	Largo do Senado (Senate Square) Man Asia ⇒ 50–64	1.97	1.56
9	Largo do Senado (Senate Square) Woman 35–49 ⇒ Asia	4.43	0.88
10	Mandarin's House 35–49 Asia ⇒ Man	1.41	1.67
11	Mandarin's House Man Asia ⇒ 35–49	1.41	2.22
12	Mandarin's House Man 35–49 ⇒ Asia	1.41	1.82
13	Monte Forte (Fortaleza do Monte) 35–49 Asia ⇒ Woman	3.59	2.68
14	Monte Forte (Fortaleza do Monte) Woman Asia ⇒ 35–49	3.59	3.40
15	Monte Forte (Fortaleza do Monte) Woman 35–49 ⇒ Asia	3.59	4.25
16	Man 25–34 Europe ⇒ Ruins of St. Paul's Cathedral	3.66	1.93
17	Ruins of St. Paul's Cathedral 25–34 Europe ⇒ Man	3.66	3.47
18	Ruins of St. Paul's Cathedral man Europe ⇒ 25–34	3.66	1.79
19	Woman 25–34 Asia ⇒ Ruins of St. Paul's Cathedral	3.73	1.36
20	Ruins of St. Paul's Cathedral 25–34 Asia ⇒ Woman	3.73	1.89
21	Ruins of St. Paul's Cathedral Woman Asia ⇒ 25–34	3.73	1.61
22	Woman 50–64 Asia ⇒ Ruins of St. Paul's Cathedral	5.84	1.20
23	Ruins of St. Paul's Cathedral 50–64 Asia ⇒ Woman	5.84	2.13
24	Ruins of St. Paul's Cathedral Woman 50–64 ⇒ Asia	5.84	2.18
25	Woman 50–64 Europe ⇒ Ruins of St. Paul's Cathedral	1.48	2.10
26	Ruins of St. Paul's Cathedral 50–64 Europe ⇒ Woman	1.48	1.91
27	Ruins of St. Paul's Cathedral Woman Europe ⇒ 50–64	1.48	0.88
28	St. Domingo's Church 25–34 Asia ⇒ Woman	1.69	1.71
29	St. Domingo's Church Woman Asia ⇒ 25–34	1.69	1.20
30	St. Domingo's Church Woman 25–34 ⇒ Asia	1.69	2.18

association rules. There are 30 strong association rules that are linked to seven cultural attractions. Table 3 articulates of the estimated relationship between those cultural sites and their prospective visitors' characteristics. Table 4 displays the selected strong association rules selected strong association rules under different regions. There are 18 strong association rules have found under that are linked to four cultural attractions. The findings predict the visiting interests of tourists from different countries and the possible scores they may give to the attraction.

Table 4 Selected strong association rules in different regions

ID	Regions	Support (%)	Confidence
America			
1	A-Ma Temple (Ma Kok Miu) Woman 35–49 ⇒ USA	5	0.83
2	Woman 25–34 Canada ⇒ Ruins of St. Paul's Cathedral	8	1.60
3	Ruins of St. Paul's Cathedral Woman 35–49 ⇒ USA	8	1
Asia			
1	Woman 25–34 Indonesia 4 ⇒ Largo do Senado	1.76	1.05
2	Woman 50–64 Japan 3 ⇒ Largo do Senado (Senate Square)	1.07	1.38
3	Largo do Senado (Senate Square) Woman 50–64 3 ⇒ Japan	1.07	1.83
4	Largo do Senado (Senate Square) Woman 50–64 Japan ⇒ 3	1.08	1.22
5	Mandarin's House 35–49 Japan 4 ⇒ Man	1.04	1
6	Man 25–34 India 4 ⇒ Ruins of St. Paul's Cathedral	1.03	0.80
7	Man 25–34 Indonesia 4 ⇒ Ruins of St. Paul's Cathedral	1.85	2.71
8	Ruins of St. Paul's Cathedral Woman 35–49 3 ⇒ Japan	2.01	1.40
Oceania			
1	Largo do Senado (Senate Square) 35–49 Australia 4 ⇒ Man	1.03	1.02
2	Ruins of St. Paul's Cathedral Woman 35–49 Australia ⇒ 3	2.76	1.30
Europe			
1	Woman 35–49 UK 5 ⇒ Ruins of St. Paul's Cathedral	1.02	0.80
2	Ruins of St. Paul's Cathedral Woman 35–49 5 ⇒ UK	1.02	0.85
3	Ruins of St. Paul's Cathedral Woman 35–49 UK ⇒ 5	1.02	0.90
4	Ruins of St. Paul's Cathedral Man 35–49 Germany ⇒ 4	1.02	0.84
5	Ruins of St. Paul's Cathedral Man 25–34 Italy ⇒ 5	1.02	0.81

5 Discussion and Conclusion

The current study performs an exploratory investigation of cultural tourism in Macau. The findings provide insights into (1) what sites are attractive to cultural tourists and why and (2) the demographic characteristics of prospective tourists who are attracted by the cultural sites of Macau. Both the data collection method and the analytical method are comparatively unconventional. The main source of data is user-generated content, which is volunteered and bereft of any interference from the researchers. They represent the natural thoughts of the informants regarding their experience of Macau. In addition, the data include a substantial number of informants, which allow a more comprehensive data analysis to be undertaken. In addition to performing content analysis of tourists' narratives, Association Rule Mining was the second analytical method used to obtain an estimation of the demographic profile of prospective tourists who will be interested in various cultural sites of Macau.

Based on the findings, Macau heritage visitors tend to be male Asian tourists who range from young to middle aged. This is different from the findings of Christou (2005) who found that the heritage site travellers tend to be older. The demographic profile is nevertheless consistent with the statistical report of tourism

figures as published by the Macau Government Tourist Office (2012) to the effect that the majorities of Macau visitors come from Asia and that 45.2 % were male tourists aged from 26 to 45. This implies that the heritage visitors appear to show little or no difference with those non-cultural tourists as regards their demographic characteristics. Yet how deeply they long for cultural experience is another issue worthy of future investigation. In this study, it is reported that those tourists who are more interested in knowing about the culture and history, in addition to their visitations to Ruins of St. Paul, Senado Square and A-Ma Temple; cultural tourists of Macau did visit cultural sites that are far from the conventional tourists' nodes, such as the Guia Fortress which is an isolated cultural site of which there is no other cultural attractions nearby where tourists can visit also by its conveniences.

In the paper, the top popular Macau cultural attractions of the UNESCO World Heritage include Ruins of St. Paul's; Largo do Senado (Senate Square); A-Ma Temple (Ma Kok Miu); St. Domingo's Church and Guia Fortress. Among them, Ruins of St. Paul still remains to be the strongest magnet for it is attractive to a wide range of visitors from Oceania, Asia, and Europe in the middle and older age groups. In general Macau cultural attractions were given an over-average and tourists were generally satisfied their experience on visiting these attractions. Yet some cultural sites remain scantly visited and the core reasons are inaccessibility, lack of interpretation, or a combination of both. Local authorities could allocate more resources to remedy to the lack of visitation to those cultural sites in order to solve the over-crowding problem of the areas with popular cultural attractions. The collected data from tripAdivisor obtains constrains on mining large number of rules, future study may consider to fulfil the limitation.

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Part II
Data Management

Integration of Data Mining Results into Multi-dimensional Data Models

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Abstract The travel and tourism domain as a global competitive service business has a special need to understand the customer and market trends. Typically, available customer-based data is stored in data warehouses and analysed by either OLAP queries or data mining techniques. However, a more powerful approach is to combine these techniques and to integrate data mining results directly into the original data warehouse structures. This comprehensive data source builds the basis for further applications of business intelligence. This paper presents a novel approach to integrate data mining results into multi-dimensional data warehouse structures and to store data mining results with the original information. A first implementation for the leading Swedish mountain destination Åre has shown the advantages of this new concept: the end-user can now easily access data mining results by simple OLAP queries and even combine them with the original information stored in the data warehouse.

Keywords Business intelligence • Data mining • Multi-dimensional data modelling • Data warehousing • Online analytical processing (OLAP) • Tourism knowledge destination

1 Introduction

The tourism business has faced major changes during the last decades. Especially through the widespread of the internet, it became a global competitive business. Potential customers have access to a huge amount of information and can choose between different product alternatives (Buhalis 2003). This makes the anticipation and fulfilment of customer needs most important. Thus, it is crucial to turn

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_12

customer-based data into knowledge about the customer. The amount of available information, especially about the customer, has dramatically increased in tourism (e.g. web-servers store tourists' website navigation, data bases save transaction and survey data, etc.) and it became common to use methods of business intelligence (BI) and data mining (DM) to gain knowledge from available information (Pyo et al. 2002; Wong et al. 2006). These methods offer the possibility to mine information about tourists' travel motives, service expectations, channel use, related conversion rates or booking trends (Pyo et al. 2002). However, up to now, DM tools demand a huge knowledge about the DM process and the single techniques (e.g. decision trees, association rules), and even the results can be unintelligible without the right technical knowledge of how to read them, which cannot be presupposed to exist, especially in small and medium sized tourism business or tourism destinations. To put it into a nutshell, BI and DM can be seen as another example for the *Business-IT-Gap,* especially in tourism. On the one side, crucial business relevant information is available, but on the other side, the user who needs the information is not able to decode it.

The objective of this paper is to bridge this gap by introducing a new approach to integrate knowledge generated by DM techniques directly into the data warehouse structures the underlying data are stemming from. By doing so, DM results, like decision trees or association rules, are now available by well-established standard analysis techniques, like *online analytic processing* (OLAP) queries. More concretely, integration concepts and multi-dimensional data warehouse structures are presented and discussed for major data mining techniques and corresponding results, like *frequent itemsets*, *decision trees,* and *clustering*.

2 State of the Art

The use of BI has faced a steady growth in the tourism domain while analysis techniques out of the field of DM became more and more powerful. By using techniques of artificial intelligence and mathematical modelling, DM discovers unknown patterns in huge data sources (Liu 2011): supervised learning methods, like classification, estimation and prediction are used to explain tourists' behaviour (e.g. booking, cancellation, consumption) (Morales and Wang 2008), or to predict tourism demand (Law 1998; Vlahogianni and Karlaftis 2010). Unsupervised learning methods, like clustering are typically used for customer or product segmentation (Wallace et al. 2004). Nowadays, new types of complex and huge data sources are available, like user generated content (UGC) from the WWW, constituting a new application field of DM (Lexhagen et al. 2012; Fuchs et al. 2015). Relevant knowledge is extracted by specific techniques, like sentiment analysis (Schmunk et al. 2014) and is typically integrated into traditional data warehouses to enrich existing data and to support cross-process analyses (e.g. interlinking booking behaviour and customer satisfaction expressed in form of online reviews) (Höpken et al. 2014).

DM techniques have in common that the generated knowledge is highly relevant but the access appears to be complicated. A major obstacle can be seen in the huge

technical knowledge which is necessary to apply data mining methods and to interpret data mining results (Fayyad et al. 2002). A promising way to solve this problem is the integration of data mining results into the data warehouse the original data are stemming from. For business users, this approach avoids sophisticated data mining operations by simply querying already existing data mining results, as well as to combine data mining results with further information available within the underlying data warehouse. Especially the second aspect makes it mandatory to store data mining results directly within the underlying data warehouse.

The task of integrating data mining results into a database is a rather complicated process, due to the fact that most data mining results can't easily be stored in general database data types, like *String* or *Integer,* without losing valuable information. Two different approaches exist to store data mining results in a relational database: The first approach extends the actual database standard. Therefore, the *Structured Query Language* (SQL) is enhanced with new data types and database operations. One of the most famous approaches in this area is the *SINDBAD project* (Kramer et al. 2006). Here, the general idea is to develop a new relational database language, the *inductive query language*, which is able to support the whole data mining process from the generation of new information up to their storage. Further approaches in this area are the *Mining Association Rule Extension* (Meo et al. 1998), the *Mining Structured Query Language* (MSQL) (Imielinski 1999), or the *Data Mining Query Language* (DMQL) (Han et al. 1996). The second approach is looking for concepts that allow the integration of data mining results without extending the database standard. Therefore, it is necessary to find a table and database structure that saves the results in regular data types. Leading approaches in this area have been presented by the ADReM-Group (http://adrem.ua.ac.be/adrem) or Fromont et al. (2007). These approaches have the huge advantage of standard conformance and, therefore, only these approaches qualify to be used for the integration of data mining results into the already existing data structures of an underlying data warehouse.

While relational databases in the typical 3rd normal form (3NF) are well-suited for storing and managing information, they face their limits when it comes to data analysis. Instead, multi-dimensional data formats became famous for data warehousing due to their effective support of complex queries and OLAP analyses. Additionally, multi-dimensional data models (MDMs) offer a better understandability for end users (e.g. business analysts) which is crucial especially in the tourism domain showing complex data structures and a multitude of different and heterogeneous data sources, e.g. in the context of a tourism destination (Höpken et al. 2013). Thus, in contrast to the approaches presented above, the study at hand presents a novel approach to directly integrate DM results into the multi-dimensional data structures of a data warehouse.

MDMs are based on the fundamental concept of separating between measures, e.g. performance measures of business processes, like number of bookings or turnover, called *facts*, and different contextual perspectives these measures can be looked at, e.g. date of booking or customer characteristics, called *dimensions*.

Integrating DM results into the structures of an MDM can be seen as a non-trivial task and has not been thoroughly investigated so far. Kimball and Ross (2002) present first approaches to integrate market baskets as specific form of frequent itemsets into MDMs. However, they do not offer a comprehensive approach for different types of DM results, like frequent itemsets in general or decisions trees. The reminder of this paper presents such an approach, covering all major DM methods which are heavily used in the tourism domain, like frequent itemsets, decision trees, and clustering.

3 Concepts for Integrating DM Results into MDM

The integration of data mining results directly into the original data structures of the underlying data warehouse, the data mining models were built from is based on specific extensions of the multi-dimensional data structures. In general, data mining results can be divided into two groups: supervised and unsupervised learning methods. While unsupervised learning methods merely identify interesting patterns and correlations in data, supervised learning methods can additionally be used to estimate or predict the value of a target attribute for new datasets, e.g. predicting cancellations or no-shows. As this target attribute is necessarily already part of the data used for learning the model, and thus, also part of the underlying data model, the application of these DM models does not constitute an issue, and the presented approach focusses on the integration of the DM models itself into MDMs. The complexity of this integration task strongly depends on the concrete DM method at hand. Certain DM results can be integrated by simply adding a new attribute to existing tables (e.g. cluster membership), while others need a more complex fact/dimension structure (e.g. decision tree models, or association rules). The below prototypical implementation of the presented concepts is based on booking data from the Swedish tourism destination Åre. Of course, the presented approach can be applied to any other kind of data stored within data warehouses, like web navigation or feedback data stemming from online reviews.

3.1 Frequent Itemsets

As a partial result of the association rule analysis, frequent itemsets identify objects or attribute values often co-occuring, but they don't show the direction of the dependency (Han et al. 2006). In general, the integration of frequent itemsets into a relational database can be archived by the following enhancement of the original data structure. Let's assume the database consists of a *data table* (D) that possesses the attributes ($a_1 \ldots a_n$). In a first step, the database is enhanced by a *concept table,* consisting of all attributes ($a_1 \ldots a_n$) from D and a primary key attribute C_{id}, which

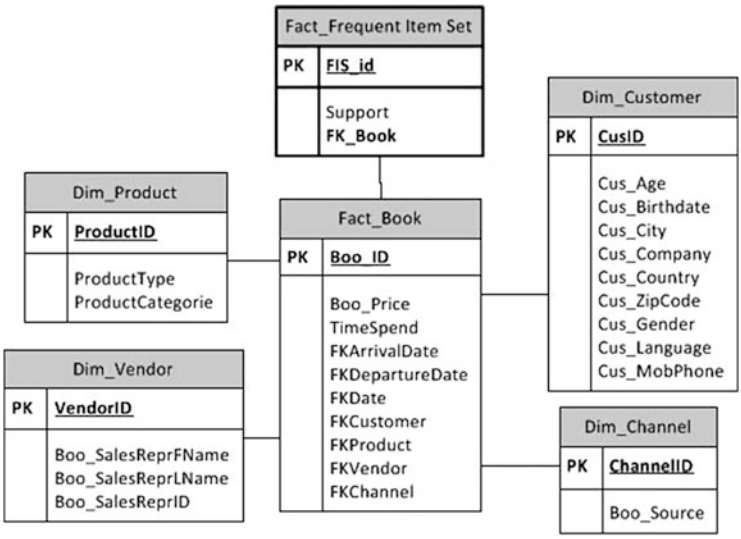

Fig. 1 MDM with frequent itemsets

enables to specify a concrete attribute value combination. In a second step, a *frequent itemset* table is added, consisting of the attribute C_{id}, referring to the attribute value combination, and further attributes for key figures of the frequent itemset, like support or confidence (Blockeel et al. 2008; Calders and Goethals 2006). A frequent itemset can now be represented by adding an entry to the concept table and referring to it by the frequent itemset table. The entries in the concept table only consist of the attributes that are part of the itemset.

The integration of frequent itemsets into a multi-dimensional database works quite similar to the concept above. In this case, it is necessary to consider that the information is spread over a fact table and dimension tables, linked to the fact table. This structure allows to reuse the fact table as concept table (as the fact table is already referencing to all dimension tables) and to add a frequent itemset table referencing to the fact table. Figure 1 presents a view of a MDM extended by a frequent itemset table. The frequent itemset table refers to an artificial entry in the original fact table *Fact_Book*, which represents the frequent itemset (e.g. Age_Group [old], Cus_Country [SWE]). Figure 2 shows a section of the implemented data warehouse, filled with booking data from the Swedish mountain destination Åre.

The figure shows that the frequent itemset with the ID 1 references to an entry in the fact table Fact_Book, with the ID 5. This entry contains mostly default values (e.g. 0/−1) with the exception of the customer attribute. This attribute refers to the first record in the customer dimension, which represents customer characteristics frequently co-occurring, in this case *Age_Group old* and *Cus_Country SWE*.

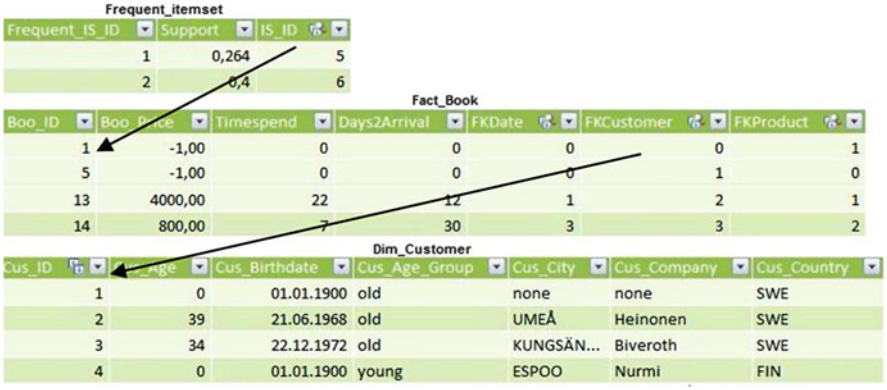

Fig. 2 Data warehouse with frequent itemsets

3.2 Decision Trees

Decision trees are one of the most famous classification methods, assigning each data record to a predefined class (e.g. customer type: valuable/less valuable). In contrast to other classification models, a decision tree can not only perform the classification task itself when applied to new data records, but also can explain the logic behind the classification (Liu 2011) and, thus, is well suited to be integrated into the underlying data warehouse. Different concepts for integrating decision trees into relational data bases have been proposed (Fromont et al. 2007; Blockeel et al. 2008, 2010), representing a decision tree either as a collection of leaf nodes, each leaf node defined by a complete decision rule similar to association rules, or as a collection of layers with nodes, defined in the same way as leaf nodes, but preserving the overall tree structure and, thus, enabling more powerful analyses. The presented approach to integrate decision trees into a MDM is based on the *layer approach*. Figure 3 shows a simple example of a decision tree, classifying customers into valuable and non-valuable customers, based on their booking behavior and booked product.

The basic idea is to offer a rule for each node on the different layers. In the example, one rule on the first layer is $Booking = [short\text{-}term] \rightarrow Customer\_type = [valuable]$), a rule on the second layer is $Booking = [long\ term]$ && $type\ Apartment = [yes] \rightarrow Customer\_type = [valuable]$). Figure 4 shows the corresponding tables of a multi-dimensional data warehouse model, representing such decision rules.

The *Classification-TreeNode* table specifies the decision rule for each node of the decision tree. The attribute *layer* contains the position in the tree structure, the attribute *output* contains information on the results of the decision rule (thus, the predicted class), the attribute *accuracy* specifies the accuracy of the decision rule, and the attribute *FKBook* refers to an artificial entry in the booking fact table, which represents the rule. Figure 5 shows a snipped of the exemplary data warehouse

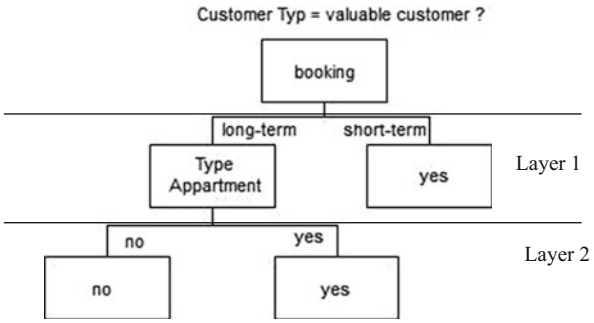

Fig. 3 Decision tree layer approach overview

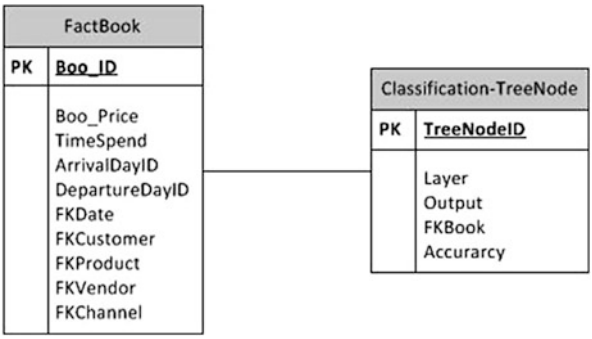

Fig. 4 MDM for decision trees

Tree-Node

TreeNodeID	Layer	Output	FKBook	Accurarcy
1	1	non valuable	7	0,2
2	1	valuable	8	0,3
3	2	non valuable	9	0,41
4	2	valuable	10	0,42

Product

ProductID	ProductType	ProductCategorie
1	Hotel	Accommodation
2	Apartment	Accommodation
3	Other	Accommodation
4	Skiing	Activities

Fact Book

Boo_ID	Boo_Price	Timespend	Days2Arrival	booking	FKCustomer	FKProduct
7	-1,00	0	42	long-term	0	0
8	-1,00	0	0	short-term	0	0
9	-1,00	0	0	long-term	0	1
10	-1,00	0	0	long-term	0	2

Fig. 5 Data warehouse with decision tree

implementation. Line 4 in the *Tree-Node* table, for instance, specifies the right node on the second layers (cf. Fig. 3), corresponding to the decision rule *booking = [long-term] && type Apartment = [yes] → Customer_type = [valuable]*. The artificial entry in the fact table, defining this decision rule, can be found in line 10, specifying *long-term* as booking type and referencing to entry 2 in the *Product* table, specifying *apartment* as product type.

The approach, presented above, simplifies decision trees by just taking into consideration nominal attributes. An enhanced solution also supporting numeric attributes and decisions based on comparison operators like '>' and '<' can be achieved by adding a separate table for specifying each single condition being part of the overall decision rule.

3.3 Clustering

Clustering is an unsupervised data mining method, aiming to group similar data records into homogeneous clusters (Liu 2011). The cluster membership of each record can be easily attached to the original data structures by just adding an additional cluster membership attribute. However, there is further cluster information (e.g. cluster centroid values, cluster quality metrics) that also has to be integrated into the underlying data warehouse for further analyses. Blockeel et al. (2008) presented an approach for integrating cluster information into a relational database, based on a concept table, similar to the case of the association rules presented above. The corresponding approach for the integration of clustering results into a MDM is shown in Fig. 6.

The attribute *FKCluster* in the original fact table specifies the cluster this data entry belongs to, by pointing to the corresponding entry within the *cluster* table. Each cluster is described by characteristics, like its inner distance, its radius, its size, and a reference to its centroid as calculated centre of the cluster (*FK_ClusterCentroid*), represented as an artificial entry within the fact table. In case of a clustering based, for example, on customer characteristics alone, this artificial entry points to the customer dimension, specifying the customer characteristics of the cluster centroid. This structure allows to save cluster models in a quite flexible way, comprising only a subset or all dimensions of the original MDM. In order to additionally store information on the whole cluster model, e.g. a ratio between

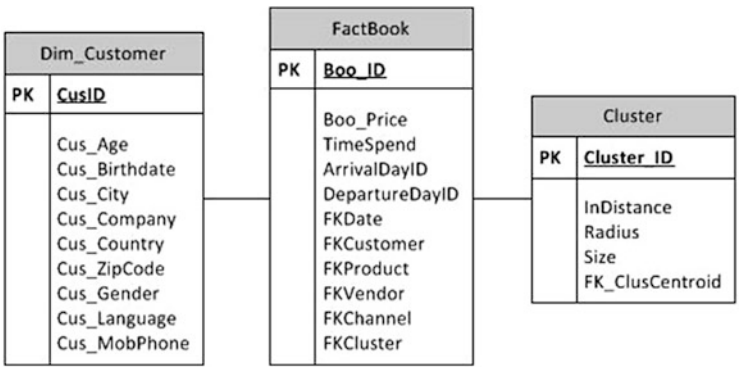

Fig. 6 Multidimensional data base for clustering results

Cluster

Cluster_ID	Clustering_ID	InDistance	Radius	Size	FK_ClusCentroid
0	1	1,07	0,4	470	28
1	1	1,3	0,7	520	34

Fact_Book

Boo_ID	Boo_Price	Timespend	FKDate	FKCustomer	FKProduct
28	-1,00	0	0	1	0
29	-1,00	0	0	2	0
30	-1,00	0	0	3	0
31	-1,00	0	0	4	0
32	-1,00	0	0	5	0

DimCustomer

Cus_ID	Cus_Age	Cus_Birthdate	Cus_City	Cus_Company	Cus_Country	Cus_Age_Group
1	0	01.01.1900	none	none	SWE	old
2	39	21.06.1968	UMEÅ	Heinonen	SWE	old
3	34	22.12.1972	KUNGSÄNGEN	Biveroth	SWE	old
4	0	01.01.1900	ESPOO	Nurmi	FIN	young
5	48	20.10.1958	BANDHAGEN	Larsson	SWE	old

Fig. 7 Data warehouse with customer clusters

cluster-within-distance and cluster-between-distance, like the *Davies Bouldin index* (Davies and Bouldin 2009), an additional table representing the complete cluster models can be added to the above structure (referenced to by the cluster table as an outrigger dimension).

Figure 7 shows a snipped of the implemented data warehouse. In this example, the customers were clustered into two specific groups represented by the two entries of the *Cluster* table. The attribute *FK_ClusCentroid* points to the artificial entry within the fact table, representing the cluster centroid, e.g. entry 28 in the fact table, representing the centroid of cluster 0. In this case the cluster centroid specifies only customer characteristics by pointing to a corresponding artificial entry in the customer dimension, e.g. entry 1 in case of cluster 0, specifying older Swedish customers.

4 Evaluation

The integration of DM results directly into the underlying data warehouse has two major benefits. First, DM results are easily accessible for business users via ordinary OLAP queries without the need to use complex DM tools. Second, the DM results complement the already existing information in the data warehouse and, thus, can be used to enhance the explanation power of the analysis and create new perspectives for OLAP queries (e.g. filter bookings by their frequent itemset or cluster membership). The following sections provide examples of typical OLAP queries on top of DM results for the different DM techniques, presented before.

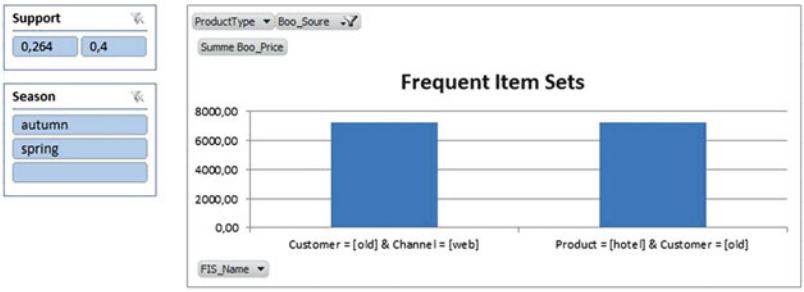

Fig. 8 OLAP results for frequent itemsets

4.1 Frequent Itemsets

Figure 8 shows an example, how frequent itemsets, integrated into an MDM as presented above, can be further analysed by OLAP queries, by displaying the overall revenue of each frequent itemset. Instead of aggregating data along dimensions, like product, customer, etc., as in the typical OLAP approach, the integrated frequent itemsets now serve as new aggregation dimension, thus, adding a completely new perspective on the data. In this example, the total revenue for each frequent itemset is calculated, enabling the user to not only look at the most frequent itemsets but also the most valuable itemsets what concerns overall turnover. Additionally, frequent itemsets can be filtered by characteristics, like their support, or for example the season of the corresponding bookings in order to investigate seasonal conspicuousness concerning the revenue of frequent itemsets.

In a second step, the business user can analyse the most important itemsets even further. Therefore, it is possible to drill through and look at the data on the level of single bookings constituting (i.e. supporting) a specific frequent itemset. Figure 9, for example, shows each single booking supporting the frequent itemset *Product = [hotel] & Customer = [old]* with detailed information, like booking date, season, customer age, origin, sex and the booking price (i.e. turnover). To sum up, the user can now look at most valuable itemsets, e.g. customers booking hotel and ski equipment together, further filter valuable itemsets by additional characteristics, like booking date or season, and finally look at the single bookings, constituting the frequent itemset at hand, to further analyse such bookings on a detailed level, e.g. the concrete hotel booked, etc.

4.2 Classification

Figure 10 shows the results of two OLAP queries based on decision tree information integrated into a MDM, as described before.

Cus_Age_Group	old	
ProductType	Hotel	
		Summe Boo_Price
⊟13		
⊟19.04.2008		
⊟spring		
⊟39		
⊟SWE		
Male		4000,00
⊞16		1466,67
⊞41		750,00
overall result		6216,67

Fig. 9 Drill through for frequent itemsets

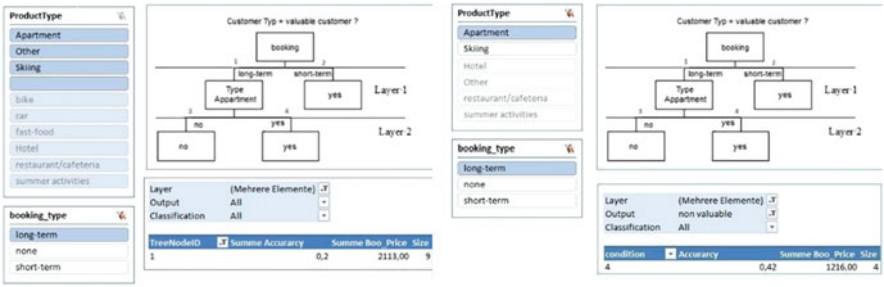

Fig. 10 OLAP results for a decision tree

The interface for OLAP queries based on a decision tree consists of a visualization of the decision tree (upper right part), a control panel to select a node of the decision tree by filtering specific attribute values (left part), and the result of the OLAP query, thus, relevant key figures, like the accuracy (of the class prediction, in this case valuable customer or not) of the selected node or the overall revenue of all single bookings contained in the node (bottom part). In the OLAP query on the left side of Fig. 10, node 1 has been selected (corresponding to selecting booking_type long-term in the control panel), and the OLAP result shows the accuracy, overall revenue and size of the node. The OLAP query on the right side drills down by selecting the more specific node 4 (corresponding to selecting booking_type = long-term and product type = apartment), which, consequently, has a higher accuracy (i.e. more bookings contained in this node have been done by *valuable customers*), a smaller size and, thus, a smaller overall revenue. Thus, instead of looking at the well-known characteristics of decision tree nodes, like size or classification accuracy, in the presented approach OLAP queries can be used to create completely new

Fig. 11 Revenue per customer cluster

Summe Boo_Price	Season		
Cluster	Spring	Autumn	overall result
Cluster 0	2994,67		2994,67
Cluster 1	4366,67	10616,67	14983,33
overall result	**7361,33**	**10616,67**	**17978,00**

characteristics of decision tree nodes, like the generated revenue of all bookings belonging to a node. In general, any fact of the corresponding fact table can serve as new characteristic of decision tree nodes, like the number or persons, number of nights, etc. In this way, decision trees can be used to narrow down the analyses to interesting subgroups of the original dataset. Thus, the integration of decision tree information into a MDM allows to investigate characteristics of the decision tree and its nodes by simple OLAP queries, or, put differently, the nodes of a decision tree constitute a new dimension to be used in OLAP queries. If a decision tree would, for example, explain whether a booking has been cancelled or not, interesting nodes of such a decision tree and, thus, subgroups of bookings, exhibiting a high or low cancellation rate, can be further analysed concerning the number of persons involved in such bookings or their overall turnover, and, thus, the most interesting and relevant subgroups can be identified.

4.3 Clustering

Figure 11 shows an OLAP query, based on customer clusters integrated into the original booking data. The query calculates the overall revenue per customer cluster and season, thus, demonstrates the ability of the integration approach to analyse specific characteristics of customer clusters and combine clusters with data of the original data warehouse. Concretely, the figure demonstrates that cluster 1 customers generate much higher overall revenue and generate revenue in both seasons, constituting a valuable input to marketing activities.

5 Conclusion and Outlook

This paper presented a novel approach to integrate data mining (DM) results into the multi-dimensional structures of a data warehouse. DM results, like association rules, frequent itemsets, decision trees, or cluster models, have been directly integrated into the original multi-dimensional data structures the data mining models were built from. This approach enables to analyse and visualize DM results in an easy way by applying ordinary OLAP queries without the need to use complicated DM and visualization tools. Additionally, the integrated DM results

generate new perspectives and interesting new opportunities to analyse the underlying data itself. The presented approach has been successfully evaluated by a prototypical implementation for booking data from the leading Swedish mountain tourism destination Åre. It has been proved that the proposed approach for the direct integration of DM results into MDMs is feasible and can generate significant benefits, especially for OLAP queries. For evaluation purpose, data mining results have been manually converted into corresponding multi-dimensional data warehouse structures, so far. Thus, in order to test the presented approach for more comprehensive DM results, a concept for an automatic transformation of data mining results into multi-dimensional structures will be developed as a next research activity. In doing this, the approach will be applied to additional business processes especially taking into consideration online data sources, like online reviews or any other kinds of UGC. Additionally, user tests based on the unified theory of adoption and use of technology (UTAUT) will be executed, to further evaluate the overall user acceptance of the new analysis possibilities.

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A Practical Approach to Big Data in Tourism: A Low Cost Raspberry Pi Cluster

Mariano d'Amore, Rodolfo Baggio, and Enrico Valdani

Abstract *Big Data* is the contemporary hype. However, not many companies or organisations have the resources or the capabilities to collect the huge amounts of data needed for a significant and reliable analysis. The recent introduction of the Raspberry Pi, a low-cost, low-power single-board computer gives an affordable alternative to traditional workstations for a task that requires little computing power but immobilises a machine for long elapsed times. Here we present a flexible solution, devised for small and medium sized organisations based on the Raspberry Pi hardware and open source software which can be employed with relatively little effort by companies and organisations for their specific objectives. A cluster of six machines has been put together and successfully used for accessing and downloading the data available on a number of social media platforms.

Keywords Raspberry Pi • Big data • Online social networks • Tourism organisations

1 Introduction and Background

Objective of this paper is to describe a system based on scalable open source technology that makes the collection of online social networks data manageable by academics and practitioners for a better understanding of the tourism phenomenon. A simple mapping 'exercise' demonstrates the functionality of the system.

Online social networks (OSNs) are not only a powerful tool for promoting and marketing tourism products and destinations (Leung et al. 2013), but, given their incredible diffusion, are also (and probably more importantly) an extraordinary source of information on a wide range of topics: from the preferences of tourists to

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_13

their activities at destination, to the way they behave, or to how the value what offered to them. And this can be seen explicitly, through their comments and discussions, or implicitly by tracking the trails they leave while moving and visiting places (Hays et al. 2013; Jungherr and Jürgens 2013; Wood et al. 2013). Moreover, the information available online can provide much better capabilities to assess the real consistency of tourist flows by analysing their activity in the social media space (Heerschap et al. 2014). This is a crucial task, because today we still rely on 'traditional' counting of visitors coming to accommodation establishments, while the phenomenon of *alternative accommodations* (private houses, couchsurfing, farms, religious establishments etc.) is developing fast, bringing tourists that are not fully accounted for, but must be serviced and satisfied for a good reputation of companies and destinations.

Obviously, there are many issues in this practice and many highlight the need for a rigorous approach to the analysis of social media data in order to avoid misinterpretations and pitfalls (the extensive review of Bonchi et al. (2011) provides a good discussion on these issues).

Big Data is the buzzword that in present times identifies the massive volume of both structured and unstructured data reputed to be easily available on the Web and difficult to process using traditional database and software techniques or by using traditional statistical methods. Actually, the problem is not much in the volume, as many other fields have faced this issue well before (astrophysics, particle physics, genetics, meteorology etc.), but rather in their fragmentation and variability, and in the need to combine structured and unstructured analysis techniques to extract meaningful outcomes. And, what is more, all these operations are often intended to be performed in a business and operational environment and not in an academic 'protected' laboratory, which adds an issue of speed in assessing situations that change quite rapidly.

Big Data is considered by many an incredible opportunity for its supposed capacity to provide answers to practically any question that could be asked about people's behaviours, views and feelings. As a matter of fact, it is rather surprising to see that a phenomenon once considered engendering disorientation and confusion, the so called *information overload*, once changed name into *Big Data* is now believed by many a kind of panacea, able to provide a wealth of useful and undeniable insights into many aspects of the modern life of individuals, organisations and markets (Mayer-Schönberger and Cukier 2013; McAfee et al. 2012).

Many of these claims are more than justified and, actually, the capability to well unravel complex phenomena by tapping and combining all the available sources of information is an extraordinary advantage for those who can exploit fully the possibilities that are available today (Bedeley and Nemati 2014).

However, besides the marketing buzz, a more careful and neutral analysis of the *Big Data* phenomenon highlights a number of issues, some of whom are well known in the academic environment, but may be not fully familiar to industry and practitioners. On these, the paper by Boyd and Crawford (2012) gives a good summary. As the authors note, many allegations of objectivity and accuracy may be misleading. Large data sets from online sources are often unreliable, and their dynamicity frequently prevents any attempt of replication of a study for confirmatory purposes.

Moreover, errors and gaps can be magnified when multiple data sets are used together. The difficulty and cost for gaining access to *Big Data*, then, risks producing a new kind of digital divide between those who can afford the endeavour and gain the advantages and those who cannot avail themselves of the indications that can derive from such studies.

The large quantities of data available put under stress our conventional analysis methods. In absence of a very clear research objective and a likewise rigorous data collection plan, the risk of discovering meaningless effects or deceptive outcomes is quite high. One example is the recent revision to the Google Flu Trends indicator that has been found to be contaminated by a number of additional factors (Lazer et al. 2014). Large quantities of data also need a reconsideration of the statistical methods used for the analysis (Fan et al. 2014). When thousands of series of data are available, in fact, the probability to find a significant correlation between any two series, even if made of completely random numbers, can be as high as 90 % (see for example Granville 2013).

In summary, scholar and practitioners agree that there are remarkable benefits in having access to a vast amount of data that cover practically any aspect of human life, and in them, obviously, those related to their travels. But in order to achieve these benefits there is a need for a particularly high care in the handling of any investigation that uses information coming from the vastly populated online world. The first important point is, as well known, a clear setting of the objectives (the research questions), the second one, a direct consequence, the decision on the methods to be used for collecting the data needed.

1.1 Issues in Data Collection

Although many applications exist that provide some kind of controlled access to the wealth of data online social networks (OSNs) collect, when a specific investigation is required the main issue is in the possibility to gather a quantity of elements that can provide significant results. In these cases, collecting tweets, Facebook posts, reviews or similar elements can be a rather complicated task.

One possibility is to resort to a data provider such as Gnip (gnip.com), Datasift (datasift.com) or Topsy (topsy.com). This can be, however, a rather expensive solution, at least for a small company or destination, as prices are in the range of some tens of thousands euro. The second possibility is to use some applications developed for other purposes that however provide a plugin for downloading such data. Examples are NodeXL (nodexl.codeplex.com), a free network analysis add-in for Excel, or Gephi (gephi.github.io) an open source platform for visualisation and analysis of complex networks which comes with this type of additions.

Nonetheless, as also pointed out by many scholars and practitioners in informal conversations, all these solutions are not fully satisfactory for their intrinsic limitations in the amount of data they can handle, or in the type of information they can collect, that are functional to the providers' main scope, and not necessarily fully in

line with what a *user* might need (Hansen et al. 2010). Therefore, a personalised approach may be required when some specific objective is to be accomplished.

An 'independent' set of programs for collecting the data needed can be put in place with not too much difficulty by using the widely available open source programs that access the APIs (application program interfaces) offered by practically all OSNs. These scripts are generally well documented and relatively easy to tailor for a specific need, and involve only a limited knowledge of computer programming (at the reach of a high school student in computer science). Their use, however, needs to take into account the constraints set by the APIs, that typically put a limit in the quantity of data that can be retrieved in a certain period of time (requests issued per hour), or on the topics that are available. When some of these limitations are exceeded, the IP address of the machine is blocked and the download terminates. Therefore, it can be advisable to have multiple machines working in parallel with different addresses. One more consequence of the time limits is that it may result in the immobilisation of hardware resources for long periods of time (days or weeks) if significant amounts of data must be collected, which is, obviously, a practice that many small organisations cannot afford.

2 The System

The system presented in this work is a possible answer to some of the issues described above. The objective is to make available a low-cost solution which is simple and flexible enough and does not require too specialised skills, so that a small organisation or company can set a personalised analysis or research program by deciding autonomously what questions to investigate and what data best fit the study objectives.

The system is a cluster of six Raspberry Pi machines, connected between them and with the Internet via an Ethernet switch and running a Linux-based operating system with a series of Python programs for accessing OSNs' APIs. This section describes the system and its hardware and software components.

2.1 The Raspberry Pi Computer

Raspberry Pi (Fig. 1) is a credit card sized single-board computer developed in the UK by the Raspberry Pi Foundation (www.raspberrypi.org). Originally designed as an educational low-cost system (Severance 2013), the Raspberry Pi, for its low cost, simplicity and flexibility has spurred an incredible global interest so that in the (little more than) 2 years of its life, more than three million machines have been sold, making this one of most diffused computers of all times.

The machine (Fig. 1) is powered by a Broadcom BCM2835 system-on-a-chip (SoC) multimedia processor with an ARM 1176JZF-S 700 MHz processor and a VideoCore IV 24GFLOPS GPU. For storage it uses an SD Card (holding the operating system and all the software applications needed). The Raspberry Pi is

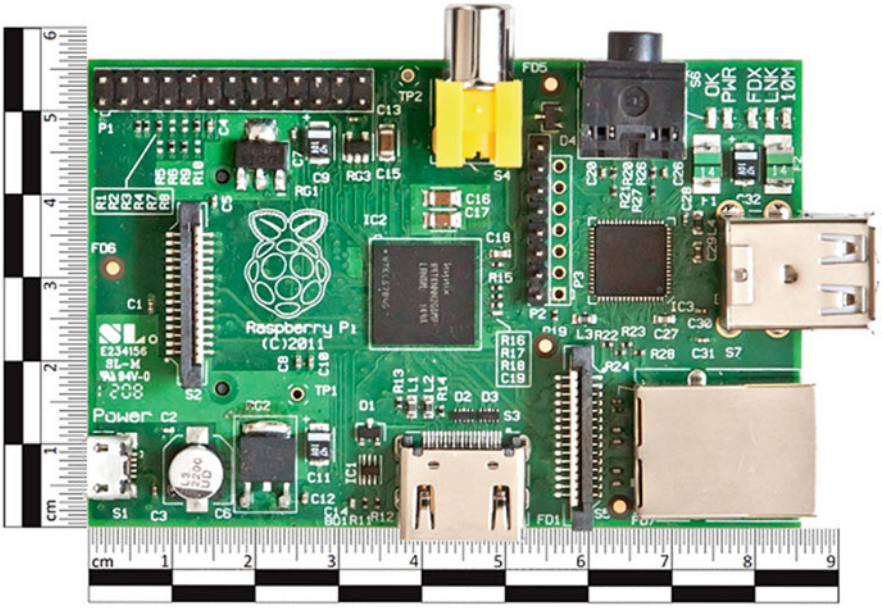

Fig. 1 The Raspberry Pi computer

available in two models: model A, with 256 MB RAM, 1 USB port, and model B, equipped with 512 MB RAM, 2 USB ports, and 10/100 Ethernet port. The device can be interfaced with external components via a set of GPIO (General-purpose Input/Output) and UART (Universal Asynchronous Receiver/Transmitter) connectors. Also available are an RCA and an HDMI ports (for external video), and a 3 mm audio jack.

The computer is powered by a DC 5 V 1A input. The USB ports (model B) cannot provide more than a 100 mA current, so devices using more than that are incompatible and for them a self-powered device or USB hub is needed (Upton and Halfacree 2013). A Raspberry Pi model B costs $35 (about €30). A working installation (computer, SD card, case and power supply) can be purchased for less than €50. When energy consumption is considered, a single computer uses (average activity) about 2.5 W, while the switch uses about 4 W and the hard disk about 10 W. For the whole cluster we therefore estimate a consumption of about 30 W. The low heat production allows using it without any special air conditioning or ventilation requirements (it can also be closed in a drawer, if needed for security reasons).

On the software side, a number of popular Linux distributions have Raspberry Pi specific versions. The Foundation provides on its website a number of operating system images that can be freely downloaded. Raspbian is the default Linux OS (operating system) provided. It is based on a Debian 'wheezy' distribution, optimised for the specific hardware. It contains a large number of packages among which the most important piece is the Python programming language. In fact, Python is the core language around which the Raspberry Pi was built (actually that is the meaning of Pi in the name).

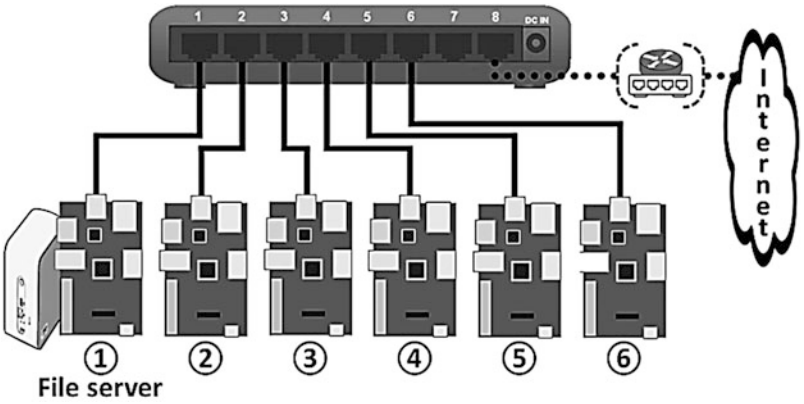

Fig. 2 The Raspberry Pi cluster schematic diagram (the router shown is optional and dependent on the specific network setting)

2.2 Cluster Architecture

The cluster is composed of six Raspberry Pi model B machines connected via an Ethernet switch (Fig. 2).

The rack holding all the components together was assembled by using Lego bricks (Fig. 3), loosely following what done by the Glasgow team for their PiCloud system (Tso et al. 2013).

One of the machines (see Fig. 3) is equipped with a 2TB USB powered hard disk and acts as a file server for the cluster, accumulating into a series of SQLite databases all the data collected. The databases are specialised by OSN in order to allow the maximum flexibility for the analysis and reduce the load on the different machines.

All machines are given a static IP address and, in our installation, access the Internet via the main University gateway. In cases in which a similar configuration is not possible, a router is needed to connect the cluster to the Net.

2.3 Software Components

All the machines have a similar configuration. Besides the Raspbian distribution, a Samba system was installed. Samba (www.samba.org) is an open source suite that provides file and print services, the clients, and the file server, and is interoperable across different operating systems so that the files can be seamlessly transferred to a Windows or a Mac machine for more complex processing.

The software programs needed for downloading data from the OSNs (online social networks) were written using the Python programming language. Python is a general-purpose, high-level programming language whose design philosophy

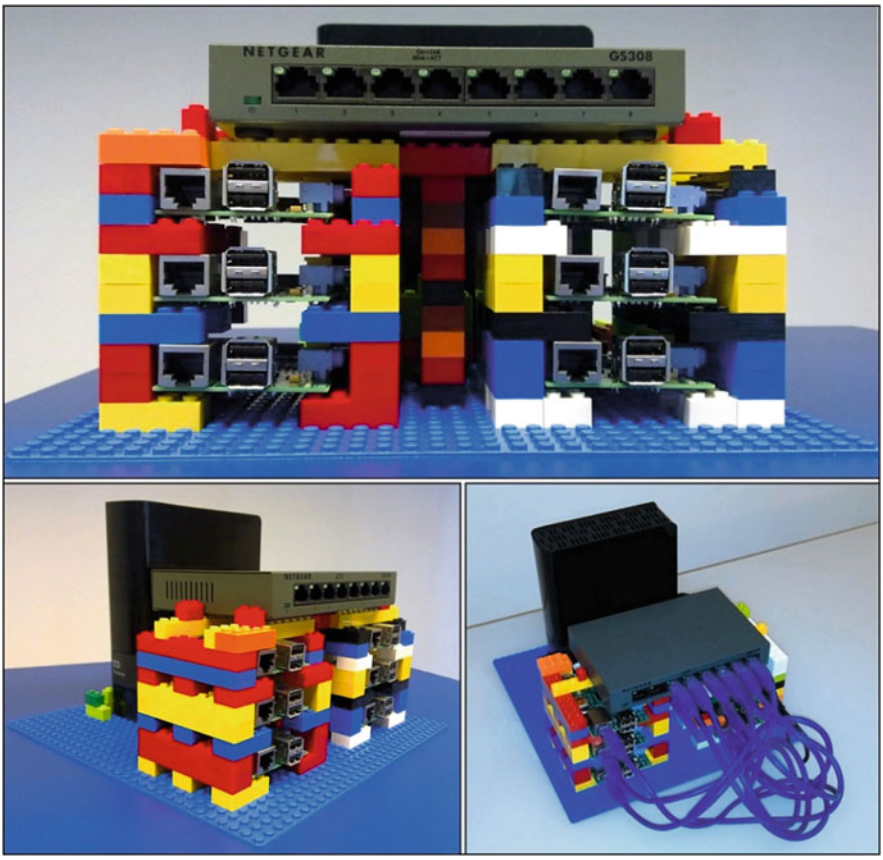

Fig. 3 The Raspberry Pi cluster

emphasises code readability. It has a relatively simple and compact syntax, thus allowing fast development of applications. Despite being an interpreted language, Python is highly efficient and the execution speed of its programs is, in many cases, comparable with that of a compiled language (Cai et al. 2005). Its open source philosophy has made possible to count on a great number of packages and libraries. Python installers are available for all environments (see www.python.org).

For our purposes, a quite large number of programs is available that allow using the APIs of many social media platforms (see a list at: www.pythonapi.com). This makes easier the task of accessing a specific platform (Russell 2013). Moreover, where textual analysis would be needed, the Natural Language Toolkit (NLTK) provides a set of highly efficient functions (Bird et al. 2009).

In general our scripts for downloading data from an OSN were built by following the diagram shown in Fig. 4.

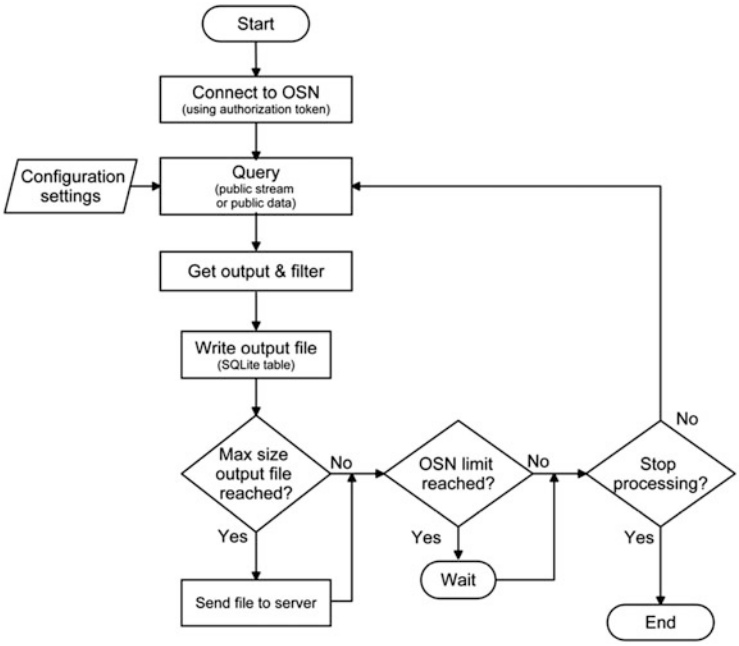

Fig. 4 The Raspberry Pi cluster schematic diagram (the router shown is optional and dependent on the specific network setting)

For all the cases, a preliminary step consists of acquiring an authorization token that is used to access the platform and its API (instructions are given in each set of Python libraries or on the developers section of the OSN considered).

All the scripts take into account the different restrictions imposed by the OSNs, that typically consist of a limit of the number of requests accepted in a certain time interval. Moreover, in order not to overload the single machines, a size limit was set for the output files. Once reached this size the files are transferred to the file server. Periodically (e.g. once a week in a 'long run' task) all machines are stopped, and a script on the file server merges the different files into a single database.

The file server machine also provides a PHP web application (presently under development) that allows managing the different jobs on the other computers in the cluster and the configuration files needed by them (e.g. the OSN to be used, or lists of objects, tags etc. to be examined).

It is important to note here that the whole system (all hardware components, cables and power supplies) has a total cost of about € 400.00, with operating costs (energy requirements) in the range of a couple of euro per week, which is a reasonable investment even for a very small company.

3 A Demonstration: Geolocating People in a Tourism Destination

The whole system was tested by executing a simple task: the geolocation of people in a destination. The city of Lugano (CH) was chosen as centre of a 5 km radius area. The cluster was employed for downloading data from Facebook, Twitter, Foursquare and Instagram. For each source all posts (tweets, check-ins, pictures) carrying a geocoded tag (in the area of interest) were selected. The resulting items were then aggregated into a list of positions (latitude and longitude) and weighted by the number of elements referring to each position. The list was then used as input for the Heatmap.js script by Patrick Wied (www.patrick-wied.at/static/heatmapjs). Heatmap.js is an open source JavaScript library that can be used for visualising geocoded data in real time by using an HTML5 canvas element to draw heatmaps.

In a heatmap three dimensional data are used where two dimensions represent Cartesian coordinates (x and y values, latitude and longitude in our case) and the third one is used for showing the intensity of a data point. The intensity is rendered as a colour, usually red (hot) for the maximum and blue (cold) for the minimum. The script produces a layer which can be superimposed on a map. OpenStreetMap (www.openstreetmap.org), the collaborative free editable map of the world was used as a basis.

On another attempt we put coloured markers (each marker represents the source of data: round solid = Facebook, round light = Twitter; square light = Instagram; square solid = Foursquare) on a Google map (using a simple javascript code calling its API). The results are shown in Figs. 5 and 6.

In a time period of 2 weeks a total of 2,288 points of interest (POIs, points referenced by at least one source) were collected, with a total of 19,378 mentions, split as shown in Table 1.

Looking at Table 1 it is interesting to note how (in the period under consideration) Instagram seems to be the most used tool, followed by Facebook. Twitter shows a lower utilization, which is probably due to the fact that most tweets do not carry geocoded information. Foursquare is used very little.

Although quite simple and straightforward, this exercise can be of great interest for a destination manager or a tourism stakeholder as, if carried on at regular intervals, is able to provide a faithful representation of the number (at least a significant sample) and the presence of active social media users in an area. This can be used to better inform plans, strategies and actions, for example by helping in the choice of the platform to use more extensively in order to engage users.

A number of other parameters can be recorded (when available due to privacy settings) about the individuals sampled, such as place of origin (which allows distinguishing between visitors and locals), age, preferences, places visited before the trip to the destination or even intentions to go somewhere else or to perform some activity, and so on. Moreover, a semantic analysis of the text collected can provide, as known (Cambria et al. 2013; Ko et al. 2013), useful indications about the attitude of the users with respect to the different POIs. The whole set of

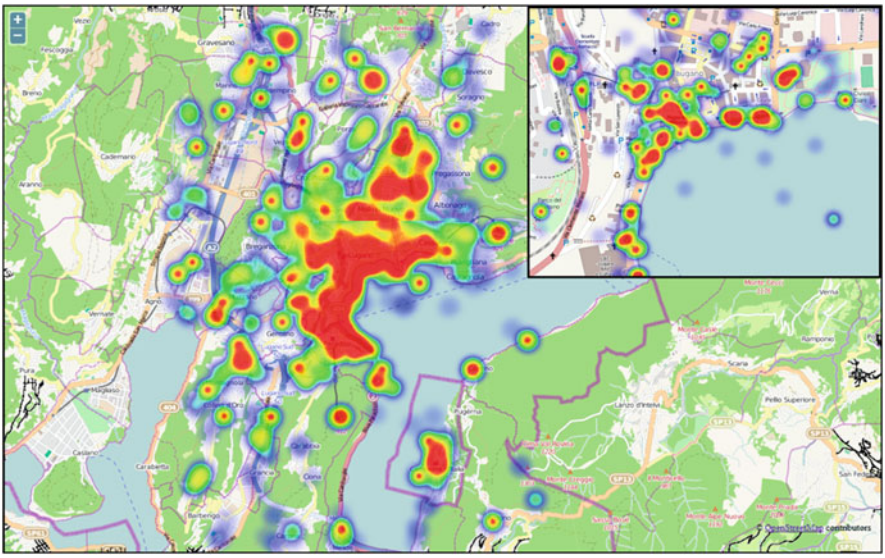

Fig. 5 Heatmap of social media users in Lugano (CH). *Inset* shows the most central area of the city

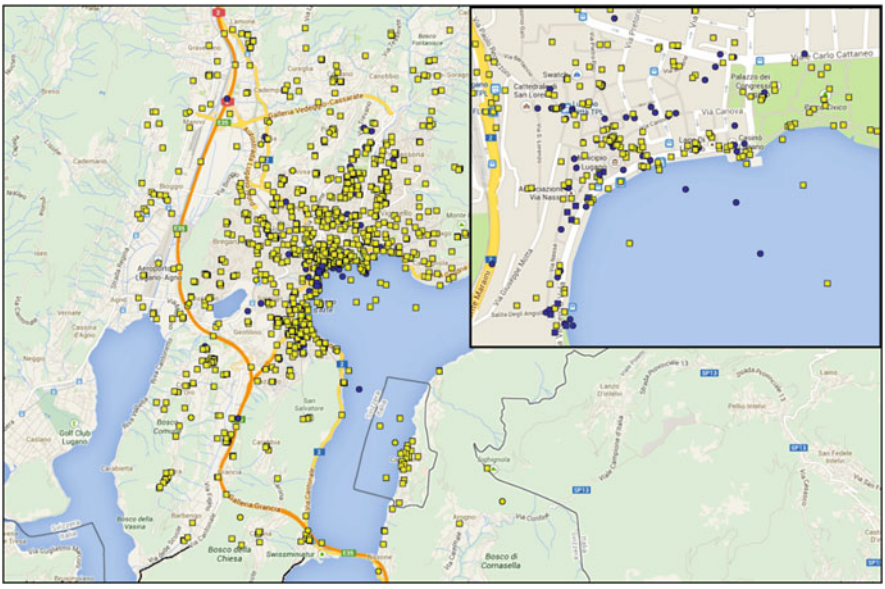

Fig. 6 Markers map of social media users in Lugano (CH). *Markers* represent the source of data: round solid = Facebook, round light = Twitter; square light = Instagram; square solid = Foursquare. Inset shows the most central area of the city

Table 1 Points of interest (POIs) and mentions collected for the different OSNs

OSN	POIs	Mentions
Facebook	291	12,923
Foursquare	15	57
Instagram	1,958	4,739
Twitter	24	1,659
Total	*2,288*	*19,378*

analyses, as said, can be performed on data specifically collected for a particular objective.

One more consideration is in order. The number of useful points recovered may seem small, if compared with the claims of hugeness of the data available. This is a demonstration of the fact that when specific objectives for an investigation are set, things can be not as easy or fast as it might be inferred by the buzz around *Big Data*.

4 Concluding Remarks

When considered critically and rationally, *Big Data* is a worthy way to better explore the highly dynamic tourism phenomenon. By accessing the huge quantity of trails left behind the online activities of billions of individuals, it is possible to distil valuable information on practically every aspects of interest for researchers, practitioners and managers. Coupled with more traditional investigation methods, the analysis of such information can turn out to be of fundamental importance for a better understanding of the different phenomena connected with the tourism world or as an aid in informing more effective choices (Jungherr and Jürgens 2013). However, despite the apparent universal availability of the data in question, actually collecting those needed for a specific objective can be, from a practical point of view, a tricky task. As discussed, issues of time cost and competence may be difficult to overcome by the smallest companies and organisations.

The Raspberry Pi cluster presented here is an affordable solution. Its architecture, combined with the usage of open source software makes it an ideal candidate for the job of retrieving data from the wide array of online social platforms. The cluster has a number of advantages with respect to conventional arrays of computers. It is a low-cost solution, with a low total power consumption, easy portability (due to its small size and weight) and easy scalability. The only specialist skill needed is the one required for the personalisation of the programs used. But this issue can be easily solved even by a small organisation by taking advantage of external programmers or computer science students.

The cluster is now operational and we look forward to employing it in a series of research programs on the most important issues in the usage and the value of the contemporary online technologies and in the opinions of users on several issues.

Acknowledgements The authors wish to thank the staff of the CERMES Center and of the Bocconi IT services for their help and support during the project.

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Methodology for the Publication of Linked Open Data from Small and Medium Size DMOs

Ander García, Maria Teresa Linaza, Javier Franco, and Miriam Juaristi

Abstract Destination Management Organizations (DMOs) create and collect valuable data in the tourism sector, which usually is kept in isolated data repositories. Linked Open Data (LOD), which combines the Open Data movement and the Linked Data initiative, adds semantic annotations and links to external data, allowing DMOs not only setting their data free from isolated repositories, but also placing them in multiple contexts by pairing them with different LOD sets worldwide. However, the lack of clear methodologies, publication examples and tools focused on DMOs has been reflected on a scarcity of available examples of tourism LOD published by DMOs. This paper presents a methodology for the publication of tourism LOD for small and medium size DMOs, which has been implemented using Open Source tools. An example of publishing a multilingual dataset of Points of Interest (POIs) is provided as well as a mobile application based on the data.

Keywords Linked open data • DMO • Tourism data

1 Introduction

Destination Management Organizations (DMO) are among the largest creators and collectors of data in the tourism sector. Such information is usually kept in closed legacy systems and isolated repositories (data silos), where it is difficult to find, access, combine and reuse. However, there are different approaches to turn tourism information that has been created and used only for internal purposes into valuable and informative datasets.

The Open Data (OD) philosophy is based on the general idea that data should be open, which means that "anyone is free to use, reuse, and redistribute it, subject only, at most, to the requirements to attribute and/or share-alike" (opendefinition.org [July 25, 2014]). The publication of updated and reliable OD by DMOs opens

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_14

new possibilities, such as the reduction of the development costs of applications (mobile guides, websites) on top of the data, or the provision of innovative added-value services which combine multiple data sources. As a further step, the semantic annotation and linking of OD to other data under the Linked Open Data (LOD) initiative will allow DMOs to improve their publication initiatives. Not only will they be able to promote the access to the data, but also they will pair themselves with different LOD sets worldwide.

Generally speaking, a limited number of anecdotal datasets are used to provide examples of tourism LOD, as the publication process has not happened in a standardised way in most of the cases.

Despite the current availability of a fragmented set of tools to support Linked Data efforts, the lack of integrated Linked (Open) Data transformation and publication frameworks is still a barrier for DMOs, which demand solutions that could operate under their scale, heterogeneity and data quality standards.

To address some of these critical issues, this paper proposes a methodology for the publication of LOD based on Open Source tools mainly oriented to small and medium size DMOs. The methodology has been validated during the LOD publication of several Points of Interest (POIs) from a local DMO, which have been reused in the implementation of a mobile application.

This paper has been organised as follows. Section 2 reviews the state of the art of LOD and its application to the tourism domain. Section 3 describes the proposed methodology and its implementation based on Open Source tools. Section 4 presents an example of the publication of tourism LOD, and a mobile prototype reusing the data. Finally, Sect. 5 summarises the conclusions and proposes some future work.

2 State of the Art

2.1 Linked Open Data (LOD)

On the one hand, the availability of Open Data (OD) has grown significantly, with pressure being placed on all kinds of public organizations to release their raw data. Although OD is often crucial for the development of public policy, it can also be valuable for other domains such as tourism. This research will follow the definition of OD provided by Janssen et al. (2012) who defined Open Data as "non-privacy-restricted and non-confidential data which is produced with public money and is made available without any restrictions on its usage or distribution. Data can be provided by public and private organizations, as the essence is that the data is funded by public money".

On the other hand, Linked Data (LD) refers to "data published on the Web in such a way that it is machine-readable, its meaning is explicitly defined, it is linked to other external datasets, and it can in turn be linked to from external datasets" (Bizer et al. 2009). LD identifies resources with unique Uniform Resource

Identifiers (URIs) references, which can be dereferenced over the HTTP protocol into data that describes the resource.

The combination of the OD movement and the LD initiative creates a powerful option for data organizations and knowledge distribution. Linked Open Data (LOD) is the method of publishing structured data (e.g., RDF, XML) that can be interlinked among different websites enabling data integration and querying (Bizer et al. 2009). LOD is freely available to access, download, and use.

Tim Berners-Lee (www.w3.org/DesignIssues/LinkedData.html [July 20, 2014]) envisioned a five-star model that has been widely accepted as a framework for evaluating OD and LOD projects: data distributed on an open license (1-star); distributed as machine-readable, structured data (2-star); distributed in a non-proprietary format (3-star); data identified with unique URIs references (4-star); and data linked to other people's data (5-star). This project will target the 5-star publication model.

2.2 *Publishing Linked Open Data*

Berners-Lee (www.w3.org/DesignIssues/LinkedData.html [July 20, 2014]) outlined back in 2006 a set of rules for publishing data on the Web in a way that all published data could become part of a single global data space. This data is expressed in the semantic language RDF (Resource Description Framework), a World Wide Web Consortium (W3C) data model specification based on making statements about resources in the form of subject-predicate-object expressions, called triples. RDF is based on ontologies and vocabularies to model the data. Ontologies are "the specification of conceptualizations, used to help programs and humans share knowledge" (Gruber 1993).

Publishing a dataset as Linked Data on the Web involves the following three basic steps (Bizer et al. 2009): (1) assign URIs to the entities described by the dataset and dereference these URIs over the HTTP protocol into RDF representations; (2) set RDF links to other data sources on the Web, so that clients can navigate the Web of Data as a whole by following RDF links; and (3) provide metadata about published data, so that clients can access the quality of published data and choose between different means of access.

A crucial step in the publication process is the conversion of information datasets, stored in relational databases or structured documents to RDF datasets. This process, known as triplification, relies on deciding the way of representing database schemas or document concepts to an RDF vocabulary to be used as the basis for generating the RDF triples (Salas et al. 2011).

Futhermore, De Faria et al. (2011) have identified three steps within the basic Linked Data publication process. The first step includes the determination and creation of vocabularies and ontologies which model the data to be published. In order to reduce the effort involved in the consumption and integration of the published linked datasets, it is crucial to maximise the reuse and extension of existing vocabularies and ontologies before proposing customised ones (Salas et al. 2011). Secondly, after the original data has been converted to RDF, the

entities in the dataset are linked either to entities in external datasets published by the same organization or to LOD published by a different organization, such as DBPedia (Bizer et al. 2009).

Thirdly, the dataset is made available on the Web in three forms: (1) through dereferenceable URIs (where an RDF document is returned when an URI is dereferenced through an URI HTTP request); (2) through a SPARQL endpoint (a SPARQL query interface, which can be considered as being to RDF what SQL is to a relational database, for the RDF dataset which is exposed on the Web); and (3) through RDF data dumps (files containing the RDF triples of the dataset). The published datasets should be made discoverable on the Web by providing the appropriate high-level dataset and search engine descriptors.

Based on the previous general steps, researchers have proposed different methodologies to publish LOD for a variety of domains. Although most of the examples are focused on Public Administrations and propose methodologies to publish Linked Open Government Data (LOGD), some of the examples are focused on generic data sources (Auer et al. 2012; Kaschesky and Selmi 2013) and others cover diverse data sources, such as georeferenced and statistical information (Consoli et al. 2014), meteorological information (Villazón and Vilches 2011), and even data about research projects (De Faria et al. 2011) and the performance of Internet links (Souza et al. 2014).

Finally, the W3C Government Linked Data Working Group has proposed a series of best practices to publish also LOD (www.w3.org/TR/2014/NOTE-ld-bp-20140109 [July 10, 2014]) based on ten general steps. The methodology proposed in this paper is based on these steps, adapting them to small and medium size DMOs. Although previous examples could serve as guidelines for DMOs, the differences among properties of source data and requirements between domains require specific methodologies and examples for tourism LOD.

2.3 *Linked Open Data for Destination Management Organizations*

LOD can extensively benefit the tourism domain. Firstly, it provides syntactic interoperability enabling a common infrastructure to share tourism data and to facilitate the consumption of these datasets by infomediaries (agents that handle information between providers and consumers) in novel applications. Secondly, links established between datasets can augment data sources with additional knowledge.

Tourism Open Data examples are not difficult to find. For example, the Basque Government published a downloadable file of Points of Interest (POIs) in five languages in 2010 (opendata.euskadi.net [July 10, 2014]) which is annually updated. However, the publication of tourism LOD is still mainly related to initiatives led by research institutions. For instance, Larrinaga et al. (2013) describe a use case of the application of LOD in the tourism sector. Data related to

destinations, accommodations and restaurants has been gathered from Open Data Euskadi and has been enriched with user reviews from social networks. Bacciu et al. (2014) also have transformed Open Data provided by the DMO about accommodations in Tuscany to LOD. In these examples, researchers have directly published LOD without the intervention of the DMO. Generally speaking, the two main data categories published are related to statistical data and POIs of the destination.

Focusing on LOD available at repositories from DMOs, authors have found few examples of tourism LOD with active URIs: Zaragoza (5-star) (www.zaragoza.es/ciudad/risp [July 10, 2014]) and National Parks of Oklahoma (4-star), (data.ok.gov [July 10, 2014]). Some initiatives have published tourism LOD, but do not have active URIs to be linked from other datasets as Barcelona (opendata.bcn.cat [July 10, 2014]), Italy (www.linkedopendata.it [July 10, 2014]) or statistical data of Serbia (elpo.stat.gov.rs [July 10, 2014]).

Furthermore, the TourMIS project contains information about the arrivals, bed nights and capacity tourism indicators, recorded from 1985 onwards, about over 150 European cities and in connection to 19 major markets (Sabou et al. 2012). The project combines this data with data from other sources (Eurostat, UNWTO) to support decision-making scenarios on the tourism domain, establishing links between DBpedia resources and corresponding destinations.

The lack of appropriate methodologies, publication examples and tools for small and medium size DMOs can be due to the lack of best practices of tourism LOD published by DMOs. This paper details a methodology with the corresponding Open Source software tools targeting these DMOs to increase the availability of tourism LOD.

3 Methodology for Publishing Linked Open Data

The proposed methodology aims at supporting small and medium size DMOs on the publication of 5-star tourism LOD, covering all the steps related to the transformation and triplification process from source files, and the linking of annotated triples to other datasets and their publication. The methodology is based on a set of well-known Open Source tools available for the publication of LOD to maximise the reuse of existing tools.

Before starting the publishing process, several non-technical and technical issues related to the data should be defined. Regarding the non-technical issues, the first decision is related to the selection and categorization of the data that will be published. Ideally, the dataset should be selected on the basis of its higher potential value for infomediaries and final users of the data. Furthermore, it is important to specify the type of license in which data will be published. Recommended licenses are the ones proposed by Open Data Commons (opendatacommons.org [July 10, 2014]), which have been designed to specifically tackle the legal issues related to OD. The technical decisions are mainly related to the correct design of the URIs

that will identify the data. When data should be available in more than one language, technical decisions also include the selection of a multilingual data publication pattern (Gracia et al. 2012).

The publication process consists of three main steps: pre-processing, triplification and publication. First, the data pre-processing step is responsible for extracting, cleaning and normalizing data from structured sources in a variety of data formats (CSV, JSON, Excel files). Although data should be normalised and properly stored, initial trials have shown that data may present inconsistencies and lack a standardised format. Thus, original data should be transformed into a source of structured and coherent data, typically a CSV file.

Several transformations could be applied at this step, including the definition of a coherent format for strings and numbers (i.e. telephone numbers with and without international prefix, decimal numbers separated by commas); the format for multilingual values (i.e. Bilbao, Bilbo, Bilbo—Bilbao, Bilbao—Bilbo, Bilbao/Bilbo); the correct storage of some values that could be doubled (i.e. two values in the telephone number field); and the detection of errors or non-existing values.

The LOD Refine software is proposed to perform the transformations required at this step. This programme extends Open Refine, which can be considered as a spreadsheet application that allows transforming data from a source file (CSV, JSON, Excel files...) based on formulas expressed on GREL (Google Refine Expression Language). The resulting file can be exported to a new file (CSV, RDF, Excel file, etc.) and all the transformations that have been applied can be stored in a JSON file.

Once initialised, the application of these transformations to new source files with the same structure or new versions of the same source file is an automatic process which only requires selecting the stored JSON file.

Secondly, the triplification step is the core of the publication process, as during this step, the properties and entities are created, expressed in triples, identified by URIs and semantically annotated with an ontology or a vocabulary. This step transforms the data obtained in the previous step into a RDF file containing semantic annotations and links.

This step begins with an analysis of the domain of the data to find related ontologies, vocabularies and linkable LOD. There are several tourism ontologies which focus on supporting tourist-centric applications. For example, QALL-ME provides a model to describe tourism destinations, sites, events as well as transportation (Ou et al. 2008). The Harmonise ontology focuses on tourism events and accommodation types (Fodor and Werthner 2005), while the Hi-Touch ontology models tourism destinations and their associated documentations (Mondeca 2004). Moreover, general ontologies such as vCard or even DBpedia have also been proposed to publish tourism data as LOD. If existing ontologies are not fully applicable to the data, new ontologies and vocabularies should be designed using an ontology editor such as Protégé, the most popular Open Source editor.

Once the ontology has been defined, the triplification process starts. The process transforms (or generates) data in RDF triples format in order to instantiate

individuals based on defined ontologies. Finally, the linking process expresses the relation between items of the source dataset and items of third-party datasets.

The LOD Refine programme also includes tools to triplify and link data, generating RDF files from source files. First, external LOD (such as DBpedia) can be directly linked from external data sources in a process known as reconciliation. Then, RDF skeletons are generated defining the semantic annotations and the links to external LOD. Finally, triplified data is automatically exported as a RDF file. Once again, the whole process can be stored in a JSON file, which can be applied straightforward to new source files with the same structure or new versions of the source file.

The final step consists of the publication of the data, both as LOD and Open Data. Firstly, the previous RDF is published on a triple store, a semantic server that provides access to LOD resources directly through the URIs, or at a SPARQL endpoint. Published resources are identified with unique URIs. These URIs will return information about the resources and could be linked by other datasets. The latter allows running SPARQL queries.

There are many triple stores that provide basically similar functionalities, although they differ in the query processing time and extra features. The Open Source version of Virtuoso has been selected as it fulfils the expected requirements from small DMOs. Virtuoso has been successfully implemented by different LOD initiatives such as the Spanish LOD repository (datos.gob.es [July 10, 2014]) and other research examples (Auer et al. 2011; Souza et al. 2014).

Secondly, within the publication step, a dataset is created at the Open Data repository of the DMO and described with metadata adhering to the Data Catalog Vocabulary (DCAT), a RDF vocabulary recommended by the W3C to describe OD catalogues. Then, the resources of the dataset are uploaded. These resources are composed by the published data on different formats: the transformed CSV file, the RDF file, the URL of the SPARQL endpoint, and optionally any related resource (for example, a PDF containing a report based on the data).

Following the Open Source approach, the DKAN open data platform has been selected as the OD repository for DMOs. DKAN has a simple user interface to manage the datasets, including the addition of metadata, the upload of resources, and the update of information. Moreover, it also allows third parties to look for and access data externally through an HTTP Application Programming Interface (API) called Datastore API, as well as to visualise and filter the data. Finally, DKAN is based on Drupal, a popular PHP Content Management System (CMS), making its deployment, customization and maintenance by DMOs easier.

Table 1 summarises the steps of the publication methodology and its tasks, and the software tools proposed for each step.

Table 1 Summary of the methodology

Step	Task	Tool
Configuration	Select data	–
	Select the license to publish the data	–
	Design the URI scheme	–
	Select a multilingual data publication pattern	–
Pre processing	Clean and normalise the data	LOD refine
Triplification	Select existing ontologies, vocabularies and LOD	–
	Define new ontologies and vocabularies (if required)	Protégé
	Triplification	LOD Refine
	Link to external LOD	LOD Refine
Publication	Upload the RDF file to a triple store	Virtuoso
	Create the dataset and add metadata	DKAN
	Upload the resources of the datasets	DKAN

4 Application to a Small DMO

The proposed methodology has been validated by the publication of LOD about different POIs of a small destination. Furthermore, a mobile prototype has been implemented as an example of added-value data reuse.

4.1 Publishing Linked Open Data

The configuration step involved meetings with the DMO to decide the technical and non-technical issues related to the data.

For this first prototype, a subset of 143 POIs available at the regional DMO Website (www.urolaturismo.net/en [July 10, 2014]) in four languages (Basque, Spanish, English and French) and clustered in five categories (restaurants, accommodations, visitor centres, museums and monuments) has been selected. Source data has been provided as a set of CSV files generated by the CMS of the Website (Joomla). For each language, the following information was available for each of the POIs: name, description, category, city, address, telephone(s), email address, and Web page.

After analysing the alternatives, the Open Data Commons Public Domain Dedication and License (PDDL) was selected, as it has no requirements on attribution (include mentions to the source of data) or share-alike (keep the license of the original data) on data derived from the source data.

Regarding the technical decisions, the URI of the resources was designed as *BASE_URL*/*data*/*tourism*/*identifier* in order to reflect the fact that resources were related to tourism. Each URI identifies one POI, including the information about the POI in all the languages. As POIs were available in four languages, a multilingual

design pattern was defined including the Basque name of the POIs as descriptive URIs, and using labels for multilingual information fields such as descriptions. The only non-ASCII Basque character is the letter "*ñ*", that was decided to be replaced by the combination "in" for URIs. It was also decided to replace blank spaces by '_' characters for URIs.

In order to transform data in the pre-processing step, three types of transformations were applied, exporting the resulting CSV to a new file. First, names of the POIs were in uppercase, so they were transformed to title case, i.e. from ERREXIL to Errexil. Secondly, international prefix was added to telephone numbers and the blank spaces between numbers were removed. Thirdly, secondary mobile numbers existing only for some POIs were stored in a new column.

During the triplification step of the data, tourism related ontologies and vocabularies were analysed (QALL-ME, Hi-Touch, Harmonise). Furthermore, there is an ongoing effort by the AENOR's Technical Standardisation Committee on Intelligent Cities AEN/CTN 178 in Spain to generate a norm about Open Data. Thus, the section about LOD of the preliminary version of the norm was also analysed. Based on the limited amount of basic information available for each POI, the general ontologies vCard and Dublin Core were selected to model the data. Related existing LOD instances were identified for the location (Geonames and DBpedia) and category (DBpedia) fields, generating links to the corresponding instances. POIs were triplified as shown in Fig. 1.

Within the publication step, the exported RDF file was uploaded to Virtuoso to load the triples; activate the URIs of the POIs; and provide a SPARQL endpoint for the dataset. The URI of the previous POI is http://212.81.220.68:8385/data/tourism/isidro#this.

Finally, a new dataset described with DCAT metadata (license, author, modified date) was created on the data repository, which is available at http://opendataazkoitia.gobernuirekia.net/eu/dataset/urola-turismo. Resources were attached to the dataset (Fig. 2): a CSV file with POIs in four languages (Basque, Spanish, English and French); a RDF file; a PDF brochure of a tourism map of the area; and a link to the SPARQL endpoint.

4.2 Mobile Application as an Added Value for Reusing LOD

As a proof of concept of the possibilities related to LOD, a HTML5 mobile prototype describing POIs of the DMO has been implemented (Fig. 3). The prototype shows a list of the POIs and presents details about each of them, including links to further information about the location of the POIs from Geonames and DBpedia.

The proposed software stack allows accessing data through different channels (direct download, SPARQL API and Datastore API). Developers can directly download the dataset from the repository and import it to their application. It is also possible to launch SPARQL queries using the HTTP API of the Virtuoso

```
<http://212.81.220.68:8385/data/tourism/isidro#this>
 a vcard:Organization ;
 vcard:fn "Isidro" ;
 vcard:adr [
  a vcard:Address ;
  vcard:street-address "Aingeru Kalea,16" ;
  vcard:locality "Azkoitia" ;
  vcard:country-name "España" ;
  vcard:region "Gipuzkoa"
 ] ;
 vcard:tel "(+34)943852003" ;
 dc:issued "2014-09-09T11:44:32" ;
 dc:description "Ordutegia: Astean zehar ... itxita."@eus,
 "Horario: Diario: ... Lunes, cerrado."@es,
 "Opening Hours:Week ... Monday closed"@en,
 "Horaire:En cours de ... Lundi: fermé"@fr ;
 dc:spatial <http://sws.geonames.org/6358108> ;
 dc:subject <http://dbpedia.org/resource/Category:Restaurants> ;
 vcard:category "Azkoitian jan"@eus, "Places to eat in Azkoitia"@en,
 "Manger à Azkoitia"@fr, "Comer en Azkoitia"@es ;
 dc:isPartOf <http://dbpedia.org/resource/Azkoitia> .
```

Fig. 1 RDF of a POI (Isidro restaurant) located in Azkoitia

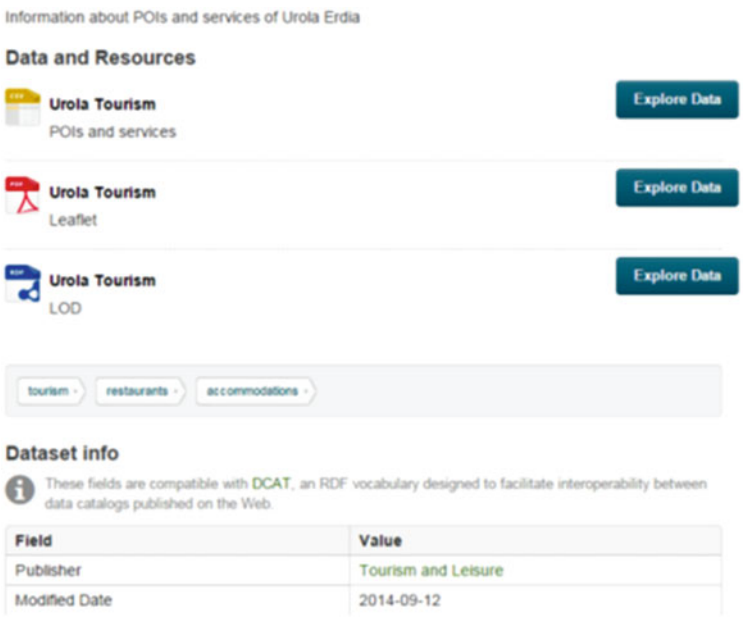

Fig. 2 Publication of resources about POIs

SPARQL endpoint in real-time from the mobile application to access only the data that satisfies some filtering conditions. Finally, the Datastore API of DKAN offers real-time access to the resources of the dataset through a regular HTTP REST API.

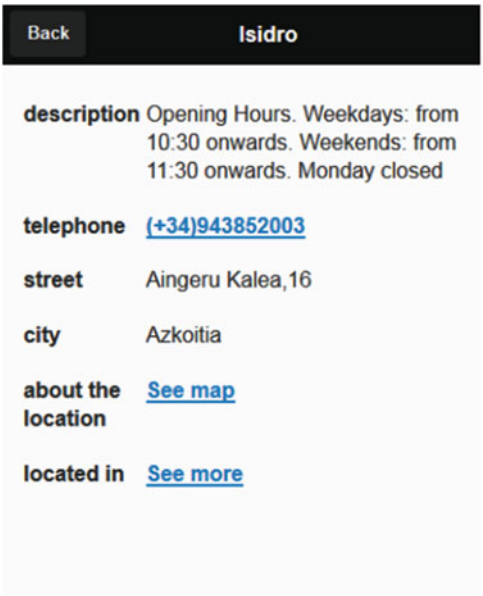

Fig. 3 Example of reusing the POIs

In order to validate the flexibility of the proposed software stack, three versions of the mobile application have been developed. Although each version presents the same interface and functionality, each one accesses data through a different channel (direct download, SPARQL API and Datastore API).

5 Conclusions and Further Work

The publication of LOD datasets by DMOs opens new possibilities such as the reduction of the development costs of applications (mobile guides, websites) on top of the data, or the provision of innovative added-value services which combine multiple data sources. However, the lack of integrated LOD transformation and publication methodologies, best practice examples or tools focused on the tourism domain is still a barrier for small and medium DMOs.

This paper has presented a methodology for small and medium size DMOs to publish 5-star tourism LOD. The methodology proposes an initial configuration phase and three steps: pre-processing, triplification and publication of data. The methodology has been implemented based on existing Open Source tools: Protégé to define new ontologies and vocabularies; LOD Refine to process, triplify and link data; Open Link Virtuoso to publish RDF files at SPARQL endpoints; and DKAN to publish OD in a data repository.

Data about POIs from the Web page of a small DMO from Gipuzkoa (Spain) have been used as an example to validate the methodology. Moreover, three

variants of a mobile application accessing data through three different channels (direct download, SPARQL queries and REST API) have been developed as a showcase of the advantages of LOD publication for DMOs.

The methodology is currently being implemented by the DMO. Although the integration of the publication process of tourism LOD on the workflow of the DMO has already started, the publication of official datasets by the DMO has been planned to the first quarter of 2015. Thus, results of the validation of the impact of the methodology on the publication and consumption of tourism LOD are expected by the end of 2015.

Future work will tackle the publication of statistical data about tourism indicators (arrivals, occupancy rates…), as it has been already asked by the DMO. Although the methodology can cope with this change, the RDF Data Cube Vocabulary must be applied in order to model statistical data and to establish guidelines to manage historical data updated periodically such as the monthly arrival of tourists.

Moreover, new software tools should be added to publish data stored at relational databases as LOD, as the Open Source version of Virtuoso does not connect to relational databases. Successful initial tests have been done with D2RQ, a triple store for this type of data. Finally, once the AEN/CTN178 norm may be published, its recommendations and best practices for ontologies, vocabularies and generation of LOD links will be integrated in the methodology to be compliant with the norm.

Acknowledgements Authors would like to thank both the Basque Government and the Regional Government of Gipuzkoa for partially funding this work; as well as the companies Elkarmedia, Eko.tx and Iraurgi Berritzen who have been part of the consortium of the project.

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Linked Data for Cross-Domain Decision-Making in Tourism

Marta Sabou, Adrian M.P. Braşoveanu, and Irem Önder

Abstract In today's global economy, tourism managers need to consider a range of factors when making important decisions. Besides traditional tourism indicators (such as arrivals or bednights) they also need to take into account indicators from other domains, for example, economy and sustainability. From a technology perspective, building decision support systems that would allow inspecting indicators from different domains in order to understand their (potential) correlations, is a challenging task. Indeed, tourism (and other indicators), while mostly available as open data, are stored using database centric technologies that require tedious manual efforts for combining the data sets. In this paper we describe a Linked Data based solution to building an integrated dataset as a basis for a decision support system capable of enabling cross-domain decision-making. Concretely, we have exposed tourism statistics from TourMIS, a core source of European tourism statistics, as linked data and used it subsequently to connect to other sources of indicators. A visual dashboard explores this integrated data to offer cross-domain decision support to tourism managers.

Keywords Statistical data • Decision support • Linked data • TourMIS

1 Introduction

Does the economic crisis influence the travelling behaviour of German tourists within Europe? Do (mass-)tourism arrivals to Spain impact the environment of the host country? In today's interconnected world, benchmarking, forecasting and, in general, decision-based activities of tourism managers cannot solely rely on tourism statistics (such as arrivals, bednights and capacity) but must also consider data from other domains. Understanding correlations between tourism and economic indicators, for example, can prepare tourism managers to plan their activities according to future financial predictions. Or, contrasting tourism and environmental indicators, as another

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_15

example, can shed light on environmental impacts (e.g., increased CO_2 emissions in heavily touristic areas) potentially caused by (mass)tourism in host countries thus helping to avoid them in the future. Therefore, such cross-domain queries are an important decision support instrument for tourism decision makers.

Most tourism decision support systems usually only cater for investigating tourism indicators in isolation from economic or sustainability indicators, as we describe in Sect. 2.2. The main reason for this is that technologically, merging data from various sources of indicators is challenging and relies on much manual effort. Indeed, as we point out in Sect. 2.1, until recently, statistical data was made available using database centric technologies that require tedious manual efforts when combined. For example, a system that would allow correlating arrivals from Germany to Prague with the GDP of Germany, must be "told" through explicitly programmed mappings that the country "Germany" in one data source (e.g., TourMIS) is actually the same as the country "DE" in another data source (e.g., World Bank). Large-scale data integration, therefore, remains challenging because (1) it requires significant manual effort to hardcode correspondences of the entities used by two data sources and (2) these manual mappings must be maintained to account for changes in the naming conventions used by the two datasets.

Semantic Web and Linked Data (LD) technologies have been developed to support the intelligent integration of data on the Web (Berners-Lee et al. 2001). Core to the idea of the Semantic Web is to represent information not as mere text or numbers, but rather in terms of structures that have a machine understandable meaning. Linked Data technologies provide a mechanism to publish this "intelligent" data on the Web and creating links between elements of different datasets, thus facilitating their integration. While originally developed for integrating facts derived from textual web pages, a new area of application for Semantic Web/Linked Data technologies, is the semantic representation and integration of statistical data. However, to date no significant amount of tourism statistics have been published as linked data.

To advance the state of the art we published TourMIS (Wöber 2003), a core source of European tourism statistics, as Linked Data. TourMIS includes data from over 100 European cities, 33 European nations and 19 source markets. The main purpose of TourMIS is to present information for tourism decision makers. The data in TourMIS is provided by either the city tourism organizations or national tourism organizations. The data set consists of bednights spent at a destination (including all types of accommodations), arrivals at accommodations, capacity and occupancy rates. TourMIS has over 18,000 registered users ranging from representatives of national, provincial, regional and city tourism organizations, which are involved in long-term, strategic planning of the tourism development of a region to tourism suppliers such as suppliers of accommodation, food, travel, as well as travel agencies and tour operators, which are mostly interested in local tourism demand forecasts. On average, they query TourMIS once every 3 min, thus leading to 200K queries per year.

Based on the created dataset we are creating a decision support system that allows investigating the correlation of indicators across several domains, in particular, tourism, economy and sustainability. The resulting LD dataset as well as the decision support dashboard have been built during the ETIHQ (www.etihq.eu/) project and therefore are named accordingly as the ETIHQ dataset and the ETIHQ

dashboard. To the best of our knowledge ETIHQ is the first online tourism decision support system that connects linked data and tourism statistics from multiple data sources (e.g. Worldbank, Eurostat). The goal of this paper is to describe the technical solution for providing TourMIS as LD, to introduce the cross-domain decision dashboard and to reflect on the main lessons learned while using this novel technology for tourism.

2 Related Work

We review existing tourism statistics sources and tourism decision support systems.

2.1 Sources of Tourism Indicators

The ETIHQ repository is unique in terms of its content when compared to other sources of tourism statistics. Given their importance, tourism indicators are published by a variety of international organisations along with indicators in other areas such as economy and sustainability. The UN provides a multitude of datasets, including also various tourism indicators from UN's World Tourism Organization (UNWTO), such as, arrivals, departures and tourist expenditures, measured per country and year. Much of this data is open, however, only provided in the proprietary Excel format. Additional UNWTO data is only available as PDF downloads. Eurostat provides a wealth of European level statistics, including various tourism indicators (capacity, arrivals, bednights, expenditures, etc.) for all European countries. Measurements are provided on a monthly basis. Data can be downloaded in a variety of formats including Excel, CSV, HTML, SPSS and PDF. The World Bank provides open access to over 8,000 indicators (data.worldbank.org), including also a variety of tourism indicators measured annually and at a country level. The available datasets can be downloaded in XML and Excel formats, as well as accessed through an API.

ETIHQ is comparable to the sources of tourism statistics described above, but it is more detailed and this makes its publishing beneficial to European tourism stakeholders. Indeed, while other sources provide annual measurements (except Eurostat), at country level, ETIHQ contains both annual and monthly measurements and it focuses on individual cities. Additionally, ETIHQ also identifies key markets based on tourists' origin, a feature not offered by any of the data sources we surveyed, although market information is essential for tourism promotion organizations in developing their international advertising campaigns.

We conclude that there are various sources that offer a multitude of indicators in the area of tourism and beyond. A general trend is offering this data as open data, primarily through downloading it in popular (non-semantic) encodings. For now, the publication of these datasets as LD has been primarily undertaken by third-parties rather than data owners, resulting in low-quality datasets that simply expose

database tables into an RDF format without enriching them with domain-specific metadata or linking them to other datasets. Upon inspection, many of these datasets were slow or returned erroneous (or no) data.

2.2 Tourism Decision Support Systems

Tourism decision support systems have been implemented in various areas such as destination recommendation systems. Some examples of previous research in this area include studies about case-based travel recommendations (Ricci et al. 2006a), travel decision styles and destination recommendations (Zins and Grabler 2006), and creating adaptive recommender systems using neural net approaches (Mazanec 2006). There are some destination recommendation systems that have been developed as well such as DieToRecs (Ricci et al. 2006b), TourBO (Franke 2006) and MobyRek (Ricci and Nguyen 2006). However, the studies related to travel recommendation systems are directed towards the consumer (i.e., the individual tourists) rather than the tourism managers therefore focusing on different content (i.e., destinations, touristic offers, events) than the ETIHQ decision dashboard. Other types of decision support systems such as yield management systems are available for tourism managers, which have been used primarily within the hospitality industry.

One example of a tourism decision support system is BASTIS (bastis-tourism.info), which combines different types of data under one online system. It has three parts, a wiki page, a blog and a forum where individuals can get information about heritage tourism in Baltic Sea region. The data comes from EUROSTAT, TourMIS, Statistisches Bundesamt Deutschland (German Statistical Office) and Deutsche Zentrale für Tourismus (National Tourism Organization of Germany). The heritage sites include churches, castles, museums, natural sites and attractions, and national parks from 10 different Baltic countries, 13 source markets and more than 40 heritage sites. Each heritage site has a profile that has basic information regarding the location of the site, the number of visitors, source markets, satisfaction of visitors and the duration of their visit at the heritage site. Furthermore, the heritage sites can be benchmarked with each other and the information can be used by decision makers involved in heritage tourism in the Baltic Sea region. However, this system is limited since it covers the Baltic Sea Region alone, the information is only about tourism domain although it comes from different sources and the data is integrated by hard-coded data source connectors.

On the other hand, the TourMIS interface already supports a variety of decisions such as detecting trends in specific source markets, monthly development of European city tourism and best performing European cities according to bednights in comparison to the previous quarter, which would help Destination Marketing Organizations (DMO) to take appropriate actions. For instance, a DMO can use TourMIS and can decide to invest more in a source market (country of origin of tourists) that shows an increasing trend such as the Russian market. However, a

shortcoming of TourMIS is that the data is limited to that contained in the system's database. Although TourMIS is a good tourism information system, the data does not include external factors such as economy of a source market or sustainability indicators that are linked to tourism industry, which can explain the trends as well. TourMIS is free to use and open to anyone; access to the website requires only a web-form based registration.

Pacific Asian Travel Association's (PATA) mpower (mpower.pata.org) is a tourism decision support system regarding the Asia Pacific countries. This system is a closed one; the detailed information is only accessible to members, which requires a fee to be paid. Its members include 80 national and regional tourism offices, more than 30 major airline companies, major hospitality groups and travel agencies. The indicators that are available are visitor information (e.g. number of international arrivals, gender, mode of transport, etc.), expenditure, source markets, aviation information including flight frequency, seat availability and air passenger traffic, accommodation (e.g. occupancy, number of available rooms, RevPAR (revenue per available room), etc.) digital indicators (e.g. top 10 travel websites, time spent on websites, % of internet users, etc.) and forecasts of arrivals and expenditure.

From the above we conclude that (1) the majority of tourism DSS are aimed at tourists rather than tourism managers; (2) while some tourism DSS systems aimed at managers include data from other data sources, these are from the tourism domain and are integrated in a hard-coded manner. All reviewed systems focus on inspecting statistical indicators from the tourism domain alone thus leaving an important market for cross-domain decision support systems.

3 A Brief Introduction to Semantic Web and Linked Data

Semantic Web and Linked Data technologies aim (1) to enrich raw data with semantic (i.e., machine processible) information and (2) to publish it using Web based languages on the Web thus allowing links between datasets to be explicitly specified.

Core to the idea of the Semantic Web are ontologies (Gruber 1993), formal domain models describing concepts in a domain and their relationships in ways that machines can process and reason with these descriptions. For example, a tourism ontology would describe concepts such as "City" or "Market". Data items (e.g., Prague) are then described in terms of ontology concepts (e.g., by associating Prague to the concept "City"). Since the goal of the Semantic Web technologies is to make data public on the Web, ontology elements as well as each raw data element to be described in the Semantic Web are assigned a unique web URL, for example, http://data.etihq.eu/etihq/page/dataset/Prague, for the data element Prague or http://data.etihq.eu/etihq/page/ontology/City for the "City" concept of the ontology. The structure of the URLs usually indicates the name of the dataset

(in our case "etihq") as well as the type of the entity, which can be either part of the abstract data model (i.e., the ontology) or of the dataset.

While relational databases rely on a relation (i.e., table like) data model, the Semantic Web adopts a triple (or graph based) model with all data being represented as triples. For example, to declare that Prague is a City, a triple is created stating that <Prague, isA, City>. To encode triple-based Semantic Web data, a set of languages have been developed, most notably RDF (Resource Description Format) and OWL (Web Ontology Language). The RDF representation of the triple above is:

```
<ebo:City rdf:ID="eds: Prague"/>
```

where the ebo and eds prefixes point to the "http://data.etihq.eu/etihq/page/ontology" and "http://data.etihq.eu/etihq/page/dataset/" namespaces respectively.

One advantage of exposing datasets online using Web based standards is that links can be created between the elements of these datasets (similarly to hyperlinks in HTML). Most often, an "owl:sameAs" link is created between URL's from different datasets that represent the same real-life entity. For example, a single triple is sufficient to declare that two URLs in the ETIHQ and WorldBank data respectively refer to the same entity—Germany:

```
eds:Germany owl:sameAs
<http://worldbank.270a.info/classification/country/DE.html>
```

Thanks to this link it is now possible for a computer program to understand that the term "Germany" as used in TourMIS is the same as the term "DE" used in the WorldBank dataset and that data about these terms can be combined.

4 Creating the ETIHQ Linked Data Dataset

To create the ETIHQ dataset from TourMIS we executed the following steps:

- *Data Cleaning*—This step prepares the raw data for being published as Linked Data and it is especially needed for legacy databases.
- *Semantic Modelling*—Selecting vocabularies, creating ontologies and a structure for the dataset.
- *RDB2RDF conversion*—Databases are transformed into triples using the process defined in the Semantic Modelling step.
- *Interlinking*—Linked Data offers simple mechanisms, such as links, to extend a dataset with connections towards other linked datasets.
- *Linked Data Interface Publishing*—exposes the data of the Web both in a way that it can be browsed by people and queried programmatically.

4.1 Semantic Modelling

The semantic structure of the proposed solution includes a variety of ontologies:

- RDF Data Cube (QB—www.w3.org/TR/vocab-data-cube/)—is the emerging semantic standard for modeling data of statistical nature and therefore it was used as a main vocabulary to publish the TourMIS data;
- PROV-O (www.w3.org/TR/prov-o/)—is the standard vocabulary for specifying provenance information and its concepts were reused to allow representing information about who and when contributed data to TourMIS;
- ETIHQ Domain Ontologies—we also developed a set of ontologies specific to the tourism domain that complement the generic models above with concepts describing the content of TourMIS.

The ETIHQ domain ontologies describe three major areas of TourMIS. The base ontology has the "http://www.etihq.eu/ontology/" namespace (prefix ebo that stands for "etihq base ontology") and has been developed as an extension of the TourMIS ontology described in (Sabou et al. 2013). Core to this base ontology is the concept of *Measurement* which has five more specific concepts corresponding to all the statistical indicators in TourMIS and depicted in Fig. 1. Additionally, the ontology models classes such as *Destination*, *Market* and *Currency*. Two further class hierarchies, one corresponding to *PointOfInterest* and one to *ShoppingItem*, are imported from two corresponding ontologies. The second ontology is the POI ontology declared under the http://www.etihq.eu/ontology/poi/ namespace which models concepts corresponding to the POI categories (e.g., museums, churches, theatres) in TourMIS as specialisations of the *PointOfInterest* concept. Finally, the Shopping ontology (http://www.etihq.eu/ontology/shopping/ namespace) defines the *ShoppingItem* concept and its main subclasses as available in TourMIS and categorised in four main categories, namely, *Accommodation*, *Entertainment*, *FoodAndBeverage* and *Transport*.

As part of the semantic modelling step we also specified the datasets that should be created from TourMIS, in terms of the structure required by the QB Vocabulary. Five distinct datasets were created corresponding to arrivals, bednights, capacity, arrivals at points of interest and shopping statistics respectively. The dimensions of

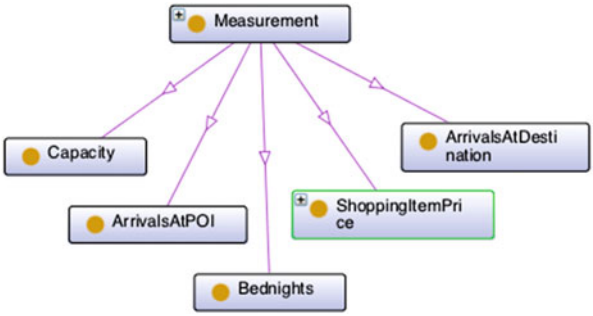

Fig. 1 Main concepts in the base ontology

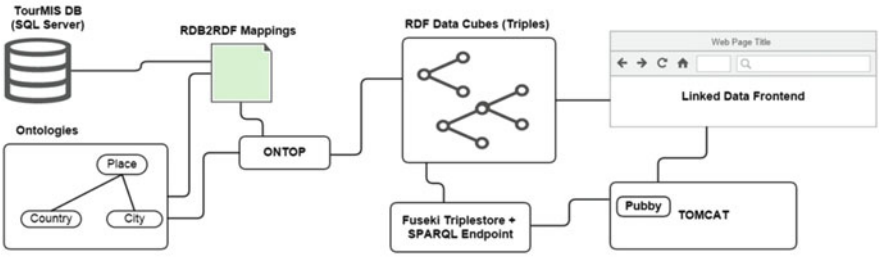

Fig. 2 Overview of the main tools used for extracting TourMIS data and publishing it as Linked Data

these datasets as well as the type of their measurements have been specified using concepts from the ETIHQ ontologies.

4.2 RDB2RDF Conversion and Linking

The TourMIS database is powered by a Microsoft SQL Server. In order to translate it into Linked Data, we used an RDB2RDF mapping (Relational to RDF mapping). The mappings file contains all the SQL queries that are used to create the RDF triples together with the rules used to create the right types and URIs for the RDF resources. These files are used by the Ontop Protégé plug-in to generate RDF files (Fig. 2).

We wrote 60 mappings to generate 5 different datasets from TourMIS amounting to around 16 million triples. The RDF files generated by Ontop are in the RDF Data Cube (QB) format, therefore the values for 1 month or 1 year are mapped to the values of observations. The resulting triples are uploaded to the Fuseki triplestore (which a dataset specialized for storing RDF style data). As a final step of the dataset creation process we specified links between the entities of ETIHQ and other datasets. We used the Silk link discovery tool (Isele et al. 2010) to create links to the DBpedia (dbpedia.org) and Geonames (www.geonames.org) datasets. We successfully linked all entities referring to countries and cities.

4.3 Linked Data Publishing

Once the data from TourMIS has been extracted, represented as RDF and stored in a specialized dataset, we published it on the Web. To that end, we provided a SPARQL frontend using YASGUI so that users can query the data. SPARQL is a query language similar to SQL in databases but adapted to query the graph like data model of RDF. Besides allowing query-based access, the ETIHQ data (both

ontologies and data triples) is exposed in a Web-page like format using the Pubby application (deployed in Tomcat). Thanks to this, users can navigate the online linked data repository using any web browser. Several online access points to our dataset can be accessed at http://data.etihq.eu.

4.4 Linked Data Access Approaches

We experimented with several different approaches for collecting, querying and aligning the data from various sources. Firstly, we used federated SPARQL, where each data source is queried via a SERVICE request, and a federated SPARQL engine (e.g., Jena ARQ) aggregates the results. This approach often leads to queryTimeouts and the data alignment has to be encoded in the query itself. Secondly, we stored all data dumps in local repositories and queried them using SPARQL. Thirdly, we indexed the data from different domains using a search server (ElasticSearch, Sindice, Lucene, etc.) and created a Search API that gets the data from all the sources. This can be done via custom scripts or plugins for the respective server. We preferred to create a custom Python script, as this allowed to also align the various data sources and bring the data into a common format that can be easily visualised. Using this approach, data is queried using server specific JSON-based query. We are considering opening this search API to external users under different open and commercial licenses, if the number of interested users is large. The fourth approach for querying the data involves the use of the visual dashboard (described in Sect. 5) that we developed on top of the Search API, as it comes with both visualizations and export functionalities (CSV or Excel for the data; SVG or PNG for the charts). We are also considering offering RDF export functionalities in the future.

5 Visual Dashboard

The visual dashboard allows selecting and concurrently visualising tourism, economic and sustainability indicators, thus being, to the best of our knowledge, the first multi-domain decision support system in tourism. The current dashboard combines information from TourMIS, WorldBank and EuroStat. While TourMIS provides European level tourism indicators, from the other two sources we select economics and sustainability indicators (see Table 1).

Figure 3 displays a screenshot of the dashboard, which includes the following main panels: (1) the top horizontal interface bar allows selecting the time-frame of the analysis; (2) the left-most frame can be used to define new queries over statistical data, displays these queries and allows their management (e.g., (de) selection); (3) the top part of the middle pane contains a chart based visualisation element that visualises the currently selected queries; (4) the lower part of the

Table 1 Economic and sustainability indicators from the World Bank

Economic indicators	Sustainability indicators
GDP growth (annual %)	CO_2 emissions (kt)
Inflation, consumer prices (annual %)	Forest area (% of land area)
Consumer price index (2005 = 100)	Roads, paved (% of total roads)
Official exchange rate (LCU per US$, period avg)	Agricultural land (% of land area)
Unemployment rate, total (% of total labor force)	

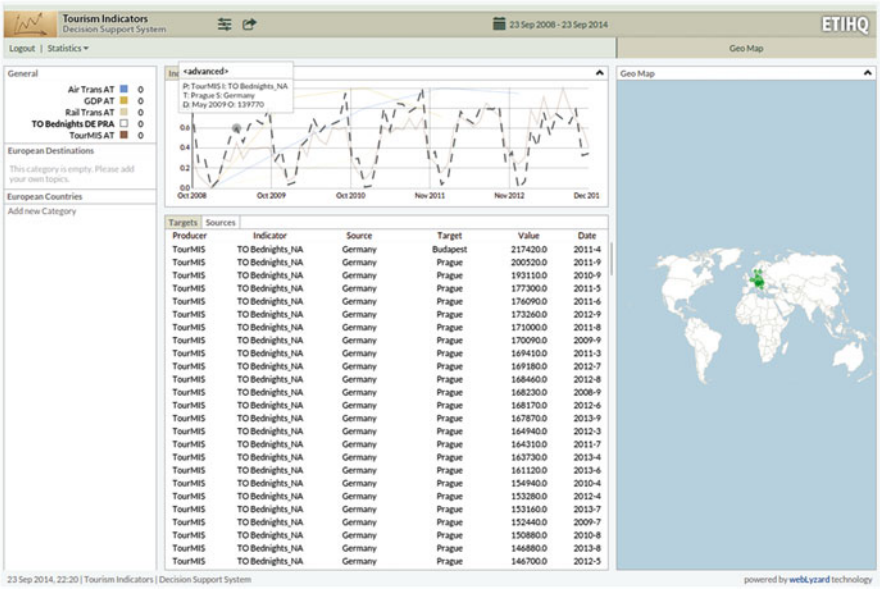

Fig. 3 The ETIHQ visual dashboard (etihq.weblyzard.com)

middle frame allows zooming into data details for the selected search; (5) the rightmost pane contains geographic data visualisations.

The ETIHQ dashboard can be used by DMO managers to enhance their decision making and understand the big picture including economical factors that affect tourism demand. Consider the example of a DMO manager who wants to understand *whether and how the economic crisis influences the traveling behavior of German tourists in Europe*. He could follow a set of steps, which we now overview and exemplify how can be concretely performed with the Dashboard.

1. *Adding a new search*: the manager could start by searching for the number of beds reserved by German tourists in any European city, for example Prague. The definition of a search in the visual interface corresponds to the notion of a topic. A new topic is defined by pushing the wheel button and selecting the "Add Topic" menu item (Fig. 4, left). A topic corresponds to an indicator, that is a slice of the data in the selected time interval with market (source) and destination

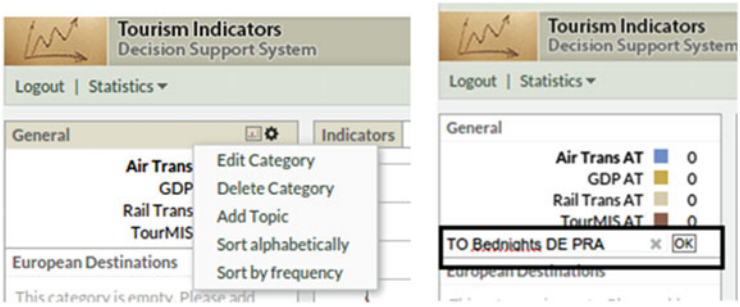

Fig. 4 Search (topic) addition (*left*) and naming (*right*)

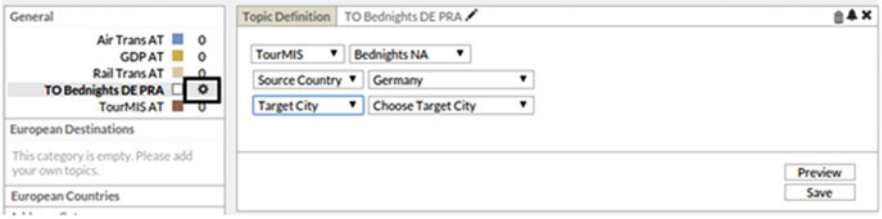

Fig. 5 Defining the content of a search (topic)

(target) as fixed dimensions. Searches should be identified with meaningful names consisting of the data source of the indicator (TO stands for TourMIS), the name of the indicator (i.e., Bednights) and the dimension values that are chosen (in our example, these would be DE and PRA). Accordingly, we name the example search as "TO Bednights DE PRA" (Fig. 4, right).

After adding and naming the search, we proceed to defining its content. For this, we hover over the new topic and press the wheel button that appears to its right. This action will replace the chart view in the top-middle pane of the interface with a dialog field that allows defining the topic (see Fig. 5). It enables selecting the data source (currently, World Bank, Eurostat, TourMIS), indicators (the indicators from the menu), markets and destinations (both can be cities or countries). Once the relevant selections have been made, we choose "Save" which will close the dialog box.

2. *Investigating the search results.* As soon as the topic definition dialog box is closed, the data related to this search is retrieved and visualized in the charts view (entitled "Indicators"). The first time a topic's data is visualized, the corresponding trend line is a dashed line, as shown in Fig. 3. The newly added topic also triggers various changes in the rest of the interface.

   The data displayed in the tables (middle pane) changes. This pane will create as many sub-panes as the number of dimensions for the visualized indicators. For our example, the TourMIS Bednights indicator has two dimensions, namely

source and target, so two corresponding panes will be created. The "Targets" table, keeps the source value fixed (in our case, "Germany") and varies the values for the Target cities, thus displaying the number of German tourists going to all European destinations. The table can be sorted based on the value field, thus allowing to quickly identify the most/least popular destination for Germans—it appears for example that Budapest is a very popular destination for German tourists. Similarly, the "Source" table keeps the source fixed to "Prague", but varies the source markets, thus allowing detecting those tourist groups that visit Prague the most/the least.

A click on the pane name will trigger a change in the Geo Map (right pane of the interface), which displays the tabular data visually. The data for a particular market is summed up (from months to yearly data), and a visual representation of the connections between markets and destinations in the form of arrows is created (bigger arrows mean more tourists in the selected interval). Following the steps above, the manager can investigate the behavior of German tourists to other European destinations as well, for example, Budapest.

3. *Adding a search over an indicator from another domain*. The previous steps allow exploring the visiting behavior of German tourists to Prague and other European cities. To understand whether this behavior correlates with the German economic situation, an economic indicator can be added as a new topic, such as the GDP Growth from World Bank (displayed as an interrupted line in Fig. 6). Figure 6 super-imposes German GDP (from WorldBank) as well as Bednights to Prague and Budapest, as these indicators have been selected for visualization in the "General" pane (the color on the right side of a topic corresponds to the graph color on the chart—e.g., light blue for German Bednights to Prague).

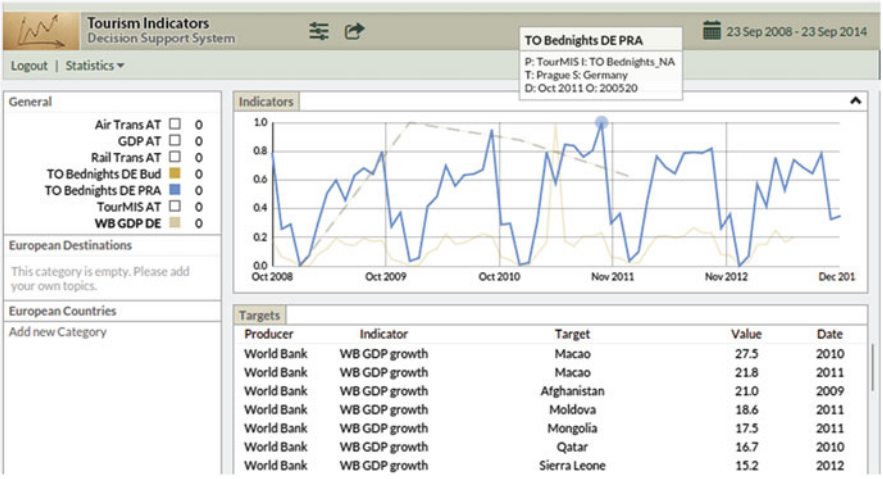

Fig. 6 Superimposing economic and tourism indicators

The resulting chart shows that there is a certain seasonality of the German visits in Prague. The peak for each year is October (Are Germans escaping from Oktoberfest?). By inspecting German arrivals to both Prague and Budapest, it appears that German tourists seem to be influenced more by the seasonality of the business year (more visits during summer) than the crisis, as the patterns seem consistent from the end of 2008 to the end of 2014 and unaffected therefore by the slight GDP drop from 2009. Searches for further destinations (e.g., Copenhagen, Dubrovnik, Venice) can be added to confirm this hypothesis.

6 Summary and Lessons Learned

Although the tourism domain heavily relies on complex decision-making, it is currently difficult to build decision support systems for this domain that would be capable of seamlessly integrating and visualising data from multiple data sources of tourism (and other) indicators. LD technologies, on the other hand, when adopted at large scale, greatly facilitate data integration at the syntactic and semantic level alike by providing a uniform data encoding format, as well as the possibility to clearly specify the meaning of the data and to establish links between various datasets.

In this paper we described advances to the state of the art in terms of (1) publishing TourMIS data as linked data; (2) interlinking TourMIS data with data from other data sources covering the economic and statistical domains; (3) creating a visual dashboard that explores this integrated data to support cross-domain decision making processes.

We also encountered a suit of issues during our work. This included the necessity to make various changes to the TourMIS dataset before publishing it. Additionally, our solution relies on several tools, mostly research prototypes with poor documentation and support. For example, although several RDB2RDF tools exist almost none of them supports Microsoft SQL Server which acts as a backend for TourMIS. Or, Linked Data publishing tools such as Pubby deliver different performance based on the underlying triple store—in our particular case, we originally used the Sesame triple store but had to replace it with Fuseki due to its incompatibilities with Pubby. The immaturity of Linked Data tools makes the publishing process time-consuming.

We also encountered licensing problems due to the heterogeneous origin of the TourMIS data set. Although TourMIS is open to anyone who registers to the system, the data comes from different sources and is financed by multiple organizations. Therefore, opening the entire TourMIS data set as Open Data for third parties is an issue which has not yet received a satisfactory answer yet.

Future work includes evaluation of the dashboard with tourism practitioners, inclusion in TourMIS, extension with additional data sources, extension of the dashboard with news media data as well as using the TourMIS linked data for other applications, beyond decision support.

Acknowledgements The work presented in this paper is partly funded by the PlanetData project (FP7:ICT-2009.3.4, #257641). We thank Prof. Karl Wöber and Prof. Arno Scharl for their contribution to the project.

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Part III
Social Media

Travel Social Media Involvement: A Proposed Measure

Suzanne Amaro and Paulo Duarte

Abstract This study proposes a measure to determine traveller's level of involvement with travel social media websites. Social media involvement is defined as a person's level of interest, emotional attachment or arousal with social media. This measure is important because understanding travellers' level of involvement with social media is paramount, enabling social media marketers to personalize online marketing strategies and predict behaviours (e.g. online travel purchases). Therefore, this research contributes to the development of literature on travel related social media by providing an instrument to measure travellers' involvement with travel related social media. A confirmatory factor analysis conducted with a sample of 1,732 respondents demonstrates that social media involvement can be conceptualized as a formative multidimensional construct, formed by interest in social media, social media consumption, social media creation and perceived playfulness with the use of social media (all for travel related purposes).

Keywords Involvement • Social media • Travel • User generated content

1 Introduction

The Internet has drastically changed the way travellers search for information (Arsal et al. 2008) and is an increasingly popular means to search for travel information (Xiang and Gretzel 2010). With the rapidly developing of the Web 2.0, social media Websites have gained popularity not only in online travellers' search for information (Xiang and Gretzel 2010) but also to post information regarding their trips, through comments, photos or pictures (Parra-López

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_16

et al. 2012). Different statistics evidence the importance of social media in the travel context. Approximately one-fifth of leisure travellers worldwide use social media for travel planning (eMarketer 2013). A study conducted by PhocusWright, one of the leading travel industry research firms, found that 80 % of the respondents read at least six reviews before booking an accommodation (Tnooz 2014). A different study demonstrated that reviews were more important than price when choosing a hotel (Noone and McGuire 2013). The same study found that negative reviews would eliminate a hotel from consideration, regardless of price.

Although there are many studies focusing on traveller's use of social media and its effect on travel planning and travel decisions, research on travellers level of involvement with social media websites is scarce. However, it is important to study traveller's involvement with social media involvement as travellers who are more involved with social media have different characteristics and behaviours. While some travellers seem to have an active behaviour on these social media websites, with high levels of involvement, others are not as active. According to Forrester Research, 75 % of Internet users use social media, but less than half actively participate (Osborn 2009). Gretzel et al. (2007) found important differences between members of Tripadvisor concerning their social media use. For example, those that read travel reviews more frequently than others travel frequently for pleasure and have higher incomes, representing an attractive market for travel marketers. Moreover, travellers that read online reviews more frequently are more likely to be highly influenced by other travellers' reviews (Gretzel et al. 2007). Gretzel et al. (2007) found that, in contrast to those who do not actively write travel reviews, travel review writers are more involved in trip planning than non-writers. They also found that travel review writers are also more likely to see other travellers' reviews as superior to travel provider information and are more influenced by reviews. A Forrester Research report also advises online travel marketers to pay attention to a group of online leisure travellers termed conversationalists, who participate in social media conversation since they have the potential to drive sales (Harteveldt et al. 2010). In conclusion, online travel marketers need to pay attention to travellers more involved with social media, since they are more likely to influence other with their reviews, are also more influenced by reviews wrote by others, are more likely to have higher incomes and are more involved in trip planning.

This study proposes a measure to examine travellers' level of involvement with travel social media websites. In the era of social media, understanding travellers' level of involvement with social media is paramount, enabling social media marketers to personalize online marketing strategies and predict behaviours (e.g. online travel purchases). Moreover, travellers with higher levels of involvement represent an attractive segment for travel marketers.

The remainder of the article is organized as follows. The next section reviews existing literature on use of social media in the travel context and involvement, to provide the basis for the proposed measures. Then, measures are proposed and tested for travel social media involvement. Finally, the last section discusses the usefulness of the travel social media involvement construct and points out future research directions.

2 Literature Review

2.1 Use of Social Media for Travel

Travel Social Media websites have facilitated traveller's access to travel information and are therefore a powerful source for travel planning. The most important factor influencing travellers to participate in online travel communities is information acquisition (Chung and Buhalis 2008a). According to Gretzel and Yoo (2008) travel review readers consider information posted by other travellers to be superior to marketer information. Moreover, their results illustrated that travel reviews played an important role in the trip planning process, by providing ideas, reducing risk and making it easier to imagine what places would be like.

Several studies have confirmed the important role social media have on influencing travel decisions. Indeed, exposure to an online hotel review improves the probability for consumers to consider booking a room in the reviewed hotel (Vermeulen and Seegers 2009). This conclusion is echoed in a more recent study conducted by Sparks and Browning (2011) which reinforces the persuasive impact that positive reviews have on intentions to book. In a different study, 84 % of travel review users reported that the reviews had a significant influence on their purchase decisions. (ComScore 2007).

While some individuals actively participate in travel related social media, by posting comments, photos and videos, others do not demonstrate such an active role. Shao (2009) suggests that individuals deal with user generated media in three ways: by consuming, by participating, and by producing. Consuming refers to the individuals who only read, or view but never participate. Participating includes both user-to-user interaction and user-to-content interaction (such as ranking the content, adding to playlists, sharing with others, posting comments, etc.). Producing encompasses creation and publication of one's personal contents such as text, images, audio, and video. Studies show that most individuals are consumers or participators (Yoo and Gretzel 2011) referred to as lurkers (Ridings et al. 2006). Producers initiate the life cycle of user generated media, with the purpose of attracting others' attention (Shao 2009) and, viewed from a social exchange theory perspective, do so in the expectation of receiving benefits through recognition, through influencing the nature of the community, and through knowing they helped another person (Ridings et al. 2006). Ridings et al. (2006) found that producers reported stronger desires to give and to get information, to exchange social support and to obtain shopping information than lurkers and infrequent posters.

Individuals engage in a particular behaviour if it provides them enjoyment and fun. Shao (2009) argues that people may use user generated media just like traditional media for entertainment purposes such as escaping from problems, relaxing, filling time and seeking emotional release. In the travel context, studies have shown that reading travel reviews added fun to the trip planning process, made travel planning more enjoyable and made travellers feel more excited about travelling (Gretzel and Yoo 2008; Gretzel et al. 2007). Chung and Buhalis (2008b)

found that users of online travel communities (e.g. Tripadvisor.com, VirtualTourist.com) participated in the online community activities not only for the informational benefits, but also for the hedonic benefits (i.e. "Having fun with contents", "Entertainment" and "To be amused by members"). Similarly, Wang and Fesenmaier (2004) found that hedonic need were an important predictor for the level of participation in an online travel community. Enjoyment also is driver of travel content generated media creation (Yoo and Gretzel 2011). This empirical evidence demonstrates that individuals use travel social media websites not only for information purposes but also because they consider its use enjoyable. Web 2.0 has made information search more personalized, active and interactive, which contributes to its hedonic value (Gretzel 2012).

2.2 Social Media Involvement

Grounded on Rothchild's (1984) definition of involvement, the current study defines social media involvement as a person's level of interest, emotional attachment or arousal with social media. The adaption of this definition to explore travellers' involvement with social media seems appropriate to extend the knowledge of social media use for travel purposes.

Researchers have argued that involvement can be conceived in behavioural terms. For instance, Stone (1984) defined involvement as the time and/or intensity of effort expended in pursuing a particular activity. Engel et al. (1995) also suggested that involvement could be measured by the time spent in product search, the energy spent and the extent of the decision process. However, other measures of involvement have included mental states, such as enjoyment/pleasure (Laurent and Kapferer 1985) and importance/interest (Laurent and Kapferer 1985; Mittal 1989; Zaichkowsky 1985).

This study takes Stone's (1984) view that involvement is both a mental state and a behavioural process. With this in mind and based on the literature review conducted in the previous section, social media involvement is conceptualized as a multidimensional construct based on individual's usage of social media (consumption and creation), their level of interest in social media and perceived playfulness with the use of social media, as shown in Table 1.

From a behavioural perspective, an individual that is highly involved with social media will be more engaged with travel related social media. Indicators of such behaviour will be their social media consumption and creation behaviour. On the other hand, individuals engage in a particular behaviour if it provides them enjoyment and fun. It is also expected that individuals using travel related social media and experiencing enjoyment are more absorbed and interested in interacting. In sum, individuals with a high social media involvement have a high interest in travel related social media, are highly active on social media, by searching and posting travel related information and enjoy using social media for travel purposes.

Table 1 Dimensions of social media involvement

Social media involvement dimensions	Definition
Social media consumption	Extent to which individuals use social media for travel related information (for example reading reviews or watching videos)
Creation of social media content	Participation on travel related social media by writing reviews, posting photos and videos
Perceived playfulness	Extent to which using social media website for travel purposes is perceived to be entertaining and fun
Level of interest	Overall interest in travel related social media

3 Methodology

3.1 Measure Development

As described in the previous section, social media involvement was conceptualized as composed by four dimensions: social media consumption, creation of social media content, perceived playfulness and level of interest. Based on this conceptualization and the literature review carried out, 20 indicators capturing the various facets of social media involvement were generated. Some of the items considered were developed for the purposes of this study, while others were based on previous studies, modified to make them relevant to the social media usage context. The items used and their sources are shown in Table 2.

For social media consumption and creation, respondents indicated their level of consumption and creation of social media content with the survey items using a five-point Likert-type scale with responses ranging from 1—"Never" to 5—"Always". Perceived playfulness was measured with a five point Likert scale where 1—"Strongly Disagree" and 5—"Strongly Agree". Interest in social media was measured with a five point differential semantic scale.

Social Media Involvement was conceptualized as a formative multidimensional construct composed of four dimensions. Each dimension of social media involvement is a component of the social media involvement construct, which would become incomplete if any of the dimensions were missing.

3.2 Data Collection

To assess the proposed measures for social media involvement, data was collected using an online. Since the study focuses on the use of social media websites, it was not necessary to address the concerns of individuals that do not have access to the Internet. A convenience sampling method was used, by sending e-mail invitations to colleagues, students, personal contacts, professional list-serve groups and other email contacts. Moreover, links to the survey were placed on Facebook, namely on

Table 2 Measures for social media involvement's dimensions

Construct	Indicators	References
Consumption of social media	*Before travelling...* SMC1—I read hotel reviews from other travellers SMC2—I searched for travel information on social media websites SMC3—I looked at activity/attractions reviews of other travellers SMC4—I read other travellers' experiences and tips *While travelling...* SMC5—I search for travel information on social media websites (for example, where to eat or things to do)	New measures
Creation of social media content	While travelling... SMCR1—I check in to the location I am at/update my location on social media (for example, on Foursquare, Facebook) After travelling... SMCR2—I write hotel reviews on social media websites. SMCR3—I post photos on social media websites. SMCR4—I write reviews of activities/attractions on social media websites. SMCR5—I put videos on social media websites SMCR6—I write reviews of the place and/or monuments I visited on social media websites.	New measures
Perceived playfulness of social media	PP1—Using social media for travel purposes is enjoyable	Adapted from Lee et al. (2005)
	PP2—Using social media websites for travel purposes is fun PP3—Using social media websites for travel purposes stimulates my curiosity	Adapted from Moon and Kim (2001)
	PP4—I consider the use of social media for travel purposes a big hassle. (R)	Adapted from Verhoef and Langerak (2001)
Interest in social media	Social Media for travel purposes is... ISM1 Unimportant...important ISM2—Unexciting...Exciting ISM3—Doesn't matter to me...Matters to me ISM4—Boring...Interesting ISM5—Useless...Useful	McQuarrie and Munson (1992)

the researchers' wall, but also on professional research groups. Although convenience sampling has the disadvantage of offering no guarantee of a representative and unbiased sample (Gravetter and Forzano 2011), it is the most employed method in social and behavioural sciences (Durrheim and Painter 2008; Gravetter and Forzano 2011) and has the advantage of obtaining a large number of responses.

The questionnaire was available online between July 17th and September 12th of 2012. During this period a total of 1,759 complete responses were obtained of which 1,732 were considered valid.

3.3 Respondent's Profile

Respondents in this study were from 51 countries, with a prominence of responses from European residents, specifically Portuguese residents. This was expected, given that the researchers reside in Portugal and have more available contacts from people residing in this country. The age group with the most significant number of responses was the age group 18–29, with 34.6 % of the total of responses, while only approximately 13 % are aged over 50. In terms of gender, there is a slight skew towards a higher proportion of female participants (61.5 %). The sample seems to be composed by highly educated individuals, with approximately 88 % of the respondents holding at least a college degree, against only 11.6 % who have only completed the 12th grade or less. Other studies addressing the use of social media for travel purposes have also revealed similar profiles (e.g. Gretzel and Yoo 2008).

3.4 Instrument Validation

The reliability and validity of the measures were tested with a confirmatory factor analysis (CFA) using SmartPLS 2.0 (Ringle et al. 2005). This approach is considered to be more reliable and valid than other approaches (Afthanorhan 2013). Moreover, PLS-SEM readily incorporates both reflective and formative measures (Hair et al. 2013).

As can be observed in Table 3, the data indicates that the measures are robust in terms of their reliability, since all indicator loadings are higher than 0.7 and are significant at the 0.001 level, indicating that each measure is accounting for 50 % or more of the variance of the underlying construct (Chin 1998). Moreover, all Cronbach's alpha are higher than 0.9, way above the minimum threshold of 0.6, demonstrating that each constructs' indicators have the same meaning. Furthermore, the composite reliabilities exceed the recommended threshold value of 0.70 (Bagozzi and Yi 1988).

Construct validity was assessed by both convergent validity, which detects if the indicators for a construct are more correlated with one another than with indicators of another construct, and discriminant validity, which determines if a construct is truly distinct from other constructs both in terms of how much it correlates with other constructs and how distinctly indicators represent only this single construct (Hair et al. 2010).

Table 3 Reliability measures

Construct	Indicators	Indicator loadings	t-statistic	Composite reliability	Cronbach's alfa
Social media consumption	SMC1	0.90	148.91***	0.95	0.94
	SMC2	0.90	152.63***		
	SMC3	0.95	301.21***		
	SMC4	0.95	297.25***		
	SMC5	0.77	68.70***		
Social media Creation	SMCR1	0.72	46.04***		
	SMCR2	0.75	57.15***	0.93	0.90
	SMCR3	0.86	118.23***		
	SMCR4	0.92	225.28***		
	SMCR5	0.77	57.81***		
	SMCR6	0.90	158.36***		
Perceived playfulness of social media	PP1	0.95	321.16***	0.95	0.93
	PP2	0.95	288.96***		
	PP3	0.93	223.21***		
	PP4	0.80	54.07***		
Interest in social media	ISM1	0.84	93.34***	0.94	0.92
	ISM2	0.88	111.45***		
	ISM3	0.89	140.94***		
	ISM4	0.89	123.64***		
	ISM5	0.87	108.78***		

***Significant at the 0.001 level based on 5,000 bootstrap samples

To assess convergent validity, Fornell and Larcker (1981) suggest using the average variance extracted (AVE). The results, presented in Table 4, support convergent validity, since they all exceed 0.50.

For discriminant validity the two measures that are typically used are the Fornell-Larcker criterion and the cross loadings. The first test assesses if a construct is more strongly related to its own measures than with any other construct by examining the overlap in variance by comparing the AVE of each construct with the squared correlations among constructs (Chin 2010). Table 5 shows the correlations between constructs. The diagonal elements are the square roots of the AVEs that exceed all corresponding off diagonal elements. Therefore, each construct shares more variance with its own block of indicators than with another latent variable representing a different block of indicators, supporting the adequate discriminant validity of the scales.

Discriminant validity was further assessed by extracting the factor and cross loadings of all indicators to their respective constructs. Not only should each indicator be strongly related to the construct it attempts to reflect, but should also not have a stronger connection with another construct (Chin 2010). The results, presented in Table 6, indicate that all indicators loaded on their respective construct more highly than on any other, confirming that the constructs are distinct.

Table 4 Average variance extracted (AVE)

Construct	AVE
Social media consumption	0.80
Social media creation	0.68
Perceived playfulness in social media	0.82
Interest in social media	0.76

Table 5 Discriminant validity of the constructs—correlations between constructs

	Interest in SM	PP of SM	SM consumption	SM creation
Interest in SM	**0.87**			
PP of SM	0.54	**0.91**		
SM consumption	0.41	0.78	**0.89**	
SM creation	0.44	0.60	0.56	**0.82**

PP Perceived playfulness, *SM* Social media

Table 6 Factor loadings (bolded) and cross loadings

	Interest in SM	PP in SM	Social media consumption	Social media creation
ISM1	**0.84**	0.48	0.38	0.38
ISM2	**0.88**	0.47	0.34	0.38
ISM3	**0.88**	0.49	0.38	0.43
ISM4	**0.89**	0.48	0.34	0.37
ISM5	**0.86**	0.43	0.35	0.32
PP1	0.52	**0.95**	0.76	0.60
PP2	0.53	**0.95**	0.73	0.60
PP3	0.54	**0.93**	0.72	0.56
PP4	0.35	**0.80**	0.61	0.41
SMC1	0.31	0.70	**0.90**	0.43
SMC2	0.42	0.71	**0.90**	0.53
SMC3	0.37	0.72	**0.95**	0.50
SMC4	0.36	0.72	**0.95**	0.49
SMC5	0.38	0.64	**0.77**	0.54
SMCR1	0.32	0.45	0.44	**0.72**
SMCR2	0.33	0.48	0.54	**0.75**
SMCR3	0.42	0.57	0.46	**0.86**
SMCR4	0.40	0.53	0.50	**0.92**
SMCR5	0.26	0.36	0.32	**0.77**
SMCR6	0.39	0.54	0.47	**0.90**

PP Perceived playfulness, *SM* Social media

To assess the formative construct (social media involvement) it is necessary to validate if each first order construct contributes to form the second order construct (Chin 1998; Hair et al. 2011). Therefore, the weights of the first order constructs on the second order constructs and their significance were examined (see Table 7). For

Table 7 Weights of the first order constructs on the second order constructs

	Dimensions	Weight	t-statistic
Social media involvement	Social media consumption	0.34	67.02***
	Social media creation	0.32	53.51***
	Perceived playfulness social media	0.29	70.49***
	Interest in social media	0.27	40.19***

***Significant at 0.001 level based on 5,000 bootstraps

a formative higher-order construct, the weights of the lower-order constructs are especially important as they represent actionable drivers of the higher-order construct (Becker et al. 2012).

All first order constructs weights are significant, which means that there is empirical support for the first order constructs relevance for the construction of the formative second order construct as theoretically conceived, demonstrating a sufficient level of validity (Hair et al. 2011). Moreover, the weights are higher than 0.10 and their sign is consistent with the underlying theory (Andreev et al. 2009).

In conclusion, the results empirically show that social media involvement can be conceptualized as a formative construct composed by four distinct dimensions, namely interest in social media, social media consumption, social media creation and social media's perceived playfulness.

4 Conclusions, Discussion and Implications

As travel social media applications continue to proliferate a deeper understanding of social media use is needed to advance knowledge and further practice. This research was motivated by a broad interest in understanding travellers' behaviour toward travel related social media, proposing and validating a construct termed social media involvement. This construct is a good start to understand social behaviour to create online social media travel marketing strategies. Depending on their level of involvement, travellers may be more passive or active when they receive advertising communication, and limit or extend their processing of this information (Laurent and Kapferer 1985). Therefore, social media involvement could be a useful instrument for online travel marketer to adapt to these differences. Moreover, travellers that are more involved with social media are considered to be an attractive demographic for online travel marketers (Gretzel et al. 2007). They are more likely to perceive trip planning as an essential process in which they typically become very involved (Gretzel et al. 2007). Online travel marketers can implement strategies to promote the creation of user generated content and enjoyment, in order for travellers to become more involved. For instance, Tripadvisor rewards its members with virtual badges taking into account the number of reviews posted. Moreover, Tripadvisor periodically sends emails to members informing them of how many people read their reviews and which country the review readers are from.

Measuring social media involvement is also important for the personalization of online marketing strategies.

Although there are many studies that focus on social media and their effect on travel planning and travel decisions, there is no empirical evidence linking the use of social media to other constructs. Thus, the social media involvement construct can be incorporated in other models to study possible effects on other aspects regarding travel planning and purchases, such as online travel purchases. It is believed that online social networking will play a crucial role in online transactions (Kasavana et al. 2010). Therefore, future research needs to address the relationship between social media use and online travel purchasing behaviour. Social Media Involvement could perhaps predict such behaviour. This study anticipates that social media involved consumers will be more likely to purchase online than those with lower levels of involvement.

Social media involvement could also be used as a segmentation criterion, followed by a further analysis of the characteristics of each segment, such as age, gender, education level or online travel experience. A deeper understanding of the characteristics of social media users for travel purposes, such as which websites they use and the motives of their interaction will help travel providers assess the revenue opportunities that the various social media channels might provide (Noone et al. 2011). On the other hand, segmentation would allow travel marketers to personalize and cater for travellers with different levels of involvement accordingly. For example, travellers with a high social media involvement level are more likely to create user generated content and can highly influence others. Therefore, travel marketers need to carefully nurture this segment, as they often act as advocates of a brand or an online travel provider.

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Mediating Roles of Self-image Expression: Sharing Travel Information of SNSs

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Abstract Social networking sites (SNSs) have become important and popular tools for not only presenting self-image, but also sharing travel information. This study adopted self-image expressions to understand tourists' intentions to share travel information and behavioural changes in SNSs. To enhance understanding tourists' intention and behaviour, the current study suggests a research model based on motivations for self-image expression (i.e., creativity, altruism and social relationship). This current study empirically resulted in the importance of users' creativity, altruism and social relationship in SNSs, which leads to the intention and behavioural changes to share travel information. In addition, altruism moderated the negative effect of creativity on self-image expression as well as the positive effect of social relationship on self-image expression. Based on the result of this study, the current study bears some implications in theoretical and practical context.

Keywords Social networking sites • Self-image expression • Travel information

1 Introduction

As the constraints of Internet environments are crumbling down, and the use of mobile Internet access has been around, social networking services (SNS) are activated by utilizing the smart devices such as a Smartphone and tablet PC. The use of social network services are constantly changing as new trends arise, the

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_17

popularity of various platforms shifts, and the market evolves. Therefore, particularly, researchers have been paying attention to the trends, changes, and fads in technologies and consumer behaviour that are closely related to travel information. In various fields of studies, the SNSs have been extensively researched for information acquiring and sharing (e.g., Kim et al. 2011a; Xiang and Gretzel 2010), user's acceptance of SNS (Ong et al. 2011), and self-disclosure and satisfaction in SNSs (e.g., Walther 2007). The literature implies that various types of information in SNSs plays an essential part in user's decision making in the context of online travel information searches; however, there has been little research on self-related information and image in social media (Kim and Tussyadiah 2013). Self-image expression in the online environment is regarded as one of the important research issues (Kim and Lee 2011). The more tourists are engaged in social activities through SNSs, the more they are inclined to contribute their experience by way of acquiring and sharing travel information. The SNSs make meaningful sources, which influence users with a wide variety of opportunities for acquiring, searching and sharing travel information. To reflect this trend, travel information websites with the characteristics of SNSs are increasing recently and, likewise, it allows tourists to more easily obtain travel information. Therefore, the SNSs have merits such as information accessibility, no barriers of time and space, and little effort in acquiring travel information. Although the SNSs have changed the paradigm of tourist behaviour, the research on the SNSs related to the acquiring and sharing of travel information are still closer to the beginning, especially, social support by self-presentation. This study examines the influencing relationship of crucial factors of the SNS context for tourism by integrating independent variables: personal aspect (creativity, altruism), social aspect (social relationship) (Parra-López et al. 2011), by mediating variable: self-presentation (Kim et al. 2011a; Kim and Lee 2011), and dependent variable: behavioural outcomes (intention to share travel information, behavioural changes to share travel information). To this end, the current study suggests the following purposes to understand the potential tourists' intention and behavioural changes to share travel information using SNSs. First, in the context of the use SNS has for acquiring travel information, this study discusses the factors influencing self-image expression in both personal and social aspects. Second, the current study also tries to find out the impact of self-image expression on both the intention and behavioural changes to share travel information. Third, our study attempts to test the moderating effect of altruism on the relationship between creativity and self-image expression, and the relationship between social relationship and self-image expression, respectively.

2 Theoretical Background

According to Ashforth and Mael (1989), a person's self-concept is made up of a personal identity and a social identity. Personal identity is a peculiar entity, evident from other individuals (Baumeister 1998). Social identity is an individual-based consciousness of what defines the group (Turner et al. 1987). In other words, social identity theory has multiple levels of selves, including "personal" and "social"

levels (Turner et al. 1987). Therefore, personal identity and social identity are mutually relevant (Kim et al. 2012). Self-concept leads to self-image expression, the activity in which people express their identities by behaving in ways that bring certain types of personal qualities (Leary 1995). The evasion of blame and the seeking of positive evaluation motivate self-presentation. Among the numerous psychological phenomena that SNS presents, self-presentational behavior is particularly interesting. Furthermore, given the social exposure that SNS affords, proliferation of self-image should be expected with online self-presentation (Walther 2007). SNS users have a control over their self-presentational activities.

Recently, SNS enhanced tourism all over the world, and has become an essential tool for accessing various sources of tourist information. Based on these applications, some studies have started to investigate the use of SNS in the tourism context (e.g., Qu and Lee 2011; Xiang and Gretzel 2010). For instance, Qu and Lee (2011) focused on the travellers' social identification and membership behaviours in the online travel community. In addition, Xiang and Gretzel (2010), particularly, studied online travel information searches through SNS, and confirms that the importance of social media increases in the online tourism domain. However, despite the rising use of SNSs for tourism, there has been limited research. Especially, there is a lack of empirical data describing the concept of self-image expression in the context of tourism. Therefore, researchers need to investigate tourism behaviours through self-presentation on SNSs. In addition, individual personality and self-image expression factors are important to understand self-image expression mechanisms on SNSs' context for tourism. Self-presentation is closely related to human beings' creativity and altruistic personality. The creativity is considered as a factor immediately influencing individuals' behaviours online (Kim et al. 2011a). Kim et al. (2012) insisted that creative people were more offensive in expressing and revealing themselves, and their results appeared to support this argument. In the context of travel information sharing, altruistic personality is strongly related to the personal aspect of online identity, and is considered an essential factor for other pro-social behaviours (Kim et al. 2011a). The person with high desire to share their own travel or destination information intends to enact pro-social behaviours such as showing oneself to others or participating in the SNSs, which leads to expression of self-image (Kim et al. 2011a). Thus, self-image expression is enhanced by the degree of an individual's creativity and altruism. Therefore, this study attempts to discuss the factors influencing self-image expression in both personal and social aspects. We also try to find out the impact of self-image expression on both the intention, and behavioural changes to share travel information.

3 Research Model and Hypotheses

Based on the self-presentation theory, a research model in was proposed in Fig. 1.

Creativity and Self-image Expression Creativity refers to the degree to which an SNS user will tend to make progressive decisions and receive new ideas from the SNS, which is based on the study of Kim et al. (2011b). This creativity is considered

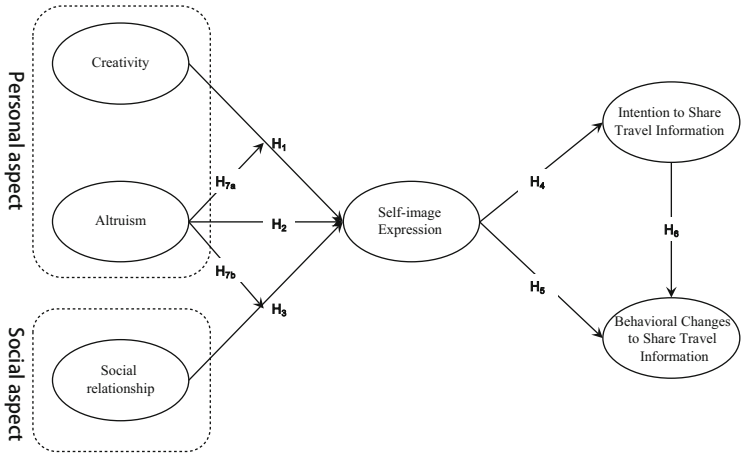

Fig. 1 Research model

as the factor immediately influencing individuals' behaviours online (Kim et al. 2011a). In addition, the person who is to attempt new ideas and new things is more likely to experience a new thing in a new way. Therefore, if the person has higher creativity, he or she favours new ways for expressing oneself in SNSs, and then he or she will try to express self-image in SNSs.

H_1: Creativity has a positive relationship with self-image expression.

Altruism and Self-image Expression In the context of travel information sharing, altruism is defined by a degree that one is concerned about the welfare of other users in the SNSs. This altruistic personality is strongly related to the personal aspect of online identity, and is considered an essential factor for other pro-social behaviours (Kim et al. 2011a). Particularly, altruism is associated with voluntary action (Lee and Lee 2010). If an SNS user has a tendency towards helping others considering travel information, the potential tourists try to take a voluntary action. In other words, the person with high desire to share their own travel or destination information tends to enact act pro-social behaviours such as showing oneself to others or participating in the SNS, which leads to expressing self-image. Thus, self-image expression is enhanced by the degree of an individual's altruism. Based on the above argument, the following hypotheses are proposed:

H_2: Altruism has a positive relationship with self-image expression.

Social Relationship and Self-image Expression Social relationship is defined as the degree which users perceived benefits from using SNSs to maintain and build interpersonal relationships (Kim et al. 2011a). Social benefits related to the SNS usage boosts the intention to use SNSs in the context of tourism (Parra-López et al. 2011). Thus, people try to form their self-identity in the places people perceive high social values. According to the social capital theory that explains the benefits resulting from interpersonal relationships, aspects of community encourage

individuals to act within the community because they perceive benefits for the community and themselves (Wasko and Faraj 2005). In addition, closer interpersonal relationships in online environments strongly enhanced presentation of a user's self-image (McKenna et al. 2002). In other words, people who perceived intensified social relationships tried to present self-image in the SNSs. Hence, the following hypothesis is proposed:

H_3: Social relationship has a positive relationship with self-image expression.

Self-image Expression, Share Travel Information and Behavioural Changes SNS becomes a channel for information acquisition or sharing behaviours. Prior studies in the context of online behaviours suggests that self-identity, such as self-image expression, plays a crucial role in influencing a person's information sharing behaviours (Kim et al. 2011a; Wang and Fesenmaier 2004). Perhaps people present self by expressing their opinions in the context of online environments, and one of their self-presentations is information sharing behaviours. Similarly, recent studies suggest that self-presentation enhances peoples' behaviours regarding travel information sharing. Kim et al. (2011a) found that online identity would affect knowledge sharing. In addition, Wang and Fesenmaier (2004) insisted that expressing identity in an online travel community enhances a higher level of member participation, which stimulates contribution to the community. In sum, self-image presentation in SNS with an establishment of identity leads contributions to the SNS and behavioural intentions such as intention to share travel information. Therefore higher self-image expression would increase the intention to share travel information in SNSs.

H_4: Self-image expression has a positive relationship with intention to share travel information.

Self-image expression may also influence behavioural changes to share travel information. According to Qu and Lee (2011), behavioural changes to share travel information are the extent to which SNS users modify their behaviours related to acquiring travel information through SNSs in the value aspect. Numerous studies suggest that self-expression is a crucial factor that affects individual's behaviour (Kim et al. 2012). In addition, Kim et al. (2012) insisted that individuals with a high level of self-image expression desired to get positive favours from other users. In acquiring travel information using social media, if active SNS users have a high level of self-image expression, then they will be likely to have a positive impression on the SNSs, and would like to get a positive favour from others. Therefore, they try to modify their behaviours in terms of the information acquiring methods considering the other's favour. Thus, we relate self-image expression to behavioural changes to share travel information in our research model and the following hypothesis is proposed:

H_5: Self-image expression has a positive relationship with behavioural changes to share travel information.

According to the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975), human behaviour can be predicted by the amount and intensity of volitional efforts. The TRA posited that human beings are rational and try to make decisions rationally. Therefore, intention has been identified as a significant predictor and motivator of behaviours. In other words, intention to share information can explain a user's behaviour about information. SNS users strongly taking part in travel information behaviour will change behaviours related to sharing travel information. Conversely, SNS users who do not intend to share travel information will not change their exiting behaviours. Therefore, the following hypothesis is proposed:

H_6: Intention to share travel information has a positive relationship with behavioural changes to share travel information.

Moderating Effect: Altruism Personal traits play important roles in forming behaviours. Particularly, the effect of creativity and social relationship on self-image expression in SNSs could change with the level of altruism that is one of the personal traits. A person's altruism is a motivator of increasing the welfare of others', which is the opposite of the egoism that enhance one's own welfare (Batson and Powell 2003). SNS users whose altruism is high may weaken the effect of users' creativity on the self-image expression in SNSs. Conversely, if SNS users have a high level of altruism when considering travel information, it makes the impact of social relationship on the self-image expression stronger because altruism, regarding travel information, leads to pro-social behaviours (Kim et al. 2011a). Thus, we believe that in terms of SNS self-image expression behaviours would be moderated, the following hypotheses is proposed:

H_{7a}: Altruism moderates the relationship between creativity and self-image expression.

H_{7b}: Altruism moderates the relationship between social relationship and self-image expression.

4 Research Methodology

Instrument Development Most instrumental items were adopted from prior studies, and adapted to suit the context of social media. All of the items were measured on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Three altruism items were adapted from previous research (Parra-López et al. 2011). Creativity was measured on three items developed by Kim et al. (2011a). Social relationship was measured on a four-item scale (Kim et al. 2011a). Self-image expression were all measured using four item scales similar to those reported in Kim et al. (2011a). Intention to share travel information items were adapted from a previous study by Ha and Ahn (2011). Four behavioural changes to share travel information items were adapted from previous research (Qu and Lee 2011).

Data Collection This study used data collected from 2013 by the leading Internet survey firm in Korea. The Internet survey firm electronically distributed the questionnaire to randomly selected potential travellers. A screening question was used to select those who have used at least a year of experienced SNS use. Based on the screening question, 204 respondents were selected. The respondent gender ratio was male 111 (54.4 %) to female 93 (45.6 %). The 20–29-year age group had the largest proportion at 38.7 % (n = 79), followed by those under 20 years (n = 605, 29.4 %). Over half respondents (n = 125, 61.3 %) had university degrees or higher. The most frequently reported occupations of the respondents were office workers (n = 78, 38.2 %), followed by students (n = 40, 19.6 %).

5 Data Analysis and Results

In order to test the proposed research, we used a partial least squares (PLS) regression analysis using PLS-Graph Version 3.0. PLS regression analysis has several advantages including small sample size, and few assumptions about measurement scale and normal distribution (Ahuja and Thatcher 2005). Using PLS-Graph, the measurement model and structural model testing were conducted.

5.1 Measurement Model

The adequacy of the measurement model was checked by convergent validity and discriminant validity. According to Bagozzi and Yi (1988), convergent validity was checked using three other criteria. First, the standardized path loading of each item had to be statistically significant and greater than 0.7. Second, the composite reliability (CR) and the Cronbach's α for each construct had to be larger than 0.7. Third, the average variance extracted (AVE) for each construct needed to exceed 0.5. As shown in Table 1, the standardized path loadings, the CR, and the Cronbach's α for all constructs exceeded 0.7. The AVE for each construct was greater than 0.5. Therefore, the convergent validity for the constructs was supported.

The discriminant validity of measurement model is checked by using two criteria suggested by Chin (1998): (1) item loadings to construct correlations is larger than its loading on any other constructs and (2) the square root of the AVE is greater than the correlations between that construct and other constructs (Fornell and Larcker 1981). As shown in Table 2, all items exhibited substantially higher loading than on other factors and the square root of the AVE for each construct exceeded the correlations between that construct and the other constructs. Therefore, discriminant validity was established.

Table 1 Descriptive statistics of constructs

Constructs		Items	CR	AVE	α
Online creativity (CRE)	CRE1	I like to experiment with new ways of doing thing in social media	0.930	0.769	0.896
	CRE2	I often try new things in social media			
	CRE3	I like to try different thing in social media			
	CRE4	I am original in my thought and ways of looking at things in social media			
Altruism (ALT)	ALT1	I always share with friends and colleagues what I know and the new things that I discover about place to visit	0.920	0.794	0.868
	ALT2	I have experiences of and/or comments about trips and destinations that may be of interest to others			
	ALT3	I use the contributions and comments of others about trips and destinations and, to some extent, feel an obligation to contribute as well			
Social relationship (REL)	REL1	Using social media better enables me to form interpersonal bonds with others	0.941	0.841	0.906
	REL2	Using social media helps me maintain my social relationships with others			
	REL3	Using social media helps me make new friends			
	REL4	Using social media enhances my social relationships with others			
Self-image expression (SEF)	SEF1	Using social media enhances my self image to others	0.941	0.800	0.916
	SEF2	Using social media improves my self-expression to others			
	SEF3	Using social media makes a good impression on other people			
	SEF4	Using social media improves the way I am perceived			
Intention to share travel information (SHA)	SHA1	I will try to share the travel information with other users of social media	0.946	0.814	0.923
	SHA2	I will share the travel information with other users of social media			
	SHA3	I intend to share the travel information with other users of social media in the future			
	SHA4	I will share the travel information using social media			

(continued)

Table 1 (continued)

Constructs		Items	CR	AVE	α
Behavioral changes to share travel information (BEH)	BEH 1	The way I share for information about travel products/services has changed as a result of my being in the travel community group	0.917	0.735	0.877
	BEH 2	Social media has influenced my behavior in some ways, such as what I share			
	BEH 3	Which social media I use has changes as a result of my being in social media			
	BEH 4	Social media has influence how I share travel information			

CR = composite reliability
AVE = average variance extracted

Table 2 Correlations among constructs

Construct	Mean	STD	CRE	ALT	REL	SEF	SHA	BEH
CRE	5.011	0.964	**0.877**					
ALT	4.830	1.059	0.501**	**0.891**				
REL	4.876	1.005	0.567**	0.577**	**0.917**			
SEF	4.614	1.041	0.563**	0.502**	0.560**	**0.894**		
SHA	4.850	0.940	0.469**	0.615**	0.498**	0.392**	**0.902**	
BEH	4.669	0.925	0.396**	0.452**	0.434**	0.489**	0.505**	**0.857**

Note The diagonal elements in boldface in the "correlation of constructs" matrix are the square root of the average variance extracted (AVE). For adequate discriminant validity, the diagonal elements should be greater than the corresponding off-diagonal elements
*$p < 0.05$, **$p < 0.01$

5.2 Structural Model

Direct Model The research model was examined for their explanatory power and path significance using a bootstrapping technique. The size of the bootstrapping sample that was used in the PLS analyses was 500. In addition, the model accounted for 15.6–42.7 % of the variance (R^2; squared multiple correlations). The percentages of explained variance for self-image expression, intention to share travel information and behavioural changes to share travel information were 42.7, 15.6 and 35.8, respectively. As shown in Fig. 2, H_1, H_2, and H_3 address the structural relationships among creativity, altruism, social relationship and self-image expression. Creativity ($\beta = 0.312$, $p < 0.001$), altruism ($\beta = 0.181$, $p < 0.05$) and social

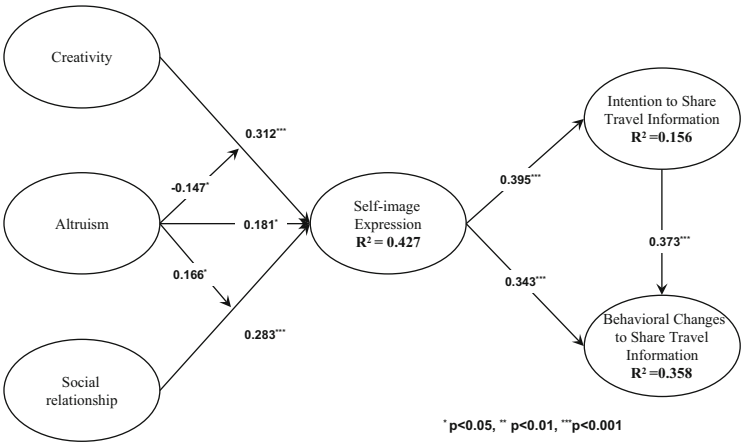

Fig. 2 Results of SEM analysis

relationship ($\beta = 0.283$, $p < 0.001$) have significant effects on self-image expression. Therefore, H_1, H_2, and H_3 were supported. Furthermore, self-image expression was statistically significant in predicting intention to share travel information and behavioural changes to share travel information. The relationships between self-image expression and intention to share travel information ($\beta = 0.395$, $p < 0.001$, H_4) and between self-image expression and behavioural changes to share travel information ($\beta = 0.343$, $p < 0.001$, H_5) were positive and significant, supporting H_4 and H_5. Finally, H_6 address the relationships between intention to share travel information and behavioural changes to share travel information. Intention to share travel information had a positive effect on behavioural changes to share travel information ($\beta = 0.373$, $p < 0.001$) supporting H_6.

Moderating Model Next, we examined if altruism will influence the relationship between independent variables (i.e., online creativity, social relationship) and self-image expression. Frazier et al. (2004) stated that a moderating effect is an interaction between one variable on the level of another variable. Therefore, if the interaction term (i.e., predictor × moderator) is significant, the hypothesis of the moderating effect is confirmed. We tested the moderating effect of altruism using a hierarchical regression analysis. The independent constructs (i.e., creativity, altruism, and social relationship) were entered in the first step, and the interaction term (i.e., creativity × altruism, social relationship × altruism) was added in the second step. As shown in Table 3, moderating effect of altruism on the relationship between creativity and self-image expression was negatively significant. The interaction between social relationship and self-image expression had a positively significant effect on self-image expression. Therefore, H_{7a} and H_{7b} were supported. The change in R^2 values between the two steps was 0.016.

Table 3 Results of testing moderator effects

Step	Variables	Model 1	Model 2
Step 1 (main effect)	CRE	0.314^{***}	0.272^{***}
	REL	0.275^{***}	0.253^{***}
	ALT	0.186^{**}	0.248^{***}
Step 2 (interaction term)	CRE × ALT	–	-0.147^{*}
	REL × ALT	–	0.166^{**}
F value		49.066^{***}	31.066^{***}
Adjusted R^2		0.415	0.425
R^2		0.424	0.440

6 Conclusion

The purpose of this study was to examine empirically the impacts of creativity, altruism, and social relationship on both the intention and behavioural change to share travel information focusing on the self-image expression in SNSs. Our major findings were that the personal aspects (creativity and altruism) and social value of SNSs were key dimensions of traveller's self-presentation in SNSs. The two aspects of human beings in SNSs, creativity and altruism, significantly influence, indeed, the travellers' self-presentation, and the self-presentation continually affects the intention to travel information search. These results suggested that potential tourists using SNSs ponder forming intention and behavioural changes involved in sharing travel information to be creative tourists, which leads to present self-image in SNSs. According to the analysis of the moderating effects of altruism, it was identified that altruism acts as a negative moderator in the relationship between creativity and self-image expression, and as a positive moderator in the relationship between social relationship and self-image expression. These results demonstrate altruism is not required in order to encourage expressing self-image in creative people using SNSs for travel information. On the contrary, it is necessary to stimulate user's altruism in order to encourage presenting themselves on SNSs in people who perceived many advantages of social relationship in using SNSs. In other words, our study re-confirmed altruism is a motivator of strengthening other's welfare in line with the studies of Batson and Powell (2003).

The findings of this study bear both theoretical and practical implications. The meaningful theoretical contribution of the current study lies in the fact that our study suggested and empirically explained theoretical framework with the prospective of self-image expression that has not been discussed in tourism research regarding the travel information in SNSs. Through the current study, personal aspects and social aspects lead intention and behavioural change regarding travel information sharing through self-image expression in the SNSs. Also, our study examined the moderator role of altruism. The results of this study suggest practical implications for tourism marketers. The founding of our study highlighted that personal and social aspects have a positive influence on the self-image expression.

From the personal aspects, tourism marketers are needed to focus on a potential tourist's creativity and altruism. It is not easy to construct these environments, but the expression of self-image is the result of the complexity of personal and social aspects of one's own identity (Turner et al. 1987). Thus, tourism marketers try to have both ways. From the social aspects, tourism marketers have to put power into offering and promoting social value to attract traveller's participation such as self-image expression.

This study has the following limitations and plans to improve the research. First, the study results are specific to one SNS: Facebook cannot be generalized to other SNSs such as Twitter, Instagram or Pinterest. Therefore, future research should consider various samples of SNSs' users in many different types of SNS. Second, this study mainly focused on self-image expressing and its associated intention and behavioural change to share travel information before, during and after travel.

Acknowledgements This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2013S1A3A2043345).

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Social Media Return on Investment and Performance Evaluation in the Hotel Industry Context

Dimitrios Buhalis and Emmanouil Mamalakis

Abstract Marketing has been impacted by social media platforms and the Internet developments. To survive fierce competition, corporations have to take advantage of all the opportunities provided by Social Media (SM). Marketers need to evaluate the effectiveness of different SM channels and Return on Investment (ROI) measurement is critical in the management of SM marketing campaigns. This paper assesses SM ROI using Princess Andriana Hotel in Rhodes, Greece as a case study. It clarifies complicated concepts related to SM ROI measurement. A comprehensive framework, built around the landscape of SM ROI assessment supports measurability. A netnographic observation revealed suitable metrics for the evaluation of the SM activities. Five SM channels and a set of analytics tools were combined to measure SM ROI. The result identified both financial and non-financial returns. Finally, recommendations for future assessment of SM campaign are provided.

Keywords Social media • Return on investment • Metrics • Case study • Hotel • Marketing

1 Introduction

The Internet and SM have dramatically changed the way people communicate, by providing channels that contribute to the interactions and transactions between consumers and businesses (Gay et al. 2007). SM platforms host over two billion users monthly (Statistic Brain 2014), who are actively participating in content creation in communities, blogs, social networking, wikis. SM have been characterized as the hybrid of marketing and communications (Orsburn 2012). Measuring SM performance and ROI have become increasingly important. Hitherto, measurement efforts and tools have been insufficient and methods undeveloped (Powell et al. 2011). Web 2.0 released innovations in communications, marketing, and promotion. However marketers are unable to precisely calculate the performance

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_18

of their online marketing activities. Managers need justifications for escalating SM budgets and promotion and for making the right high-level decisions. Investments in online promotion need to be measured and evaluated to assess any form of return. The purpose of this paper is to explore online marketing measurement practises and to create a framework that assists the measurability of SM ROI. The research used the SM activity of the Princess Adrianna Resort and Spa Hotel, in Rhodes, Greece to develop a framework of techniques and measurements to evaluate effectiveness.

2 Theoretical Background

The development of Web 2.0 strengthened the communication between consumers and companies through a variety of online channels. These interactions enhance marketing, attracting new customers by superior value and satisfying existing customers. Marketing is entering into a new era where the power of influence moves from marketers to consumers. This requires new marketing tools and methods for measurement of ROI in promotional activities. ROI fulfils business need for a tangible profit from an investment (Kaske et al. 2012). In finance, ROI is simply calculated by the following formula (Lenskold 2003; Ambler and Roberts 2008, cited in Rautio 2012; Sheehan 2010):

$$ROI = (Gain\,from\,Investment - Cost\,of\,Investment)/Cost\,of\,Investment$$

ROI is the relationship between profit and the investment that generates that profit, and is widely used to examine the performance of an investment (Franklin and Plewa 1996). However, there are differences between calculating the ROI in financial terms, and in terms of marketing; especially in online marketing where there are increased levels of complexity. In marketing ROI equations, there is a variety of different metrics replacing traditional ones. The early history of SM ROI measurement has presented negative opinions about measurement (Powell et al. 2011). Companies have dropped the idea of ROI as a success measurement for SM (Crosti 2013). The debate rise around the types of SM ROI that can be measured. Therefore, it is critical to investigate the different opinions around online marketing measurement (Table 1).

2.1 Metrics

Ultimately, there are financial and non-financial measurements of ROI (Perdue 2010). In the past, measuring the performance of online advertising used simple metrics such as unique visitors, page visitors, page views or cost per clicks (Fisher 2009). Web 2.0 applications brought a further advance of e-metrics. E-metrics are defined as performance criteria that measure the success of Internet sites (internal and external) and e-business and e-commerce (Fisher 2009). Metrics could be divided into marketing,

Table 1 The SM ROI debate

Financial arguments	Author
Inability in measuring traditional media. Conversely, ability in measuring SM	Sheehan (2010) Crosti (2013)
The key through hard metrics and financial ROI is Web analytics	Robson (2013)
Trusts the three categories of metrics: qualitative, quantitative, ROI	Turner (2010)
It is possible to measure by taking two important steps	Orsburn (2012)
Financial metrics win the battle against non-financial metrics	Kaske et al. (2012)
Non-financial arguments	**Author**
Businesses realised that there is no financial metrics to measure, there is only soft metrics	Heggestuen (2013) Seiter (2012)
Marketers will never be able to measure every single financial lead, thus SM is about impression	Filisko (2011), Westlund (2013)
The metrics to be measured are often unknown	Cleverwood (2011)
SM financial ROI: Measuring the immeasurable	
It is more effective to measure engagement rather than financial ROI	
Financial and non-financial arguments	**Author**
SM can be now measured due to traditional media tactics	Powell et al. (2011)
Internet marketing has developed web metrics for measuring and evaluating online performance	Gay et al. (2007)
It's impossible to precisely measure ROI	Crosti (2013)

financial, and technical, although those three categories can be inter-connected (Ryals 2008, cited in Rautio 2012). Different performance indicators are used for engagement, traffic measurement, customer service, financial return, reputation management and so on (Powell et al. 2011; Fisher 2009; Orsburn 2012). Barefoot and Szabo (2010) suggest that the following metrics can deliver ROI measurements: visitors, incoming links, social network activity, conversations and contributions, references in the blogosphere, views on SM sites, RSS subscribers, and social bookmarking (cited in Perdue 2010). Different authors use different approaches to SM ROI and present various metrics. This paper identified and categorized those metrics as financial and non-financial, depending on the result that is delivered during the measurement. For instance, The Rocky mountain Hotel increased revenues by their online marketing campaign, grounded on Twitter, for the year 2011–2012 (Herrmann 2012). Based on the formula: $Revenues = Reach \times impact \times Yield$ and knowing that $Influenced\ conversations = Reach \times Impact$ the company revealed revenues increased by $21,900 due to SM initiatives.

The Twitter strategy procedure extracted the following data: 365 tweets, 876 - re-tweets, 1,777 followers on Twitter and 1.630.394 reach in all their tweets, 3,606 clicks, 0.22 % click-through rate, 0.3 % Lead conversion rate, 11 conversions and $1,059.29 average revenue per room. The expenses measured in that period of time were: $5,667 for personnel and $7,500 for the social analytics solution. The outsourced company (BCF) that delivered these data used the common ROI formula:

$$ROI = (Gains - Costs)/Costs \times 100$$

The result shows that the ROI through the company's SM marketing strategy that year was 66 %. Accordingly, BCF trusts that SM ROI is obviously possible to be

measured though proper measurement practises as well as clear objectives and strategy (Herrmann 2012).

Despite the fact that ROI metrics have been consolidated to hard financial metrics non-financial metrics of investments are sometimes better predictors of the future than the standard accounting systems (DTTI 1994; Kaplan and Norton 1996; cited in Ittner and Larcker 1998). Hard-financial metrics need to be complemented by non-financial ones due to the SM marketing complexity. Engagement is the most important element of the non-financial ROI. Few marketers actually try to translate the benefits of engagement into hard financial return. Engagement is immediate, accessible, and appears where the audience already exists. Engagement can be effectively accomplished through several marketing actions, namely: (A) Word-of-mouth (WOM) the most productive influences in online conversations between consumers (Fogel 2010), as research showed that 90 % of consumers trust more other consumers rather than advertisements (cited in Fogel 2010), 76 % of people think that marketers lie (Athanasiou 2013), and 20–50 % of all purchasing decisions are affected by WOM; (B) reach, which is the metric that is easiest to quantify across all platforms (Kaske et al. 2012); (C) traffic, to find out where the customer came from, which SM applications customers used and finally what led the customer into the actual purchase of the product or the service; (D) customer service as the key for customer engagement strategy; and (E) brand advocates, who apart from positive recommendations about a brand through the e-WOM, they can deliver ten times ($\times 10$) financial ROI.

2.2 Cost of SM Activity

The cost of a SM campaign is calculated depending on the strategy a company follows. Whether a company outsource its online marketing activities or keep them in house is of significance. In the effort to establish the rates for the creation, design, and maintenance of SM channels, the websites of the top 10 SM agencies in the UK, and in rest of the world were examined. It appeared that there are no standard rates amongst the services those agencies provide. The costs cannot be accurately defined, however they can be broken down into four basic categories: (a) staff costs; (b) external costs; (c) advertising; (d) other costs. Perdue (2010) highlights that despite costs, paying for these reputation-tracking tools can be highly beneficial as these tools can help the engagement and response in real time.

3 Methodology

Comprehensive case studies are a very productive way to expose the interaction between a phenomenon and its context (Dubois and Gadde 2002). The purposive selection of the Princess Andriana hotel was because it offers a very active presence in the online marketing area, with the use of three social media channels, as well as two social travel networks. Princess Andriana belongs to the small local hotel chain HHotels managed by the Hatzilazarou family. Furthermore, the hotel's management were really interested in the evaluation of their efforts regards to the return on several investments they made on the promotion sector. Therefore, they granted access to confidential data and offered assistance. Through a netnographic observation, the research gained consumer insights through both qualitative and quantitative data (Kozinets 2010). The research design was split into two pathways. The first pathway reflected to quantitative web analytics research using hard financial metrics, frameworks, formulas, and figures that contributed to the evaluation the performance of the SM marketing strategy. The second pathway comprised the qualitative user engagement and reputation, by observing soft metrics that aimed to show the non-financial forms of ROI. Taking as an advantage the unlimited boundaries of data that can be collected by the netnographer (Kozinets 2010), the research proceeded with the recovery and analysis of insights data from a web analytics platform (Google Analytics), a reservation and analytics platform (WebHotelier), and a social network insights platform (Facebook). Apart from the two social travel networks, TripAdvisor and HolidayCheck, the only SM channel that was thoroughly examined was Facebook, as YouTube and Google + did not show any activity at all. The analysis process was benefited by the Facebook insights, which were compared with Google Analytics statistics. After determining the purpose of this study, the data were selected, pulled, examined, and categorized, with the help of those online analytics platforms (Table 2).

4 Findings and Analysis

To understand the audience of Princess Andriana Hotel, the Google analytics account of the hotel was observed. For the year 1/12/2012–1/12/2013, the official website received 75,882 visits in total. Out of those visits, 64.5 % were new users, while the rest 35.5 % were returning users. Google analytics provides the traffic sources that show where the users came from and the type of search used (Table 3). Among those types of research, the observation focused on the social referral traffic, which presents the visits from a website that has embedded link for the hotel's website. Facebook holds the overwhelming 93.4 % of the social referral visits to the website, and this is the reason why it is more thoroughly examined than the other SM channels.

Table 2 The sources of the data

Platform	Type of platform	Type of data (metrics)
Google analytics	Web analytics	Number of visits, traffic sources, referral traffic sources, visitor's flow, conversion rates
WebHotelier	Reservation and analytics	Number of referral visits, number of bookings, conversion rates, revenues from referral sources, revenues for extended examination period, number of views through social travel networks
Facebook	Social network	Post analysis, post reach, page likes, engagement rates (likes, shares, comments), inbox messages

Table 3 Social referral traffic sources to Princess's Andriana website

	Source	Number of visitors	Percentage (%)
1	Facebook	2,873	93.30
2	Vkontakte	91	3.00
3	Odnoklassniki	44	1.40
4	Twitter	21	0.70
5	TripAdvisor	17	0.60
6	Google +	13	0.40
7	Draugiem.lv	8	0.30
8	Jappy	5	0.20
9	Facebook apps	4	0.10
10	goo.gr	2	0.10
	Total	3,080	

4.1 Costs

Lewis's (2012) proposed framework of expenditures presents the types of expenses that constitute the summary of the cost: social marketing budget, staff and technology investment (Table 4). The SM channel management for all five properties of the HHotels chain was the exclusive responsibility of one employee in the marketing department. It was impossible to estimate the exact amount of time that the employee spent on the SM channels of each hotel since it varies according to the traffic. Therefore, the calculation of the expense for each hotel was calculated by dividing the salary in five parts assuming that the employee devotes equal amount of time to each hotel's SM activities. In addition, paid advertising on the Facebook channel was also used in the hotels' marketing strategy. Offering a free, seven-night stay for two people as a prize, the advertisement was posted as a quiz challenge requiring the uses to like, share, and then take the quiz. This CPC approach aimed to spread the content as the post would appear on the users' timeline and their friends' news feed update. Finally, a booking application, powered by WebHotelier was added into the hotels' Facebook page expecting to facilitate customers to make reservation directly through the Facebook platform, instead of transferring to the hotels' official website.

Table 4 Hotel's online marketing costs for 2012–2013

2012–2013	Annual costs (€)
Employee (pro rata employment cost)	3,360
Facebook CPC advert (April 2013)	74.18
Facebook instant booking	200
Total	3,634.18

4.2 Financial Return

The calculation attempt of the financial ROI started with the WebHotelier insights, which provide the reservations and sales landscape in details. Table 5 reveals that the referral traffic from the Facebook channel yielded 37 visits in total, however without any conversions. Consequently it is evident that there were no revenues coming directly from Facebook, or from the embedded in Facebook page booking platform.

As a result, the formula:

$$ROI = (Gain\ of\ investment - Cost\ of\ investment)/Cost\ of\ investment$$

was acknowledged unnecessary, as the data revealed that there was no direct conversions from any referral sources. Despite the fact that no revenues were found through the SM channels, Kaske et al. (2012) provides a rational explanation, "More troublesome are indirect influences, for example when a customer uses a crowdsourcing platform to obtain advice and then proceeds to buy in a physical store". Booking arrive through an email, phone call, or simply by walk-in customers.

4.3 Non-financial Return

The non-financial return findings present the levels of engagement as a result of reach, customer service, and positive sentiment, as well as high levels of brand reputation, that emerged from the users' interaction with the hotel's social media platforms. According to Facebook (2014), post engagement is the number of actions related to a post as the outcome of an advertisement. Metrics such as likes, comments, shares and post clicks, are used in an algorithmic filtering for the calculation of engagement (Facebook 2014). Unfortunately, Facebook insights do not provide the total engagement rate for the period of time that the hotel is examined. Due to a range of complexities and inconsistency of the Facebook insights, it was found impossible to calculate the engagement rate by adding the engagement rate for each individual post. Thus, the research procedure moved on with the manual observation of the posts on the timeline. Those posts consist of promotional photos, customers' photos, holidays and welcome cards, promotional videos, and charity promotions (Table 6). During the observation it was revealed

Table 5 Bookings and conversions through Facebook

www.facebook.com	**21**	**0**	**0.00 %**
www.startsiden.no	21	0	0.00 %
www.google.es	19	0	0.00 %
www.google.by	19	0	0.00 %
search.sky.com	19	0	0.00 %
hotels.sletat.ru	19	0	0.00 %
m.facebook.com	**16**	**0**	**0.00 %**

Table 6 Facebook posts along with their views, likes, and shares

Type of post	Number of posts	Average views per post	Average likes per post	Average shares per post
Promotional photo	44	1,620	91.6	6.74
Customer's photos	11	1,593.3	58	2.87
Holiday & welcome cards	4	1,255.5	49	0.25
Promotional video	1	1,209	37	0
Charity promotion	2	1,039.5	13	1
Quiz	4	13,434	144	52.5
Other	3	1,089.6	26.6	1
Total	69	146,047	5,493	308

that, the posts with the higher organic average of views, likes, and shares were promotional photos posts. However, the unique action that boosted the hotels' reach to its likers and followers of the page was the quiz post which delivered 9,941 paid reach, three times more than the organic reach (2,934).

A further part of the examination of the user engagement and reputation was the user's correspondence activity on Facebook timeline posts. Out of the 543 comments on those posts, the overpowering 75 % showed that the users commented very positive to the posts, while the staff liked every very positive, positive, and neutral comment. As a part of customer service, every query was answered in real time and in detail. Users occasionally used posts as a chat room to exchange opinions and experiences about the hotel between themselves. Negative and very negative responses were only 0.75 %. Yet, the staff managed to reverse any negative sentiment or complain that was spotted through the posts, by providing solutions or detailed and rational clarifications. Those actions minimized the negative responses from the customers by adding value to the positive ones, as the customers tented to like staff's responses after a helpful reply. Taking into consideration all the activity for the period that the hotel was examined, and considering that the number of the fans at the end of this period was 1,810, the total engagement rate can be calculated based on Smitha's (2013) formula:

$$\begin{aligned} \textit{Engagement rate} &= \textit{Total engagement } (\textit{likes} + \textit{comments} + \textit{shares})/\textit{total fans} \\ &= (5,493 + 308 + 543)/1,810 = \mathbf{3.5} \end{aligned}$$

After an extended research of 500,000 Facebook pages, Leander (2013) supports that the average engagement rate of a page below 10,000 fans is 0.96 %. Furthermore Leander trusts that a satisfying engagement rate for a business should be above 1 %. In a smaller scale, Lee (2013), after a research of 5,000 Facebook pages among 168 industries, supports that the average engagement rate of a page below 10,000 fans is 6.1 %, with the minimum engagement rate being around 1.7 %. Therefore, according to the above statistics, the engagement rate of Princess Andriana hotel seems to be between medium and good levels. Customer service refers as any form of social interaction that assists meeting customers needs. The aim of customer service examination is to reveal the effectiveness of the hotel customer care. Facebook appeared to be the only SM channel that customers used to reach the hotel to place their complaints and make queries. As seen on Table 7, those private (inbox) messages were categorized depending on the content. The overall positive sentiment between the customers and the hotel through Facebook was retrieved both from the customer service support and engagement metrics. Ghali's (2011) following formula from was chosen for the calculation:

$$\begin{aligned} \textit{Positive sentiment} = &(\textit{total likes} + \textit{total shares} + \textit{positive comments} \\ &+ \textit{positive messages})/\textit{total number of posts} \\ &+ \textit{total number of comments} \\ &+ \textit{total number of messages} \ = 84\,\% \end{aligned}$$

As a result of the positive sentiment, the e-WOM delivered growth of the total page likes; as on December 1st of 2012 the total page likes were only 240 and after a year of online promotional operations, the hotel likes were boosted up to 1810, which is a growth of almost 655 %. Taking into further consideration the critical use of social media in relation to the brand advocacy, the netnographic research continued to the observation of the two social travel networking channels that the hotel uses as promotion tools. The findings presented a very good presence of the hotel in the

Table 7 Visitors' messages through Facebook 'Inbox' messages (125)

Type of message	Number of messages	Percentage (%)
Positive feedback	10	7.6
Complaints	4	3.0
Quiz competition	56	42.4
Price and availability	10	7.6
Transportation and guidance	2	1.5
Price list for spa & other services	2	1.5
Candidates hiring	4	3.0
Other	43	32.6
Error	1	0.8
Total	**132**	

social travel networks, TripAdvisor and HolidayCheck. The 390 customer reviews on TripAdvisor with overall percentage of 89 % customer satisfaction, place the hotel in the third ranking position in Kiotari, Rhodes, Greece. On HolidayCheck, Princess Andriana stands for 5.1/6 in overall rating out of 168 reviews. Furthermore it is 83 % recommended from the official website of. Princess Andriana seems to have grown a very good reputation among the online travel communities.

4.4 Further Findings

The same time that this examination was taking place the hotel's management was investing into further marketing and sales actions for the tourist season 2014. A short observation revealed some investments as well as returns, involving the two main social travel-networking platforms that the hotel uses as promotional tools (Table 8). Due to the fact that the main period of examination 2012–2013 revealed no hard financial return, a slight extension of the examination period of nearly 2 months was considered as an immense opportunity for this research.

According to Holmboe (2011), if the actual sales of a specific period are higher than the forecasted sales, then that difference can be used as the value of the SM return. During that period, there was an increase in revenues by 134.61 % (Table 10), that has to be partially attributed to the contribution of TripAdvisor and HolidayCheck. According to Table 9, paid advertising boosted the views through these two referral websites. As a result, the connection between increased views and revenues delivers possible ROI through the formula:

$$ROI = (Gain\ of\ investment - Cost\ of\ investment)/Cost\ of\ investment$$

Essentially, the financial return of Princess Andriana for its online marketing campaign between 1/12/2013–27/1/2014 is estimated to be:

$$ROI = \{(63,336.28€ - 8,376.5€)/8,376.5€\} \times 100 = 656.11\ \%$$

Marketers can use a more simple equation to calculate the Return on Marketing Investment (ROMI). ROMI refers more specifically to marketing activities as 'the revenue generated by a marketing program divided by the cost of that program at a given risk level' (Powell et al. 2011). In our case, ROMI is estimated as:

$$ROMI = incremental\ value/marketing\ cost = (63,336.28€ - 26,669.83€)/$$
$$8,376.5€ = 4.33$$

With the completion of the findings, Table 11 was generated to present the overall outcome of Princess Andriana hotel SM ROI. The table consists of the forms of ROI that were revealed, as well as the SM platforms that were used in the SM campaign for the examination periods, along with the required metrics for the measurement.

Table 8 Hotels online marketing costs for the period 2013–2014

2013–2014	Annual costs (€)
TripAdvisor	3,937.50
HolidayCheck	1,079
Employee	3,360
Total	8,376.50

Table 9 Increase in hotel's website views through referral websites

	TripAdvisor	HolidayCheck
1/12/2012–27/01/2013	0	0
1/12/2013–27/01/2014	301	185

Table 10 Increase in revenues after the investment in TripAdvisor & HolidayCheck

Period of time	Return		
1/12/2012–27/01/2013	26,996.83 €	Increase: 134.61 %	
1/12/2013–27/01/2014	63,336.28 €		

Table 11 The overview of princess Andriana SM ROI

2012–2013	Platforms	Metrics		ROI
Financial	Facebook	Direct sales, Instant booking cost, Advert cost, Pro rata employment cost		ROI = 0 %
	Google Analytics	Visitor's flow, Conversions through referrals		
	WebHotelier	Bookings through referrals, Mobile Facebook app reservations, Facebook platform reservations		
Extended period	*WebHotelier*	*Overall sales, Incremental value, Social travel networks investments, Pro rata employment cost*		*ROI = 656.11 %* *ROMI = 4.33*
Non-financial	Facebook	Engagement	Posts, Likes, Comments, Shares, Views	Engagement rate = 3.5 Daily engagement rate = 11.05 % Positive sentiment = 84 % 1,810 page fans
		Reach	Posts, Organic reach, Paid reach, Post reach, Total page likes	
		Customer service	Messages, Post comments, Positive sentiment	
	TripAdvisor	Reputation	Reviews, Ratings, Overall satisfaction, Ranking	89 % in overall satisfaction Ranked #3 out of 13 in the region
	HolidayCheck	Reputation	Reviews, Ratings, Overall satisfaction, Recommendations	5.1/6 in overall satisfaction 83 % recommendation from HolidayCheck

5 Conclusions and Recommendations

The main purpose of this paper was the evaluation of the ROI of SM activities using the Princess Andriana hotel in Rhodes as a case. The paper illustrates that SM ROI can be measured into two forms, financial, and non-financial. Financial ROI, the conversion rates revealed no direct revenues from Facebook. However, during the extended examination period presented financial ROI of 656.11 %, and ROMI of 4.33. The incremental value that was generated during that period is partially attributed to the positive reputation of Princess Andriana from the two social travel networks. It is clearly verified that social media can indeed generate hard revenues for a business. All promotion platforms can be utilized either as selling points, or as promotional tools. The innovative functions of the Facebook instant booking as well as the direct booking through messages, provide extra purchase potentials to the user by avoiding unnecessary transitions to other websites. In regards to non-financial ROI, the findings demonstrated very satisfying levels of engagement and brand reputation. An overall increase in popularity, especially on the Facebook page contributed to the hotels' reputation, as Facebook stands as the most popular and multidimensional platform.

Return and investment proved to have a similar positive relationship. Rationale management and correct tools can convert a high investment to high returns. Marketers should not hesitate to invest on SM channels for their online campaign. Successful marketing campaigns must not underestimate the power of SM and especially the e-WOM. Real time B2C engagement and customer service are fundamental for a dynamic presence in the online communities.

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An Exploratory Study on Social Media in China

Li Li, Siming Zheng, and Zihao Wang

Abstract The research explores the use of three most popular social media (SM) websites in tourism-related activities in China. It identifies how Chinese use SM to share information about, and personal evaluation of, destinations, tourism products, itineraries of travel, visa and currency exchange. The SM sites provide Chinese users a space for open communication and freely exchange of ideas, emotions and cognitive insights into travel, life and being. The technology also offers them a new way of socialising with each other. The paper argues that SM should not be only regarded as information communication channels, but also a creator and a shaper to forge what tourism is in the contemporary societies.

Keywords Social media • Tourism • China

1 Introduction

From a medium of broadcasting, the Internet has evolved to become a platform which allows individuals to become 'media' themselves (Thevenot 2007) by using applications known as social media (SM). There is yet a formalised definition of SM; however, it is generally considered as a type of information communication technology (ICT) applications that enable peer-to-peer communication and the formation of virtual communities. On the contrary to the 'new media' e.g. email and online message boards, SM is considered as 'new new media' (Cao 2011; Levinson 2011), giving the freedom to individuals, not professions, to freely share ideas, experience and information cross various platforms. As such it nurtures interactive content creation (Cohen 2011), free social interactions and collaborative construction of knowledge (Sigala and Chalkiti

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_19

2014), which challenges the conventional communication of the top-down control approach (Levinson 2011).

SM permits sharing and exchange of textual, graphic, and verbal information. Applications such as Twitter offer users to write short messages to each other, known as blogs and micro-blogs. More than five million tweets and a million new blog entries are posted on blog sites (Bodnar 2010). Images can be shared through applications such as Flickr. YouTube is where users can upload their videos for public viewing. YouKu takes the place of YouTube which is not accessible in China. The functionality and inter-connectivity of SM has welcomed various online communities to share interests and experiences across political, economic and geographic boarders. By July 2014, there were over 1.4 billion Facebook members worldwide and 98 % of 18–24 years olds already use social media (Statistic Brain 2014). There are 71 % of online adults in the America using Facebook, followed by LinkedIn at 22 % and Pinterest at 21 % in 2013 (Duggan and Smith 2013). By January 2014, there are around 180 million Chinese bloggers, representing 13 % of the total population (Statistics Brain 2014).

SM plays an important role in tourism. They shape how travellers make decision and change their behaviours pre-travel, during travel and post-travel (Xiang and Gretzel 2010; Hudson and Thal 2013). It is reported that 43 % of UK holidaymakers use social media while on holiday and over a quarter trust peer review and personal recommendation on the social media (World Travel Market (WTM) 2013). Xiang and Gretzel (2010) report that social media constitutes a substantial proportion of research results on the Internet. As such, one may question the usefulness of traditional providers of travel-related information. SM has also influenced industry practice in the areas of marketing, sales and product development. Tourism organisations use various SM platforms to promote their offerings. For example, hotels in Hong Kong have put extensive efforts on Facebook to attract customers (Chan and Guillet 2011), which indeed reflects the growing global phenomenon of integrating with Facebook in the business world. By 2014, there have been seven million apps and websites being integrated with this world biggest SM platform (Statistic Brain 2014). What is puzzling the authors is that China, as the No. 1 market for tourism (WTO 2013), how Chinese nationals engage with SM in tourism activities given that Facebook, as well as YouTube, is not accessible within China. Research in this area is indeed underdeveloped. To what extent, is SM being utilised by industry players in China? Therefore, this study explores the use of SM in tourism-related activities in China with the aim to understand the role of SM in China's tourism sphere.

2 China: An Emerging Tourism Market Through Social Media?

China is a country that enjoys the fastest Internet penetration in the world (Chiu et al. 2012). By the end of 2013, the number of Internet users in China had reached 632 million, representing a penetration rate of 47 % (China Internet Network

Information Centre (CNNIC), 2014a). The same source reveals that this nation has witnessed over 527 million Internet mobile users as of the end of June 2014. The majority of the Chinese Internet users are considered affluent and live in well-developed economic areas (Chiu et al. 2012). The most widely used social media websites are RenRen, Douban and Weibo with 89, 62 and 44 % of the Internet users respectively in China (CNNIC 2014b). Over 70 % of social media users hold national diplomas and above while over 90 % of them were born in 1980 and later (CNNIC 2014b; Sina 2013).

Internet users use SM to upload photos, post blogs, update status, share files, stay connected with friends and so forth. Around 44 % of the users use social networking sites, micro-blogging and instant messaging at the same time to meet their needs at all levels (CNNIC 2014b). The number of blog entries on RenRen reaches over 12.5 million every day, including around 1.7 million entries sent via location based services (RenRen 2013). Over 84 % of Weibo users chat online and 62 % of them have group chat sessions on Weibo (Sina 2014). In their study, Chiu et al. (2012) report that 21 % of the participants have minimal participation on social media whereas 14 % of them express their opinions and build large personal followings implying a tendency of virtual identity building. In between are those who are enthusiastic about maintaining friendship, accounting for 15 %, users who re-post original materials (15 %) and readers who do not participate but read posts (14 %).

Weibo, in particular, is used by businesses and Chinese and foreign governmental agencies to market their products and services and/or promote their destinations (Zhang 2013). Around 5 % of Sina Weibo corporate accounts are businesses in the tourism and hospitality industries (Sina 2013). Zhang (2013) reports that Korean Tourism Board posts on average 10 blog entries daily, being the most active blogger among the foreign governmental agencies registered on Weibo, and that the Education Division of the British Embassy has the highest number of followers. About 37 % of social media users have purchased products online (CNNIC 2014c). Data on types of products purchased via social media sites are not available. However, it is reported that by the end of June 2014, over 1.9 million Internet users have purchased air tickets, hotel accommodations, train tickets and/or travel tours online in China (CNNIC 2014a).

3 Social Media: Information Communication, Socialisation or More?

Although SM is not the number one channels of communication (Munar and Jacobsen 2014), their role in tourism has drawn much of the attention. Xiang and Gretzel (2010) suggest that when travellers search information online by using a search engine, they are likely to be directed to SM sites partially due to their high levels of inter-connectivity. SM technologies enable creation and exchange of user generated content, which can be textual, graphic, audio and video. In the domain of tourism marketing, SM as information communication channels permit the sharing

of information and knowledge creation online at various stages of decision making. Travellers have the freedom to share information and experiences anytime anywhere during evaluation, buying, and the phase of enjoy, advocate and bond (Edelman 2010). As such it becomes more challenging for marketers to control what is conveyed out there in the virtual marketplace than it is in conventional top-down controlled communication. Not surprisingly, marketers now make great efforts to compete for customers' attention online long before actual purchase, which is known as Zero Moment of Truth (Lecinski 2011).

The free flow of information on social media has generated not only increased competition but also opportunities for businesses as well as for individual customers. Tourism and hospitality businesses utilise the notion of word-of-mouth (WOM) in SM and find ways to engage with the virtual community members though companies are advised to avoid hard selling on SM sites (Chan and Guillet 2011). Litvin et al. (2008) argue that in the Internet age, WOM is becoming digital (e.g. eWOM), which could be a cost effective way for marketing hospitality and tourism. Some destination management organisations have also joined the scene. For example, the local government of Xi'an in China has launched its micro-blog and attracted around 25,000 members in 2012 (Mu 2013) to promote and enhance the awareness of the city as a destination.

Why is it that WOM can affect consumers' decision making? Consumers learn knowledge, skills and attitudes of others through communication, which as a result, assist them behaving as consumers in the marketplace (Ward 1974). This process is known as consumer socialisation. In conventional socialisation, consumers learn from people they know such as parents, colleagues, etc. (Solomon 2013). Peer communication plays an important role in socialisation. In SM it entails interactions about products and services among the virtual community members. Internet-based SM makes socialisation with strangers and real-time multi-party connection to acquaintances in a 24/7 virtual world possible. The resultant new form of socialisation has accelerated the transmission of information about a product or service as well as the process of learning in socialisation. More companies are utilising SM and the notion of eWOM in their marketing efforts. For example, some intermediaries, such as Agoda and Ctrip, and hotels, such as Accor Hotels, invite their customers via email to give a review on their recent hotel stay. Over a quarter of UK holidaymakers claim that they trust peer review and personal recommendation on SM (WTM 2013). Wang et al. (2012) argue that in the Chinese market, peer communication in the online consumer socialisation affects purchase decisions in two ways: direct conformity of product attributes with peers and indirect conformity via reinforcement of product involvement. In their research only positive peer reviews are considered. However Lee et al. (2011) reveal that reviews that give low hotel rating are perceived helpful by the community members.

eWOM can also impact a destination's image and perceived attractiveness. Through their analysis of China-related travel blogs, Li and Wang (2011) reveal that travel bloggers have a mixed and paradoxical image of China. In that, there are positive reviews of China's cultural attractions, historical sites and natural sceneries, which are consistent with Xiao and Mair's (2006) findings. The negative comments are made in relation to local infrastructure (e.g. transportation), crowdedness, communication,

cleanliness and so forth. Li and Wang's findings appear to be homogenous, which is maybe due to their methodological approach, in which they only focus on travel blog websites. On the contrary, Choi et al. (2007) investigate the image of Macau represented in online travel blogs, and other conventional marketing communication channels e.g. the official websites of Macau tourism board, travel agencies etc. The authors discover that the image of Macau projected online varies across different communication channels. Their findings echo commentators' (Cao 2011; Levinson 2011) remark that social media can pose a challenge to conventional communication that is driven by top-down controlling. However, Sotiriadis and Zyl (2013) argue that electronic WOM is not the only thing about marketing a product and/or a service, and that social media is not a panacea. It is because reliability of followers, degree of involvement e.g. posting and the expertise and knowledge of the followers are critical influential factors regarding the use of tourist information, which can be better satisfied through an integrative multi-channel marketing strategy.

Going beyond the informational and marketing perspectives of SM, scholars argue that sharing a tourism experience involves subjective evaluation and affective, cognitive and behavioural undergoing of events related to his/her tourist activities (Munar and Jacobsen 2014; Tung and Ritchie 2011). Munar and Jacobsen's (2014) study highlights the underlying values of interactions in SM by pointing out the functioning of individual and collective motivations in experience sharing, and teases out the implicit values hiding behind the notions of lurkers versus posters (Baym 2010). Hsu et al. (2007) speak of altruistic and community-related motivations in user involvement in virtual communities. Social and emotional support is a reason for participation in online communities (Baym 2010). Indeed, Munar and Jacobsen (2014) report that 40 % of sampled Scandinavian tourists regard helping others as an important reason for sharing their tourism experiences and that 40 % of them want to help people avoid bad experience. In response to a post of a mother who asked if any hotel in Edinburgh could help her disabled child see the firework display on the Virgin Money Fireworks Concert on Twitter, Apex International Hotel offered help (Garland 2014). Such humanistic action has generated a positive socially responsible image of the hotel. Thus, SM should not be seen as only sales channels but platforms for tourism as cultural and humanistic conducts in modern societies.

4 Methodology

Search engine was used to collect tourism-related blog entries on Sina Weibo and RenRen. Synonyms of 'tourism', 'travel', 'holiday', 'visit', and 'leisure' in Chinese characters were entered in the built-in search engines of the sites, which are powered by Baidu, the biggest search engine in China. The search brought up over 865 million entries from Sina Weibo. Within the search results, 'information' 'experience' and 'interaction' were entered separately in the search engine to further categorise the entries. This sorting processes draw up over 460, 157 and 210 million entries that are considered relevant to 'information', 'experience', and

'interaction' respectively. It is possible that some entries may appear in more than one category. The same method was used with RenRen. The search brought up 1 million, 2 million and 347,000 entries in that order. However, this approach was not possible with Douban, because the search did not generate any relevant result. Therefore the biggest two groups on Douban, which provided over 420,000 entries in total, were selected for further investigation. Due to limited resources, only the first 10 pages of the search results from each SM site were imported to NVivo and analysed by one researcher.

Framework analysis method was used to understand the data. As outlined in Table 1, two main themes emerged: information sharing and marketing, and experience sharing. Nine sub-themes were identified, such as hospitality product and services (P&S) information, and socialising, which were under the main themes in that order. The developed framework was examined by the primary researcher by applying it to extra 2 pages of search results from each site. In that, no more different key themes and sub-themes could be identified. Thus, the researchers are confident that data have reached saturation.

Table 1 Themes and sub-themes with evidence

Themes	Sub-themes	Examples of evidence
Information sharing and marketing	Tourism P&S information Tourist P&S marketing Travel requirement information	'My apartment is located in the east of Beijing, within the second ring road area because my company requires staff living in a location that is in 10 min on foot.' (DouBan, Blogger S) 'Destinations that are suitable for early autumn travel: 1. RuiLi, YunNan: National Border scenery; 2. BaMa, GuangXiYachting cave' (WeiBo, Shan-Dong Tourism Administration) 'This modern destination open to tourists at 1664, with the famous midnight sun area, you can feel freedom and satisfied the urge for lights with sunlight all night long.' (RenRen, South Europe Tourism Administration) '#ExploringGuangZhou# [College Town 1 day travel recommendation-Ancient ShenJin Villige] ShenJin located in Guangzhou HuangPu district, you can experience Lingnan style's alley and ancient style Mansion.' (WeiBo, Tourism Guangzhou) 'VISA Application assistance group: [VISA 600 application process] first, download the application form: (attached with official website addresses: 1419CHS Form & No.54 form for family members) these two form you need to fill and remember attach your photo in 35 cm × 45 cm.' (DouBan)
Experience sharing	Socialising Personal reflection on travel Personal evaluation of P&S Recommendation	'I am really happy and lucky to know you guys in Pattaya this summer, the beautiful scene, kindest people and best new friends. Travel is an amazing stuff providing you chance to experience most precious relationships!!! Love u all, I will miss you all' (WeiBo, Miss X)

(continued)

Table 1 (continued)

Themes	Sub-themes	Examples of evidence
		'I cannot imagine what it would be like if I had not chosen going to Egypt . . . during this 2 months, I learned how to live a life by myself and overcome the fear inside your heart. Most importantly, I found the calm in the mosque which let me reconsider myself as a person and change my plan for the future. I will never forget the kindest smiles and faces of Egyptians who helped me while I was in trouble. Thanks Egypt and Bye Egypt. Bye the Old me, and Hello the New me!' (RenRen, Miss Z) 'The most delicious beef steak I have ever tasted-little post stop restaurant! I feel my trip become colourful due to this!! I wish I can live in Chong Qing (attached a photo of the blogger with the dish)' (WeiBo, Miss D) 'I spend half year travelling for 17 provinces and stayed in about 60 youth hotels in 2013. I want share and recommend to you guys about the youth hotels I have ever lived' (DouBan, Mr. Z)

5 Results

5.1 Finding 1: Information Sharing and Marketing

The sampled SM websites are being used to provide information about transportation, international destinations, such as Thailand and Japan, destinations in China, tourist activities and so forth. Information on visa and foreign currency exchange is also available to the users. In addition to individual users, commercial tourism organisations and tourism departments of foreign governments have Weibo accounts on the site to introduce their destinations and attractions. Chinese government offices post information about domestic tourism destinations on Sina Weibo to attract tourists. Some travel businesses, such as Mafengwo and Qyer post discount information on the site to attract users to switch to their websites. On Douban, there are non-profit non-government organisations that act actively to introduce "green tourism". For instance, there is a group called Responsible Travel which encourages sustainable tourism. Voluntary Service Overseas China has also many followers.

Among the three SM sites, there seems to be more graphical information and personal evaluation accounts on a particular destination or attraction site on Douban. Users tend to upload photos of the places they have been to with their own 'stories', some of which are length and informative. On this site, there is abundant themed-travel information, such as volunteering tourism, spiritual travel, and the revolutionary route of the Red Army. Douban users also post information about places or attractions appeared in films such as Alnwick Castle in film Harry Porter. Information on Douban is organised by destinations, which may suggest that its users are experienced travellers.

5.2 Finding 2: Experience Sharing

SM are utilised as platforms for experience sharing. Users post their accounts about their thoughts and emotions in relation to their travel experiences and/or travel in general. Some of them also share photos taken at the destinations and video recordings. This type of sharing is different from that of factual information about travel and tourist products, because experience sharing involves inward engagement with the self and outward expression of that reflection and evaluation. For example, blogger Xiaoxia writes:

> "Finally, all the photos are now in my space!!! This time, [I] travelled 2 weeks. It was really tiring but it was fun" . . . "Travelled from [C]airns to [S]ydney to [C]auberra" . . . Australia has a beauty of tranquillity while China is beautiful for its grandness. There are also places in China that are beautiful and peaceful." . . . "[I] spent too much money this time, feeling a bit of guilty. I don't know how to earn money yet but know how to spend it. [I] spent Daddy's money. I feel terrible. But Dad tried to comfort me by saying that I could use his money to travel and in the future I could pay for his holiday. He is really a brilliant dad!!!" . . . "It was my first time to do scoop diving. It was really really scary. I felt breathless. [I] threw up terribly and was sick on the boat. I'd better not to take boat anymore." . . . "[I] found in fact scoop diving is really fun!!! Ha Ha!!"

She gives her evaluation of Australia and China as destinations, expresses her feeling of being terrified under the sea and physical discomfort on the boat. Travelling around Australia has made her look into herself and realise own limitations. At the same time, she finds the touching affective bond to her father.

Travel is not just about seeing and/or experiencing exotic conducts in the places that are different from home, but also provides travellers opportunities and means to question being as a person and being in relation to others. "Qiongyou" as an emerging new concept in China is increasingly adopted by Chinese budget travellers and tourists. This type of travel has its altruistic nature.

Blogger Xiaozhan writes:

> "[Qiongyou] is wonderful because you develop friendships with strangers" . . . "[It] should be based on mutual respect and experience sharing" . . . "It is an attitude to life, a forward attitude to life, walking on the path with freedom" . . . "In that journey of Qiongyou, you're bound to get to know people that you don't know, some of whom may also like travelling. You can talk to each other sharing experiences" . . . "Get to know people. You may find your partner for life".

His account highlights two main issues. Firstly, he expresses his morality of Qiongyou by suggesting what it should be based on. Secondly, he associates travel with an upward attitude to life. He believes that travel is a way to socialise with other people and shares his ideology of future life through the lens of Qiongyou. His outlook is shared by blogger Jingjing, who writes:

> "Travel is a way of living, a hobby" . . . "[I] love the feeling of walking on the road freely with uncertainty, expectations and surprises" . . . "On the journey, wash away all the troubles in your mind. Let the sun shine our hearts" . . . "[and] say to yourself: how can we give up the beauty now for the past miseries?"

Both accounts surface the bloggers' beliefs of travel. In that, they see it as a metaphor for life journey. It is found that the SM sites have provided a platform for their users to socialise with each other through travel-related activities. Blogger Suzan who has offered free home stay for Qiongyou travellers writes: "It is always about with someone. It doesn't matter if you are walking on the magnificent landscape of Tibet or wondering through the ancient gardens in Suzhou. At the end of the day, it is the people whom you are with to share the views matters." Blogger Btong posts: "Come to Shanghai, and you can stay with me. There is a double bed. [I will] let you feel like at home. I have a good sense of humour, like to talk just about everything. I am a person who is absolutely *nice* [original in English]. I am a good singer and I can sing songs for you at night. I am very busy during the day but can take you to the city over the weekend." In another blog entry, blogger Lianbadu says: "We may see different people but they are all young and love life. We will share our own travel experiences, hobbies etc. Except offering accommodation, we can introduce you must-go places and local cuisines. The room is small but you would feel cosy and welcomed". All these blog entries share the same call for socialising with people whom they don't know. The SM sites have enabled them to have their voice heard across the country, taking travel-driven human socialisation beyond geographical boundaries.

6 Discussion

The study learns that the members of the virtual communities use the SM sites to express their personal views, values, attitudes derived from their travel experiences, and to share those experienced episodes with other people. This finding is consistent with findings reported in other studies (Edelman 2010; Litvin et al. 2008; Wang et al. 2012). A tourism experience involves subjective evaluation, emotional and cognitive undergoing of events related to one's tourist activities (Munar and Jacobsen 2014; Tung and Ritchie 2011). Whether it is a Qiongyou experience or a parent-funded travel, the experiences embrace the embodiment of tourism. Physical sickness, frightening, excitement, being ready for surprises are all part of the tourism experiences, echoing the embodied nature of human life. Critical tourism scholars (Knox and Hannam 2007; Obrador 2003) argue that it is important to recognise that tourists are embodied individuals so that a total tourist experience or memorable experience can be created through various aspects of practices. In our research, a memorable experience includes not only physical reactions to the scenes and the experienced but also inward deep reflections upon self, life, family, and interactions with other people.

One of the most interesting findings of this study is that "travel journey" is often taken by some Chinese bloggers as a metaphor for life journey. They associate their journey of travel with the journey of life, conveying their longings for unknown but promising future while walking on the road with free mind. Such interpretation of travel journey in relation to life journey is deeply rooted in Chinese culture. An

ancient Chinese saying reads “read ten thousands of books, travel ten thousands of miles”, which conveys the vital role of travelling in the life journey of knowing. Munar and Jacobsen (2014) and Tung and Ritchie (2011) speak of subjectivity and cognition that people undergo in their sharing of lived experience, which is indeed witnessed in the present study. However, the cultural dimension of interpretation of travel is not yet well documented in the existing body of knowledge on the role of SM in tourism, but is widely shared on the top three most popular Chinese SM sites, which indeed calls for a re-consideration of the meaning of travel in the arena of eTourism. In tourism studies, travel is traditionally considered as moving from point A to point B, a temporary away from the home environment. However, “travel” discussed in the blogs is quite different from the conventional meaning of travel in existing tourism studies literature. The SM sites have provided a means to accelerate the social construction of “travel”. In doing so, SM is shaping tourism as a social human conduct. Experience sharing on SM has become an integral part of tourist activities.

Another important finding of the study is that the SM sites not only function as means for consumer socialisation but also for social socialisation. Chinese bloggers share information about destinations, tourism and hospitality product providers, visa application processes, different itineraries and so forth. More interestingly, some Chinese bloggers use SM as channels to develop friendships with people who share the same passion for travel. Scholars (De Botton 2003; Tribe 2006) question the truth of tourism and argue that tourism is not just an aggregation of concrete activities and businesses involved in travel and holiday. Tourism should be treated as social cultural doings. Indeed, some Chinese bloggers regard travel as journey to discover with people alike. There have been talks on the misuse of SM among some Chinese to exaggerate the real travel experiences (Southern Metropolitans News 2014) in light of the recent lawsuit against a Qiongyou celebrity (Jing News 2014). Such exaggeration is considered as a result of travel-related self identify-seeking which is underpinned by Chinese culture of ‘face’. We may name such tourist practice “virtual face construction”. In that, people post flawed information about their travel or even make up an experience to create a virtual identify of experienced travellers with a lifestyle that other people may admire and then become their followers. In the present research, such phenomenon is not detected due to the applied methodology. However, we do find that the Chinese use SM to reach out others who share the same values and have similar dreams. Websites such as Facebook and YouTube are not accessible in China, but the Chinese bloggers use other similar sites to share information and experiences in their native language. Although English is taught as a second language in schools, it is not a widely used daily language in the country. Therefore, there is an invisible boundary of internationalisation of tourism divided by languages that bloggers are proficient in. The geographical co-existence of similar travel-related practices in the West and the East is itself an outcome of contemporary tourism as well as a means to shape future tourism. It also demonstrates the changing philosophical boundary of tourism as a human social conduct. In other words, SM is an integral part of modern societies and is playing a significant role forging the future of modernity.

7 Conclusions

The study has explored the use of three the most popular SM sites in relation to tourism activities in China. It is learnt that these sites have not only been used by individuals but also organisations and governmental agencies. The sites provide platforms of information communication for Chinese travellers. Tourism organisations use the sites to promote their products and services whilst some local and international governmental offices use SM to raise the awareness of their destinations. There are community-based groups whereby users share similar interests such as Qiongyou followers. These groups provide more specific travel-related information on SM. An interesting finding is that some Qiongyou followers engage with tourism activities to get to know people. SM is facilitating this process of social socialisation. Furthermore, Renren and Donbanin in particular give Chinese bloggers a space to freely externalise their deep reflection on travel, life and being in the public domain. Through this process of knowledge transformation, a discursive discourse of tourism representation and understanding is created and re-created. Therefore, SM is more than just an information communication channel. It is a creator that enables the expansion of tourism boundary and a shaper that constantly shapes tourism as a human social conduct within that boundary.

The biggest challenge in this research is concerned with the methodological approach. The authors used built-in search engines of the SM sites, with exception of Douban, to collect blog entries. The majority of search results are short with limited information. Hence, only those that were considered formative were analysed, which is however subject to the researchers' subjective evaluation and own underlying philosophical paradigm adopted. Moreover, there were some insightful graphical data associated with some blogs. Due to the lack of technical knowledge on handling this type of data, the researchers did not include graphical data in data analysis. Future research may incorporate more systematic approach to collect data with IT-specialised techniques and employ methods that allow in-depth qualitative data collection to investigate the cultural dimensions such as the formation of virtual identify and social socialisation in tourist practice in SM.

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Social Media on Smartphones for Restaurant Decision-Making Process

Jooyoung Hwang and Sangwon Park

Abstract Based on the importance of SoCoMo marketing, this study investigates consumers' activities and the usefulness of social media on smartphones when deciding on a restaurant. More importantly, this research takes into account the three stages of consumption (pre-, during, and post purchasing) separately to understand the heterogeneity in the usage of social media, and considered a situational factor (types of restaurant visited) to identify different functions of social media according to different decision tasks. In order to highlight the "authenticity" of the findings, the ground theory approach was conducted to address the goal of identifying themes based on the descriptions created by the respondents. Thus, this study provides a foundation for the understanding of consumers' restaurant decision-making behaviour in advanced information technology, and offers practical implications for marketers to develop effective social media marketing.

Keywords SoCoMo marketing • Social media • Smartphone • Restaurant decision-making • Technology

1 Introduction

Restaurants are an important travel product, going beyond simply satisfying hunger. Travellers expect to obtain pleasure and regard the restaurant as an important travel attribute (Sparks et al. 2003). According to UK Tourism Statistics (2013), outbound travellers spent £564 million on food and beverage servicing services in 2012, and the total amount spent by both inbound and outbound tourists was estimated at £27,358, which is the largest travel income across the tourism-related sectors in the UK. Accordingly, numerous studies to understand restaurant decision-making behaviours have focused on identifying factors influencing restaurant choice in terms of individual and restaurant related attributes (e.g. Alonso et al. 2013). Current consumers, however, are more likely to use information

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_20

technology when choosing a restaurant. For example, Nielsen (2013) reports that the number of people who use mobiles to search for information about restaurants is double that of individuals searching for travel, and that they tend to perform mobile restaurant related searches across all consumption stages (at home, on the go and in restaurants). Yet, the research on the search process in terms of restaurant decision-making is largely lacking (Gregory and Kim 2004).

The study of Buhalis and Foerste (2014) proposed a concept of social context mobile (SoCoMo) marketing in tourism, which suggests the importance of social media affiliated with mobile devices on recognizing the users' surrounding context. Along with the SoCoMo marketing, traveller behaviours are expected to become more impulsive and spontaneous (Lamsfus et al. 2013). The authors of this research argue that the restaurant decision has a large potential to be successful in the application of SoCoMo marketing because travellers perceive the restaurant decision as the most flexible task within their various travel facets (Park and Fesenmaier 2014). That is, the consumers' restaurant choice can change depending on the information obtained during the purchasing process, implying increased chances of touch point to affect consumer behaviours by offering personalized information via the proper technology platform. Thus, this study investigates the usage of social media on smartphones based on the notion of SoCoMo marketing. More specifically, this current research aims to identify (1) what kinds of activities in social media using smartphones do consumers engage in when deciding on a restaurant to visit, (2) why consumers perform these specific social media activities across the three consumption stages, and (3) the usefulness of social media use for restaurant choices according to different types of restaurants. Consequently, this research offers deeper insight into tourism and hospitality literatures regarding mobile information search and restaurant decision- making behaviours in a comprehensive way.

2 Literature Review

2.1 Restaurant Decision-Making

With recognizing the importance of restaurants as a part of tourism destination (Sparks et al. 2003), several researchers have investigated the consumer's restaurant decision-making process. Those efforts mainly focused on identifying factors that affect the restaurant choice (Buchtal 2006) and/or satisfaction (Namkung and Jang 2007). For example, people emphasize the type and quality of food in the stage forming the consideration set, whereas a restaurant's style and its atmosphere become important elements in the final decision (Auty 1992). In addition, menu variety, the location, and the price strategy of restaurants play an important role when consumers decide on a restaurant (Choi et al. 2010). Apart from these restaurant attributes, consumer's characteristics also influence the restaurant choice, such as socio-economic (Kim and Geistfeld 2003) and demographic features (Alonso et al. 2013) as well as previous experiences (Harrington et al. 2011).

In addition, the role of children (Labrecque and Ricard 2001) and spouse are recognized as an important determinant on restaurant choice (Zalatan 1998).

Restaurant decision is a process of consumer decision-making: that is, the information search is one of the most important steps for individuals to reach their final decision (O'Connor and Murphy 2004). Based on the characteristics of the services (i.e., intangibility and perishability), consumers have relatively high levels of uncertainty in their choices. Accordingly, they are more likely to be involved in searching for information to reduce the perceived risk in their decisions. With the development of information technologies that enables consumers to obtain information and communicate with other consumers anywhere and at any time, people facilitate meeting their information needs across all stages of the decision-making process (Gretzel et al. 2006). In addition, based upon these evolutionary changes of consumer behaviours, marketing practitioners with the advanced technology recognizing the certain contexts can provide more customized services when consumers require specific information (Buhalis and Foerste 2014). Thus, this structure leads consumers to wait until the last moment to make their final decisions. In other words, individuals are open to the chance to change their decisions according to the certain contexts that they face, such as information obtained from external sources, rather than adhering to their initial decision (Smith et al. 2005).

While researchers in consumer behaviour suggested the importance of understanding the three different stages (pre-, during-, and post-consumption), previous studies in restaurant marketing have applied the static approach (i.e., mainly the stage of pre-consumption), which explains the partial aspect of the restaurant decision-making behaviours. Thus, it is argued that considering advanced information technology in comprehensive decision-making behaviours is important for restaurant choice.

2.2 Social Media Use

The advent of social media has led to large changes in consumer marketing. Marketing communication by utilizing social media is now fulfilled without the restrictions of place and time, as mobile devices have been widely introduced (Barnes and Scornavacca 2004). Nowadays, consumers can share their information and implement reactions through the usage of social media (Tussyadiah 2012). In particular, social media helps to engage potential guests, increase online presence of tourism and hospitality companies, and lead to improving online revenues by dealing with user-generated content (Leung et al. 2013). As such, social media can be valuable for managing consumer relationships, as it provides detailed, attentive and user-generated content that attracts consumers (Wang and Fesenmaier 2004). Based upon these helpful features of social media, marketers who are interested in enhancing their relationship with consumers can adopt social media marketing strategies with the aid of smartphones, referring to the notion of SoCoMo marketing. For instance, the usage of social media is expected to provide tourism

companies and marketers the chance to understand what current consumers want and respond appropriately to customers' preferences (Dellarocas 2003). Consumers can easily obtain information and share their own experiences/thoughts (Xiang and Gretzel 2010) as well as accomplish entertainment and self-actualization through various platforms of social media (Tussyadiah 2012). This argument is also consistent with the spill-over effect whereby people carry skills, routines (i.e., participating in online social media), and habits formed in their daily lives into another task (Wang et al. 2014). Thus, current consumers who want to acquire information regarding a restaurant tend to utilize social media on smartphones at any point in the restaurant decision-making process, based upon the beliefs that social media can provide more trustworthy and valid information opposed to other information sources (Miguéns et al. 2008).

3 Methodology

3.1 Research Design and Data Analysis

The current study was conducted through using the qualitative approach as it aimed to explore consumers' social media use on smartphones and its usefulness on restaurant decision-making. Specifically, an online open-ended questionnaire was used to understand the meanings that the informants attached to these issues and phenomenon in more depth, rather than by selecting pre-formulated responses (Fink 2002). A total of 61 informants in South Korea were invited to this research project via social media websites in April 2014. In order to justify the qualification of the samples, the authors of this research assess two criteria. First, the informant should own and use a smartphone. Second, the informant has experienced the use of social media on their smartphones in order to decide a restaurant for daily life recently within 1 month.

The questionnaire was divided into four sections. Section 1 of the questionnaire focused on the types of restaurants they visited and the price range of the food. Section 2 addressed the types of activities using social media on smartphones across the three stages of restaurant decision-making. Section 3 asked about reasons and usefulness of the specific activities indicated in Sect. 2. The final section of the questionnaire studied the demographic information of the respondents. In total, 49 completed responses were obtained. Then, this study took the approach that highlights the "authenticity" of the data: specifically, it adopted data analysis strategies with the goal to identify themes based on the descriptions created by the informants.

In order to achieve this goal, qualitative text analysis software (Nvivo 10.0) was used to facilitate the management of transcripts and the coding process in which the unit of analysis was either a sentence or paragraph. This study employed the three steps for a grounded theory proposed by Strauss and Corbin (1990). The first step is

to look over all of the data collected from the informants in order to grasp a general understanding of the data. The second step is to read through the collected data and categorize the factors related to the motivation. Lastly, the third step in analysing the data is to manually undertake the coding work. Additionally, in order to acquire the authentic meaning of the collected data, this study followed Hycner's (1985) instructions. The sentences or paragraphs were examined to clarify basic units of meaning; these basic units were then divided based on the meanings expressed by the informants. For instance, each type of social media use was identified through the keywords that the informants used (e.g., before deciding on a restaurant, "I *searched previous visitors' reviews* about the restaurant"; during visiting a restaurant, "If the restaurant I visited was good enough to recommend to others, I *uploaded photos of the restaurant's* atmosphere and its food"). The final codes were compared with the original meanings of the informants. In addition, the principles that Lincoln and Guba (1985) suggested were followed in order to ensure the validity of the study; therefore, the corresponding strategies, such as triangulation and reliability were applied.

3.2 Demographic Profile of Respondents

Among 49 participants, 38 (77.6 %) of the respondents were female, and 11 (22.4 %) were male. 26 (53.1 %) participants were married, and the ages of the respondents ranged from 21 to 45 years old. With regard to the types of restaurants visited, 71.4 % of the consumers visited casual dining restaurants, followed by 20.4 % for fine dining and 8.2 % for quick service restaurants. The average price of the food ordered at the restaurants was 27,548 (Korean won: about £17) per person.

4 Findings and Discussion

This section provides the results of the research questions organized by: (1) types of social media activities consumers perform according to the three consumption stages, respectively (Pre, during, and post), (2) reasons for fulfilling the certain activities using social media on smartphones when deciding a restaurant decision, and (3) the perceived usefulness of social media depending on different types of restaurants visited (a situational factor).

4.1 The Use of Social Media on Smartphones Before Visiting a Restaurant

Based upon the data, ten activities using social media on smartphones before visiting a restaurant were identified (See Fig. 1). All 49 informants utilized social media on their smartphones to acquire information about restaurants. They used their smartphones to look up previous visitor's general reviews (24.5 %), restaurant location (20.4 %), taste of food (18.4 %), price (12.2 %), atmosphere (10.2 %), menu (8.1 %), service level (4.1 %) and cleanliness (2.0 %). Searching previous visitor's reviews of a restaurant that informants wish to visit is regarded as the most common activity before visiting a restaurant (reported by 12 informants). According to informant #51, previous visitors' reviews about a restaurant can allow for (1) more detail, (2) more professionalism and (3) more credibility.

> Before deciding on a restaurant, I searched previous visitors' reviews about that restaurant. I think that searching for information on social media allows for more detail, professionalism and credibility than just visiting a restaurant without that information. (Informant #51)

Thus, the informant believed that searching reviews on social media was better than just visiting a restaurant without enough restaurant information. The second most frequent activity was searching for the location of a restaurant. For instance, informant #41 followed bloggers' explanations on how to find a location of a restaurant or sometimes utilized a map application connected to social media.

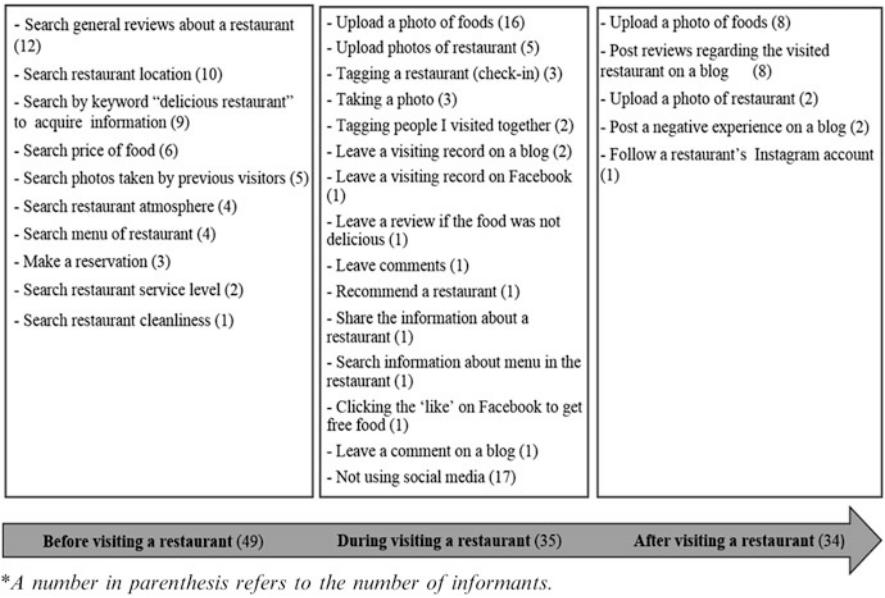

Fig. 1 Consumers' social media use on smartphone before-, during- and after visiting a restaurant

> When I'm finding my way to a restaurant, sometimes I follow the explanation on how to get there from bloggers or sometimes I follow a map application which is connected to social media. (Informant #41)

Furthermore, 9 informants answered that they use social media on smartphones to search for 'delicious' restaurants around where they live or in the area that they are before going to a restaurant. For instance, informant #22 reported that she tends to type 'delicious restaurant' with the name of the area where she is on a blog to search for the appropriate information before visiting a restaurant. Relatively, consumers tend to look for information about food price, atmosphere, menu, service levels and cleanliness before visiting a restaurant (Kivela et al. 2000; Alonso et al. 2013). This is because people perceive that those restaurant attributes are important criteria making a restaurant choice. Finally, informants commented that looking up photos taken by previous visitors is a common activity, because photos are a heuristic information source when making a decision.

Based upon the results of the data analysis, most of the informants used social media to search for specific information before visiting a restaurant. Interestingly, three (6.1 %) of the informants indicated that they used social media on smartphones to make restaurant reservations. For instance, informant #45 reported that she uses social media on her smartphone because it allows her to easily make a reservation at a restaurant by quickly being able to access booking information, such as telephone number and opening hours from blogs. With regard to types of social media used, 34 informants searched blogs (69.3 %), followed by Facebook (8 informants, 16.3 %) and Instagram (3 informants, 6.1 %). Thus, it can be said that consumers utilized blogs the most before visiting a restaurant.

4.2 The Use of Social Media on Smartphones During Visiting a Restaurant

Fourteen activities of social media use on smartphones at the stage of restaurant consumption were identified (See Fig. 1): Informants utilized social media for uploading photos of food (45.7 %), detailing restaurant atmosphere (14.3 %), tagging a restaurant and/or their companions (14.3 %), sharing a visiting experience (8.6 %), leaving negative comments (2.9 %), recommending a restaurant (2.9 %), and sharing information (2.9 %). Among these various activities, uploading photos of food was the most frequent activity using social media (mentioned by 16 informants). Based upon the data, it is revealed that informants not only take pictures of food but also immediately upload pictures of a restaurant's atmosphere. For instance, informant #1 replied that she tends to upload pictures of a restaurant's interior and atmosphere on her Instagram account to let her followers know her current status in real-time.

> I take pictures of a restaurant's atmosphere and interior, and then upload the photos on my Instagram account to notify others about my current status. (Informant #1)

Thus, it is assumed that using social media on smartphones while visiting a restaurant is effective for sharing a user's experience and status in real-time. In addition, some informants suggested that they utilized social media on smartphones when tagging a restaurant or friend on a social media platform. For example, informant #49 indicated that

> When visiting a restaurant, I upload photos of the food to Facebook and tag my friends and the restaurant as well. I believe one of the advantages of using Facebook is that I can upload my status in real-time, so I normally do it on my smartphone. (Informant #49)

However, it is identified that not all of restaurant consumers utilized social media for notifying others of their status or sharing positive experiences with others. For example, informant #41 leaves negative reviews regarding food and service at a restaurant, when they are disappointed with their experience. Interestingly, apart from sharing their consumption experiences, people tended to use social media to recommend a restaurant to their followers in an instant manner. A female informant between the age of 26 and 30 (Informant #36*)* reported that she uses Instagram in order to recommend a restaurant to her followers in real-time.

> If a restaurant I visited was nice, I recommended that restaurant by uploading pictures of the food and the ambience of the restaurant on my Instagram account. (Informant #36)

Based upon these findings, restaurant consumers are likely to adopt social media on their smartphones for updating their current status and sharing restaurant experiences with other online users at the stage of consumption. That is, it seems that the development of information technology facilitates people's desire to show-off their restaurant experiences. However, 17 of the informants (34.7 %) did not access social media on their smartphones while visiting a restaurant, which implies that about 35 % of informants are likely to use social media as a type of information source before reaching the consumption stage. Regarding types of social media used, 11 informants (31.4 %) adopted Facebook, followed by Instagram (8 informants, 16.3 %) and blogs (5 informants, 14.3 %). This result suggests online users showed different patterns of social media utilization in both activities and types of platforms accessed between different consumption stages.

4.3 The Use of Social Media on Smartphones After Visiting a Restaurant

According to the data provided by total 34 informants who utilised social media after visiting a restaurant, five activities using social media on smartphones were identified: uploading photos of a restaurant's food (23.5 %), posting a review on a blog (23.5 %), uploading photos of a restaurant's ambience (5.9 %), posting a negative experience (5.9 %), and starting to follow a restaurant's Instagram account (2.9 %). Uploading images of food was identified as the most common of the

activities (commented by 8 informants). One notable reason was to recommend the restaurant to other online users.

> If the restaurant I visited was good enough to recommend to others, I upload photos of the restaurant's atmosphere and food. By doing this, I can recommend the restaurants to others and can share my personal experience as well. (Informant #41)

Ten informants utilized social media on their smartphones to share their restaurant experiences through posting positive or negative reviews. In particular, the activity to leave negative reviews can be explained by the cognitive dissonance theory. When a consumer faces an unsatisfactory consumption experiences (conflicting with their belief), an individual is more likely to present their negative feelings in a variety of ways (e.g., leaving negative online reviews). For instance, a married respondent between the age of 31 and 35 (Informant #44) suggested that she leaves reviews on blogs so as to share her negative restaurant experience with others.

> I post my negative experiences on a blog, because I want to let others know that not every positive restaurant review on social media is good enough to trust. (Informant #44)

In addition, informant #34 followed a restaurant's Instagram account, because she wanted to receive the latest news and photos provided by the restaurant. Interestingly, however, some informants indicated that they preferred using social media on a PC rather than on their smartphones after visiting a restaurant. This is because they regarded using social media on a PC as more convenient for posting reviews including detailed and specific content, which shows different patterns of consumers' social media use in accordance with specific situations.

In summary, restaurant consumers mainly use social media on their smartphones to share their experiences by uploading images of food and restaurants and leaving textual information to describe their restaurant experiences. With regard to types of social media used, 10 informants (29.4 %) adopted a blog, followed by Facebook (6 informants, 17.6 %) and then Instagram (6 informants). Thus, consumers most often adopted a blog after visiting a restaurant.

4.4 The Usefulness of Social Media Use for Consumers' Restaurant Choices

Restaurant types are an important situational factor that establishes different contexts for consumers when searching for information (Auty 1992). Accordingly, this study categorized the type of restaurants as fine dining, casual dining, and quick service (Fu and Parks 2001). First, ten informants who visited fine dining restaurants regarded objectivity of information (40 %), followed by sharing experience (30 %) and then convenience of searching information (30 %) as important usefulness of social media use on smartphones for restaurant choice. Interestingly, consumers who visited fine dining restaurants regard sharing restaurant experiences

Table 1 Usefulness of social media use on smartphones according to restaurant types

Usefulness	Types of restaurants			Total freq.(%)
	Fine dining freq. (%)	Casual dining freq. (%)	Quick service freq. (%)	
Sharing experiences	3(30.0)	2(5.7)	0(0.0)	5(10.2)
Convenience of searching information	3(30.0)	9(25.7)	1(25.0)	13(26.5)
Trustworthiness of information	0(0.0)	7(20.0)	0(0.0)	7(14.3)
Connectivity to map	0(0.0)	1(2.9)	0(0.0)	1(2.0)
Objectivity of information	4(40.0)	6(17.1)	2(50.0)	12(24.5)
No failure to visit	0(0.0)	2(5.7)	1(25.0)	3(6.1)
Comparing reviews	0(0.0)	1(2.9)	0(0.0)	1(2.0)
Detailed information	0(0.0)	4(11.4)	0(0.0)	4(8.2)
Helpful for menu selection	0(0.0)	3(8.6)	0(0.0)	3(6.1)

as a useful aspect provided through social media on smartphones, which implies that social media can satisfy their desire to show-off fine dining experiences. Whereas, 35 informants who selected casual dining provided different usefulness of social media compared to the consumers of fine dining restaurants.

Based upon the data, they suggested that convenience of searching information (25.7 %), followed by trustworthiness of information (20.0 %), objectivity of information (17.1 %), detailed information (11.4 %) and helpfulness for menu selection (8.6 %) were what they regarded as important usefulness of social media use through smartphones for restaurant selection. In case of quick service restaurants, 50 % of the informants regarded objectivity of information as the most useful activity, and then convenience of searching information (25.0 %), and also no failure to visit (25.0 %) as important usefulness of social media use for restaurant choice. As such, the reasons why consumers utilize social media on smartphones for restaurant decision-making are different with regard to the type of restaurant they choose to visit. In addition, based on the data, it seems that most activities utilizing social media on smartphones are related with information search. Thus, it can be assumed that consumers' information search for restaurant choice is affected by the type of restaurant (Auty 1992) (Table 1).

5 Conclusions

With the large penetration of smartphones in everyday life, a number of consumers have used social media on their smartphones to make a decision on a restaurant. Since the restaurant is a type of experiential product, people are likely to actively engage in the utilization of social media to accomplish various information, communication and entertainment needs during the decision-making process. Similarly,

this research demonstrates how and why consumers use social media on their smartphones and the usefulness of the activities in making a restaurant decision with concern to a situational factor (i.e., restaurant types).

The results of this study indicate that consumers' social media use on smartphones before visiting a restaurant is predominantly related to information acquisition for the restaurant choice (e.g., searching for general reviews, restaurant location, price and menu), while the usage of social media during and after visiting a restaurant includes activities to share their experiences by uploading photos and leaving textual reviews, as well as recommending the restaurant to others. Another finding of this study reveals that perceived usefulness of utilizing social media on smartphones is heterogeneous depending on the type of restaurant.

This research provides theoretical and practical contributions. In terms of academic contribution, this research attempts to identify restaurant consumers' information search behaviours with concern to social media. That is, mobile technology and restaurant choices have been discussed as important subjects in separate ways: however, this research fills the gap by understanding the underlying usage behaviours of the advanced technology and usefulness on restaurant decision-making process. Specifically, the findings of the study reveals consumers' distinctively different usages of social media in both behavioural and motivational aspects across the different stages of the decision-making process. More interestingly, it is suggested by this research that the boundary between during and post consumption is blurred with regard to information search behaviours, which implies that current consumers are able to express their experiences of products/services while simultaneously consuming them. That is, people do not have to wait to indicate their feelings and thoughts until they can access a certain device and remind themselves of previous experiences. Rather, consumers can provide instant and concurrent information during the purchase of products, which improves the reliability of information quality. Therefore, the findings of this study can contribute for researchers who are interested in the consumers' restaurant decision-making process and their behaviours while utilizing social media.

From the practical contribution perspective, based upon the findings of this study, marketers in the tourism and hospitality field can actively and dynamically utilize social media for allowing their consumers to meet diverse needs relevant to information search and communication during the entire consumption process. Thus, the recognition of user's context would be a critical element to make social media marketing successful in association with SoCoMo marketing. It is also required for hospitality marketers to take into account the types of restaurants people intend to visit because the functions of social media that consumers perceive useful are different. In addition, the findings of this study can be beneficial for restaurateurs who plan to develop and employ restaurant apps/ social media for attracting more consumers, as now they have knowledge of which activities are performed by consumers in accordance with the stages of restaurant choice.

While the current study identified interesting findings, there were a few limitations. First, this study should admit that generalizing the findings of this study to all consumers of restaurants could be limited, as this research adopted the qualitative

research method with a limited number of informants. Second, this research focused on a temporary dimension (when people accessed social media using their smartphones), whereas tourism literatures identified other factors influencing information search behaviours (i.e., the characteristics of consumers and the context of purchasing). Third, this study could not clearly identify respondents' social media usage for the restaurant decision-making process in accordance with demographic factors (e.g., the age and gender of the respondents). Thus, it is suggested for future research to consider more various factors to better understand usage and impact of social media on decision-making behaviours.

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The Social Impact of Events in Social Media Conversation

Alessandro Inversini, Rogan Sage, Nigel Williams, and Dimitrios Buhalis

Abstract Events often support social causes. In addition to altruistic reasons, this association may bring also commercial benefits. However, to date, it is not entirely clear the extent to which event stakeholders engage in socially related discussions, making it difficult to evaluate the degree to which events act as a platform for social awareness. Using archived online narratives from Twitter.com, this study seeks to examine the extent to which event stakeholders engage in discussions of social causes. Results show that there is a scarce interest in socially motivated discussion by events attendees on social media.

Keywords Events technology • Social impact • Social media

1 Introduction

There is a vast array of studies measuring the impact of events. Many of these publications focus largely on the economic impacts (e.g. Bagiran and Kurgun 2013). Events can also generate intangible, social impacts among their communities (Kania 2013). Schulenkorf and Edwards (2012), for example, noted the capacity of events to facilitate the crossing of social boundaries like racism and prejudice through positive social interactions. However, there is much discrepancy over how to accurately measure intangible impacts (Fredline et al. 2003). The growth of social media may provide an avenue to resolve this challenge. These sites currently host real time discussions on a number of issues, including events. They can therefore be analyzed to understand the extent to which socially motivated discussions are a part of the discourse on a given event to understand it is possible social impact. This research uses twitter.com as medium to investigate socially motivated discussions. It examines its Communities of Interest (Williams et al. 2014) to understand the level of engagement of attendees on socially motivated discussions.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_21

Data was collected from the twitter conversations around Glastonbury music festival (glastonburyfestivals.co.uk). This event was suitable as it is not only one of the largest music festivals in United Kingdom, but maintains social values and is often associated with social causes (glastonburyfestivals.co.uk/worthy-causes/). Twitter conversations about the festival were archived and analyzed using social network analysis and content analysis in order to understand the nature and extent of social cause related conversations.

2 Literature Review

2.1 Festivals and Events

The term 'festival' has been used traditionally to signify a time of celebration, relaxation and recuperation which often followed a period of hard physical labour, typically the sowing and harvesting of crops. In the field of tourism and the related disciplines of event management and event tourism, festivals are described as ". . . public, themed celebrations. . ." (Getz 2005, p. 21). Festivals are distinguished from other types of special events by their purpose, which is the celebration or expression of the historical, social or cultural aspects of a particular host community (Getz 2008). While this is still true for many festivals, an increasing number of festivals incorporate economic and promotional objectives to justify the costs of organizing for the taxpayers (Gold and Gold 2008).

Kania (2013) found that events generate social capital among their communities. Sharpley and Stone 2011) specified three ways in which events generate positive social capital. Schulenkorf and Edwards (2012) noted the capacity of events to facilitate the crossing of social boundaries like racism and prejudice through positive social interactions. Their study focused on interactions between children surrounding sports events and suggested that shared experiences united the event participants. Most importantly, they noted the likelihood of influence on a wider range of people by expression of acquired socially responsible views to others through word of mouth.

2.2 Social Impacts of Hallmark Events

Most of the studies looking at events' impacts do focus on economic impacts (Bagiran and Kurgun 2013). Researchers have developed an increasing interest in the more intangible impacts of events and a number of studies have been conducted over the past decade including many focusing on social impacts (Fredline and Faulkner 2000; O'Brien 2007; Schulenkorf and Edwards 2012). Although the research is evolving, there remains much discrepancy over how to accurately measure these often-intangible impacts (Fredline et al. 2003). As a plethora of studies emerge in attempt to measure and quantify social impacts of events (Picard

and Robinson 2006), a strong definition of social impact is necessary to realise this objective. Social impact is rarely allocated a comprehensive definition in the literature with authors opting to simply list the effects under headings such as 'community pride, 'participation', and 'expanding community perspectives' etc. (Swart and Bob 2005). However the following definition from (Latane 1981) is commonly accepted throughout the literature (e.g. Page and Connell 2011):

> . . .Any of the great variety of changes in psychological states and subjective feelings, motives and emotions, cognitions and beliefs, values and behaviour, that occur in an individual, human, or animal as a result of the real, implied, or imagined presence of action of other individuals—(Latane 1981)

Lin (2012), who employed a very broad scope regarding the social impact of events, supported the comprehensive nature of Latane's definition and its propensity for negative and/or positive orientation of an event's social impact. Moving from Latane's (1981) definition of social impact this research explores socially motivated discussions via the social media within the communities formed on Twitter.com.

2.3 Social Media Communities of Interest to Understand Social Impact

In order to understand if social media conversation related to events can be vehicle of social capital and socially motivated discussion the analysis of the narratives created online communities of interest around the event (Williams et al. 2014) is here proposed. In order to understand its nature, top down deductive methods may not be sufficient. While inductive methods can provide a deep understanding of the topic, it is difficult to apply them to the volume of stakeholders involved in a major event.

Actually, the disruptive rise of the internet present an incredible opportunity for tourism and events researchers as many of the discussions about travel, destinations and events now occur online in a form that can be archived and analysed (Neuhofer et al. 2013). Due to the number of individuals using these online platforms, it is possible to compare a number of perspectives on the issue (Zaglia 2013). Since the emergence of communities based on interest, information and affection, researchers have sought ways of classifying them. These network communities have been defined by the structured social relationships created by fans, customers or admirers (Muniz and O'Guinn 2001).

Communities of Interest (COI) can be online or offline (Muniz and O'Guinn 2001), small (Bagozzi and Dholakia 2006) or large. Communities of interest are agglomerations of individuals with a shared interest in a domain or area. Members may also share distinct values, behaviours patterns of language and signals (Muniz and O'Guinn 2001). Further, beyond common beliefs, members may feel moral responsibility for supporting other members and integrating new members into the community. This is the core of an online community as these categorizations define the nature and extent of their activities, allowing them to identify members and non members (Bagozzi and Dholakia 2006). It defines and structures the community

experience and allows members to assign meaning to their activities that they then communicate to others (Casaló et al. 2008).

Several factors influence the nature of the interaction that members will have in these communities. The size of the group can positively influence the amount of content created or shared and hence the benefit that individuals will gain from membership. Group heterogeneity also positively influences the amount of contributions and benefits to members (Oliver et al. 1985). In addition to ubiquity, customer narratives on COI hosted on social media, are based on the perceived experience of individuals (Inversini et al. 2009) and may be seen as more authentic than media or in general promotional materials. By presenting a consumer influenced narrative (Inversini and Buhalis 2009) about the event, these discussions can generate "eWord of Mouth" (Hennig-Thurau et al. 2004), creating impressions that can influence consumers' actions (Godes and Mayzlin 2004).

3 Methodology

The main aim of this research is to develop an understanding of the socially motivated discussions of festivals on social media communities of interest. In order to understand this two main research objectives have been designed:

- To understand the extent to which social media has a propensity to facilitate Socially Motivated Discussion
- To establish a correlation between social media users centrality in the network and the propensity to facilitate Socially Motivated Discussion

3.1 Research Design

The analysis was conducted on a body of secondary data collected from the microblogging site Twitter.com about the Glastonbury Music Festival (GMF), one of the major music festivals in UK. Every year GMF publishes on its website a series of social causes supported by the festival (please see: glastonburyfestivals.co.uk/worthy-causes/). The data was compiled of tweets from the time period of Data was collected for the time period: 00:00:00 am (GMT + 0) on 27/06/2013–11:59:59 pm (GMT + 0) on 04/07/2013. Tweets were collected based on them containing at least one of the following words: 'Glastonbury', 'Glasto', '#Glastonbury' or '#Glasto'. The Tweets were then collated into a spreadsheet for sorting, filtering, and analysis. The date boundaries were based on the festival schedule. The opening date represents the start of the performances at the festival and the closing date represents 1 week after this date and the 3 days after the final day of the festival. Each tweet was collected with the following information: Username, Text, Language, Location, Time Zone, Hashtags and User Mentions.

3.2 Data Filtering

In Honey and Herring (2009, p. 7) study found that Tweets including the @ were "more likely to provide information for others and more likely to exhort others to do something". Therefore tweets not including a user mention (signified by an '@' sign) were removed because they do not constitute conversation or interaction and are just seen as 'noise' (Denzin 2008). Tweets that were sent from a GMT + 0 time zone were separated from those within a GMT + 0 time zone to differentiate between tweeters who could have been directly influenced by the event in other ways; such as direct contacts with socially activist tents or expositions at the festival; and those who could not. With the separated dataset, it was possible to compare the international impact across the online platform with the impact in the local time zone across the same platform. Time zone variation was used instead of 'location' because time zone is allocated automatically and location is given by the user and therefore may not be reliable. This was confirmed in the data where users often left the location blank or put in alternatives such as 'earth' and 'here' which reduces to the reliability of all 'location' information. Given the window of time that the dataset represents, it is unlikely that many of the tweets from outside the GMT + 0 time zone would be from attendees, however it is possible that some may have left the time zone before tweeting about the event in the proceeding days up until the 4th of July. The final data set consisted of a total of 106,650 individual tweets, all of which contained either the words '#Glastonbury', '#Glasto', 'Glastonbury', or 'Glasto'.

3.3 Social Network Analysis Process

The data was then put through a SNA tool (NodeXL—V.1.0.1.245); a program which sorts the data into nodes and edges in order to group tweets by topic of discussion and establish the individuals who are most visible within the groups. A participation/relational method was used to define key actors within the network (Knoke and Kuklinski 1991). Those with a higher 'betweenness centrality' (BCen) score were those who bridged the gap between two or more other nodes most frequently; and those with a higher 'closeness centrality' (CCen) score were those who were more closely linked to all members and hence are in a good position to monitor what goes on within the network (Scott et al. 2008). Both figures indicate positions of higher influence in those network members (nodes) with higher scores.

Centrality measures enable researchers to understand the role of nodes (in this research, twitter users) in networks (Borgatti 2005). Degree centrality is defined as the number of nodes that are directly connected to a given node. For this research, it would be the number of twitter users that have retweeted, mentioned and replied to a given user during the period of study. A high degree centrality indicates that a user is active in the network as they have the most ties to other people in the network.

Closeness centrality identifies the overall influence of a node in a network. It is defined as how close a node is to other nodes in a network. In the case of this research, closeness indicates the number of times a given node lies on the shortest path from one side of the network to another. The higher the closeness centrality, the more control the node has over communication between nodes on different sides of the network.

3.4 Content Analysis

Computerised content analysis is an objective and systematic process allowing inferences to be made from attitudes, intentions and values of individuals (Morris 1994). The text was extracted from the dataset and put through the text analysis tool, Voyant (http://voyant-tools.org) for syntactic analysis to see how frequently each word was used. Topical Word Uses (TWUs) were identified through word frequency analysis and then contextually analysed to determine whether they constituted Socially Motivated Discussion (SMD). When running the content analysis there were a number of stop-words removed from the results including: 'Glastonbury', 'Glasto', 'http', 't.co', '2013', '@youtube', and 'RT'. When trigger words such as 'feminism' or 'peace' were identified, these tweets were then analysed semantically to reveal the context of the usage to define relativity to the research context (Zhang et al. 2013). For example: the word 'peace' could be used in a social context or in reference to the artists whose band are named 'peace'. To remove insignificant date, TWUs with a count of 2 and above were recorded whilst single count word uses were overlooked.

4 Results

The total number of tweets gathered was 106,650. Of those tweets there were a total of 58,406 edges, which connected users through direct interaction. The interactions between each data point were used to create groups where users were connected directly and indirectly between each other. The top 20 groups were identified in both the GMT and NGMT networks; collectively they accounted for 32.03 % (18,710) of the total edges. Topical word uses were identified within these groups through word frequency analysis and then contextually analysed to determine whether they constituted Socially Motivated Discussion (SMD).

A total of 164 edges (interactions) made up the 19 SMDs identified through context analysis. It is here important to note that for this research, a socially motivated discussion is an online interaction in the form of a retweet, reply or mention of a tweet that is focused on a domestic or international social issue. The average edges per SMD were 8.632, whilst the maximum was only 38, which shows that the SMDs were generally not adopted by the networks to any significant

Table 1 Network comparison, GMT + 0 vs. non-GMT + 0

	GMT + 0	Non-GMT + 0	Total
Tweets	**33,025**	**73,625**	**106,650**
% of total	31.0 %	69.0 %	–
Edges (interactions)	**17,475**	**40,931**	**58,406**
% of total	29.9 %	70.1 %	–
Vertices (users)	**21,002**	**48,480**	**69,482**
% of total	30.2 %	69.8 %	–
Groups	**5,170**	**11,390**	**16,560**
% of total	31.2 %	68.8 %	–
Edges in top 20 groups	**5,714**	**12,996**	**18,710**
% of network edges	32.7 %	31.8 %	32.03 %
SMDs in top 20 groups	**9**	**10**	**19**
% of total SMDs	47.4 %	52.6 %	–
Total SMD edges	**81**	**83**	**164**
% of total edges	0.464 %	0.203 %	–
% of top 20 groups	1.418 %	0.639 %	–
Max edges in SMD	**28**	**38**	–
Avg. edges per group	**4.062**	**3.594**	–

degree. Given the wealth of data collected between the set dates, it is clear that the volume of socially motivated conversation generated on the social media site 'Twitter.com', regarding Glastonbury Music Festival, was minimal. This shows that the social conscience, which the organisation articulates through its company objectives, is not replicated in the public social media domain.

A substantial amount of the total conversation (Table 1—69 %) was generated outside of the GMT + 0 time zone. This implied that there is a vast potential audience for GMF, and hence a strong potential outside of the host time zone for significant social impact connected to conversation associated with the event (Durst et al. 2013).

The network analysis separated the GMT network into a total of 5,170 distinguishable groups based on 17,475 interactions. The average number of interactions (edges) per group was 3.59; when compared to the number of edges in Group G1 (713), Group G2 (674), and Group G3 (412), this indicates that the majority of GMT discussion surrounding GMF on the social media site Twitter.com was nucleated around a small number of larger groups, with many small groups connecting much smaller quantities of people. The NGMT network was separated into a total of 11,390 distinguishable groups based on 40,931 interactions. The average number of interactions (edges) per group was 3.38. The relationship between the total network edges and the total edges in Group 1 (1,868), Group 2 (1,475), and Group 3 (1,185), indicated that the discussions were nucleated as they were in the GMT network.

In the top 20 GMT groups identified through content analysis, there were only 81 interactions contributing to nine (9) SMDs that were identified to be contextually

Table 2 GMT + 0 socially motivated discussions (SMDs) and lead user centrality

SMD	Count	Lead user	BC	CC	Groups
MP Resigns	28	NoiseyMusic	378,579.4995	0.00002	10,12
Ageism	18	HadleyFreeman	66,949.84464	0.000021	4,12,17
Volunteers	11	EmilyEavis	326,887.6952	0.000022	1,7
Throwaway society	10	Redorbital	173,882	0.000017	14,17
#lovesyria	4	Oxfamgb	69,574	0.000023	1
#wowpetition	3	WOWpetition	0	1	1
Class priorities	3	arbolioto	52,188	0.000015	13
Glastonbury University	2	crowsnestcrew	52,186	0.000014	5
Crime	2	GlastoWatch	23,693,015.61	0.000029	9
Total	**81**				

relevant to the research (see Table 2). Given the size of the network as a whole, the amount of social discussion generated in the GMT network was very low. In the top 20 NGMT groups identified through data analysis, there were only 83 interactions among ten (10) SMDs that were identified to be contextually relevant to the research; 38 of which could be attributed to one SMD (see Table 3). Given the size of the network as a whole, the amount of social discussion generated in the NGMT networks was very low.

Only 0.639 % of interactions within the top 20 NGMT groups constituted SMD compared with 1.418 % of top 20 GMT group interactions. More than double the percentage of conversation was socially motivated in the GMT network compared to the NGMT network. This implies that the degree of social impact generated by GMF varies depending on location. However this could also be due to a lack of international transferability regarding some of the social topics discussed. When country-specific SMDs which are not considered transferable; in this case 'MP resignation' & 'war on welfare petition' (combined at 31 vertices); are removed from the GMT top 20 findings then the percentage of interactions constituting SMD is reduced to 0.875 % (compared with 0.639 %—NGMT). This decreases the implication that the degree of social impact generated by GMF varies significantly depending on location.

4.1 Betweenness Centrality and Socially Motivated Discussions

The betweenness centrality rating of the lead user in each SMD was plotted against the edge frequency within the respective SMD. The graph exposed two anomalous results ('#savethearctic' & 'Crime'), which had significantly larger BCen scores. Therefore these two data points were removed from the graph to give a clearer representation of the trends within the data (Rosenthal 2011—see Fig. 1). Figure 1 shows no discernable correlations between the x and y axis, which indicates that

Table 3 Non-GMT + 0 socially motivated discussions (SMDs) and lead user centrality

SMD	Count	Lead user	BCen	CCen	Groups
#savethearctic	38	alt_j	4,810,121.821	0.00001	9
Feminism	21	UK_Feminista	161,140	0.000007	1,3
Legal highs	8	ukhomeoffice	456,059.2792	0.000007	18
Girl power	4	AllanaSouthgate	322,218	0.000007	6
Social class in the music industry	3	JohnRMulvey	81,471.4481	0.000009	3
#stopthecull	2	veggiesnottm	80,574	0.000008	4
Charity event promotion	2	coldplaying	619,615.517	0.000009	9
Corporate glastonbury	2	GuardianUS	161,140	0.000007	16
Ageism	2	HadleyFreeman	201,420	0.000006	19
Horse & Pony Sanctuary	1	veggiesnottm	80,574	0.000008	4
Total	**83**				

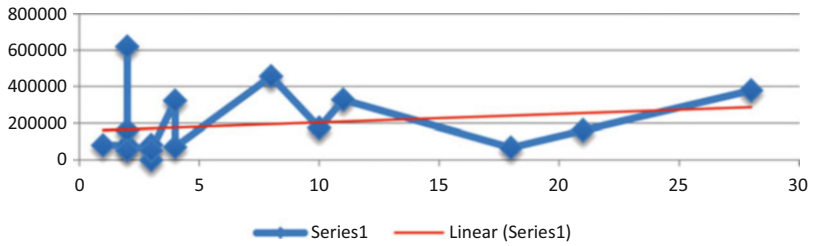

Fig. 1 SMD edge frequency vs. betweenness centrality rating of lead user

BCen rating of the lead user and the adoption of SMDs in the network have no significant impact upon each other.

4.2 Closeness Centrality and Socially Motivated Discussions

The closeness centrality rating of the lead user in each SMD was plotted against the edge frequency within the respective SMD. The data included one anomalous result ('#wowpetitiion'), which had a significantly higher CCen rating (1). The data point was removed from the graph to give a clearer representation of the trends within the data (Rosenthal 2011—see Fig. 2). Figure 2 shows no discernable correlation between CCen score of the lead user and the adoption of SMDs. This indicates that the CCen rating of the lead user and the adoption of SMDs in the network have no significant impact upon each other.

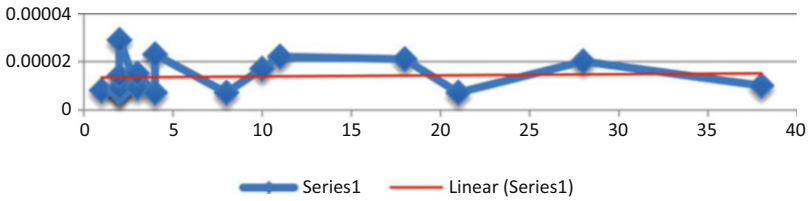

Fig. 2 SMD edge frequency vs. betweenness centrality rating of lead user

5 Discussion and Conclusions

The results of this study clearly highlight the importance of studying community of interests on social media when it comes to socially motivated discussion. Social motivated discussion can be a string driver for event organizers to generate awareness towards a given topic and involve event attendees in meaningful discussions thus fostering the relevance of the social cause. Events such as the one studied which claim to support a series of social causes may like to increase the online and offline discussion about those in order to generate much more impact.

The indication from the literature was that social media networks had strong potential as a platform for the advocacy of social issues, and potential therein as a catalyst for social change. However the adoption of SMDs throughout both networks was very limited which suggests that this is not the case. Two reasons for this lack of SMD adoption in the networks could be lack of advocacy to inspire discussions or simply a lack of willingness from the network to adopt these discussions. The findings for the two networks showed that there was a difference in the percentage adoption of SMDs; however this could be due to a range of factors including anomalous results, given the relatively small dataset. Additionally, the lack of significant differentiation between GMT and NGMT adoption of SMDs was expected given that geographical location is not a prerequisite of membership within the network, and nor does it affect the ways in which users can interact with the network. This indicates that the conversation surrounding events can transcend across time zones via social media irrespective of geography.

Events organisers must therefore consider their social impacts as global rather than domestic. Additionally, the research expected to identify that SMDs garnered more support when users with higher centrality (BCen/CCen) were involved in the discussion, however the findings showed no correlation between the centrality of the lead user and the adoption of SMDs. It is important to note that the BCen and CCen graphs show a total of 17 and 18 data points respectively, and therefore do not give substantial evidence to make a conclusive inference. Further research into this phenomenon is needed.

Future research may be able to examine this issue. In the case of lack of advocacy, a comparative approach examining the online narratives explicitly

cause driven events and music festivals that support causes may be able to illustrate the nature of advocacy in this domain. It may also provide rationales for the relative presence or absence of such advocacy. For what concerns lack of willingness, it may be necessary to examine the users online narratives outside of this event to understand their level of engagement with social causes any why they may or may not continue such engagement during an event.

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Destination Brand Communication Through the Social Media: What Contents Trigger Most Reactions of Users?

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Abstract The social media have become important tools for the communication of destinations and their brands. Multiple studies have demonstrated that the interactivity generated in this communication leads to greater engagement and better brand image among users [Munar and Jacobsen (Tourism Manag 43:46–54, 2014)], but the aim of this study is to unveil what contents generate the most reactions among users and if the communication of brands and their emotional values also generate reactions. The results show that the most destination-specific and identifying themes/attributes and values are the ones generating most reactions and interactivity, although very often destinations communicate generic values with which all destinations identify. Moreover, it is shown that the communication of emotional values and brands also generates reactions and interactivity.

Keywords Communication • Social media • Facebook • Interactivity • Reactions • Destination brands • Content analysis

1 Introduction

The social media have revolutionised communication in all domains (Agarwal et al. 2011), but especially for tourism and destinations (Xiang and Gretzel 2010) becoming key tools for their communication. Given that in general the places for visiting are not previously known, the opinions and appreciations of other users, who have no economic or other interests in the territory, become highly credible (Litvin et al. 2008), can be perceived as more trustworthy than the information from sources such as official destination websites (Leung et al. 2013), and influence

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_22

tourists' decision-making (Schmallegger and Carson 2010; Yoo and Gretzel 2011). However, some authors (Jacobsen and Munar 2012) ascertain that the social media are complementary information sources for tourists, who continue to use traditional sources for information purposes. Within the social media, Facebook is the most used social network both by users worldwide, according to Alexa.com, and Spanish tourist destinations (Huertas and Marine-Roig 2014).

Given the importance of the social media as communication tools for Destination Management Organisations (DMOs) and National Tourism Organisations (NTOs) (Leung et al. 2013; Hays et al. 2013), most of them have started to use them (mainly Facebook) in their communications; however, many do not know very well how to manage them in order to reach their target publics, what communications strategies to follow or what information to transmit (Huertas and Marine-Roig 2014). In fact, social media usage among top DMOs is still largely experimental and strategies vary significantly (Hays et al. 2013). Because of this, destinations need to assess the results of their social media communications (Hays et al. 2013; Huertas and Marine-Roig 2014) and with that purpose, an increase has been seen in the creation of professional tools for data collection, classification and analysis (Marchiori and Cantoni 2012). These tools are especially useful to analyse social media data which is often too voluminous, changing and diverse. It has been observed that some aspects of interactivity, especially user reactions (e.g. likes, comments or shares), is the main item measured by these online tools, but that conversely, they have great limitations in the content analysis of posts (Huertas and Marine-Roig 2014). They basically measure the most frequent words or keywords, but they still have a long way to go in a more qualitative analysis of the content of posts (Mandelli and Cantoni 2010) or of the communication of brand values.

Therefore, the contribution of this study is to conduct a content analysis of Facebook posts with the aim of seeing what contents generate comparatively more reactions and, consequently, more interactivity between destinations and users, and to test if the communication of emotional values of destination brands also generates more user reactions. All of this taking into account different types of destination and with the purpose that it might prove useful for them. This methodology will be applied to the official Facebook fanpages of a selection of Spanish destinations.

2 Background

2.1 Reactions and Interactivity

The social media, and among them Facebook, are characterised by their inherent interactivity (Lovejoy and Saxton 2012), as they enable the reactions of users and the establishment of dialogue with them (Saffer et al. 2013). Interactivity indicates the extent to which the user is actively engaged with the content or promotion of the site (Jung and Butler 2000). Therefore, users' reactions to contents are fundamental items to measure interactivity in the social media. These reactions are measured in likes, comments and shares in Facebook.

Interactivity in communication through the social media has multiple advantages: greater surfing time and implication of users (Huertas and Fernández Cavia 2006), greater processing and impact of information (Ko et al. 2005) and the creation of relationships with users (Nusair et al. 2013). Moreover, it entails the generation of a better destination brand image (Munar 2011), maximising the added value, (Buhalis and Law 2008), positive effects in satisfaction and tourist decision-making (Walther and Jang 2012) and major opportunities in product distribution by focusing on specific target groups (Buhalis and Law 2008).

Some authors analyse the engagement that the social media generate among users (Del Chiappa 2011; Nusair et al. 2013) and how it influences the creation of relationships with organisations and their brands (Saffer et al. 2013). Recently, Munar and Jacobsen (2014) analysed the motivations leading people to share tourism experiences in social media.

2.2 Brand Communication

Furthermore, the social media are key tools for communication that enable an effective communication of tourist destinations' identities and brands (Munar 2011). It should be noted that all tourist destinations have an identity and should create a brand to represent it. The tourists' experiences and narratives in these social media spaces, where they also express their feelings, help to construct an online reputation (Inversini and Buhalis 2009; Xiang and Gretzel 2010; Marchiori and Cantoni 2012) and create and interpretative framework through which users establish relations with destination brands (Tussyadiah and Fesenmaier 2009). Through them new conversations and destination identities are created (Govers and Go 2003; Marine-Roig 2013).

In this context, the destination brand identity must be a key aspect in destination communication through the social media. A destination brand generates identification with the territory and distinguishes it from other destinations (Huertas 2014), generates emotional attachment and a favourable predisposition for a visit. Some studies analyse how the social media influence the configuration of a destination brand image among users and the relationships they create with brands (Govers et al. 2007; Laroche et al. 2013). An empirical study based on surveys on users (Laroche et al. 2013) demonstrated that the social media have positive effects on the user-brand relationship, which at the same time entails positive effects in credibility and brand loyalty.

An essential part in the evaluation of any destination brand communication is the content of the communication. DMOs should assess whether or not the values of the brand are being transmitted, the most recurrent themes, the type of messages and how they are being sent in their communications through the social media. To achieve successful brand communication, the destination should transmit a single identity and communicate the brand's emotional values to appeal users' emotions and thus they feel attracted by the place (Morgan et al. 2003). Some studies deal with how the interactivity and participation of the publics generate better brand image (Munar 2011), but not the other way round: whether brand communication,

with its tangible attraction factors and emotional values, generates more reactions and interactivity. Besides, studies based on the content analysis of destinations' social media have analysed: what users perceive from the online contents published by destinations or what information they wish to find when they search for tourist information (Marchiori and Cantoni 2012), but not what information or contents effectively generate most user reactions and interactivity.

3 Methodology

The proposed methodology consists of a content analysis of several destinations' top Facebook Fanpage posts, in terms of attraction factors and brand values, and then assessing which trigger most reactions (operationalized through the sum of likes, comments and shares) in general and according to different destination types. This methodology is based on the perspective of communicative and relational analysis as it combines the analysis of contents with the interactivity they generate and can thus be useful for DMOs to direct and adjust their communication and branding strategies.

3.1 Destination and Social Media Selection

The selected destinations for analysis are Spain (as a whole) and a total of 37 Spanish destinations located in five autonomous communities (Andalusia, Canary Islands, Catalonia, Galicia, and Madrid) which correspond to different types of destinations (National destination (ND), Autonomous community (AC), Large Municipality (LM), corresponding to Autonomous community capital cities, Large littoral destination (LLD), Heritage City (HC), Littoral destination (LD), Inland destination (ID), Medium-sized city (MC), Mountain destination (MD)). These types of destinations are representative of the different types of Spanish tourist destinations (Spanish NTO www.TourSpain.es & www.femp.es). One destination of each type was chosen for each community if its geographic features so permitted.

The social media selected for analysis were the official Facebook Fan pages of these destinations. Facebook is the most used social media by users in Spain and in the world (http://www.alexa.com/topsites) and by far the most used social media among the selected destinations, thus the significance of its communication analysis.

3.2 Dataset

To retrieve data, different online tools for social media analysis were considered and explored. The methods to measure interactivity usually concern "the extent to which the visitor actively engages with the Web content or advertisement" (Jung and Butler 2000, p. 168). Although different tools retrieve similar content and

interactivity data, FanPage Karma (http://www.fanpagekarma.com/) was chosen because it provides both information about the top posts in a period of time and the reactions of users to these posts. Top posts are those which present more user reactions in total (sum of likes, comments and shares) during a period of 1 month. Analysis of the top posts is suitable because their contents are the ones which have caused greatest impact.

We downloaded a total of 37 Facebook Fanpage Reports from FanPage Karma corresponding to each of the destinations chosen for the case study in April 2014. These include a list of the 25 top posts with their associated user reactions (likes, comments, shares) per Fanpage. For some destinations less active in their Fanpages, the list of top posts includes less posts. Thus, the dataset consisted of a matrix with a list of a total of 714 top posts.

3.3 Content Analysis

Content analysis is "a method of gathering and analysing a text or content of a piece of writing into various groups or categories depending on selected criteria and by systematically identifying specified characteristics or patterns" in order to make predictions and inferences from data (Opoku 2006, p. 24).

The methods most widely used to analyse content are keyword frequency, sentiment and coverage analysis, semantic analysis, and the association of topics to brand values (Marchiori and Cantoni 2012), however, as the authors note, there are no standard models and procedures to conduct content analysis and there is a need to build templates or models for the content analysis of destination communication through the social media, to which our methodology intends to contribute.

To conduct content analysis on online media, some authors identify different themes in communication texts (Beerli and Martin 2004; Xiang et al. 2008; Marine-Roig 2013) such as natural resources, leisure and recreation, culture, art, history, atmosphere, transportation, accommodation, activities, shopping, climate, etc. However, to analyse destination brand communication, thematic content analysis is not enough. In this respect, some studies build specific analysis templates concerning brand attributes/values (Aaker 1997, which has been widely used in research) and Huertas (2014) specifically for tourist destination brands, among others.

Destination brands, understood as identity (Lawson and Baud-Bovy 1977), comprise two dimensions (Baloglu and McCleary 1999): a cognitive and an affective; a functional or tangible and an emotional; namely attraction factors and emotional values. Attraction factors are destinations' interest assets, and emotional values are the values that represent their personality. Therefore, the items used in our methodology to analyse identity or brand communication content are the following:

(A) *Attraction factors, Activities and Services (themes)*: Nature (Nature and natural landscape, Rural landscape, Mountain, Ecotourism); Tangible Heritage (Sites, History, Religion, Works of Art, Museums); Cityscape (Architecture, Urban planning/landscape); Intangible Heritage (Intangible heritage/popular culture/traditions, Anthem/Flag/National Symbols); Gastronomy (Food/Cuisine, Wine Tourism); Leisure (Urban and cultural leisure/shows, Night life, Shopping); Sun and Beach (Sea/Beach, Sun, Climate/Weather); Business/trade; Sports (Hiking, Winter Sports, Water Sports, Adventure Sports, Elite Sports, Other Sports); Technology (Social Media/ICT, Technology, Innovation); Services (Hotel/Accommodation, Transport, Other services); Things to Do; Tourist Information/Agenda; Institutional and Non-tourist information.

(B) *Brand values:* (we used an adaptation of the "Brand Personality Scale" by Aaker (1997), which has been extended with other relevant destination attributes and values:

- Sincerity: Down-to-earth (Family-oriented, Down-to-earth, Sustainable); Honest (Calm, Real, Traditional, Honest); Wholesome (Original, Wholesome; Quality of Life); Cheerful (Happiness, Sentimental, Friendly)
- Excitement: Daring (Trendy, Daring, Exciting, Exotic, Fashionable); Spirited (Cool, Spirited, Dynamic, Vital, Fresh, Young, Sensorial); Imaginative (Unique/different/diverse, imaginative, creative); Up-to-date (up-to-date, independent, contemporary, modern); Cosmopolitan (Cosmopolitan, Tolerant, Hospitable)
- Competence: Reliable (Reliable, Hard-working, Secure/safe, rigorous/responsible/Pragmatic), Intelligent (intelligent, technical, corporate, innovative); Successful (Successful, Leader, Ambitious, Powerful)
- Sophistication: Luxurious (Glamorous, Luxurious); Charming (charming/seductive, smooth, romantic, magical)
- Ruggedness: Outdoorsy (Outdoorsy, Get-away, Recreational); Tough (Tough, Rugged, non-conformist)

In this case, the team of researchers classified the posts' content after reading them and checked that the content was being classified and coded in the same way.

3.4 Data Analysis

First of all we measured the average reactions to top posts per destination type. Then we calculated the most mentioned themes and brand values and the themes and brand values triggering comparatively more reactions in general. Finally, we studied the themes and brand values which generate most reactions per destination type and compared them to the most mentioned themes and values.

Table 1 Average reactions to top posts per destination type

Destination type	ND + AC	LM	LLD	LD	HC	MC	ID	MD
Total posts	178	104	128	40	119	63	56	26
Avg. likes	1437.6	153.7	25.4	48.4	60.3	36.0	19.8	29.6
Avg. comments	35.4	4.9	0.7	1.3	3.0	1.2	0.4	0.7
Avg. shares	248.1	25.1	3.6	3.8	7.0	35.6	2.3	0.8

4 Results

Table 1 shows the different number of top posts analysed per type of destination, from the most numerous posts corresponding to ND plus AC Facebook pages to MD with the fewest posts. The differences in post numbers are due to the fact that some destination types did not always have activity on their Facebook Fanpages or had personal Facebook pages (not public Fanpages) and their top posts could not be analysed. In the case of average reactions it can be observed that the top posts of ND and AC have by far the highest reactions per post. LM have the second highest average reactions per post, but about 10 times less than ND + AC. In general regions and cities have higher average reactions to their top posts if compared to littoral destinations or inland and mountain destinations which have the fewest reactions.

Moreover, it is worth mentioning that all types of reactions: Likes (L), Comments (C) and Shares (S), have strongly significant correlations between them superior to 0.8, meaning that when one of them grows, the rest also grow in a similar proportion.

Most Mentioned Themes The most mentioned theme in general (Table 2) is Tangible Heritage (298) (especially History (149) and Sites (70)). The next most mentioned themes are Agenda (255) and Nature (247). If we look specifically at the different types of destinations it is remarkable that in the case of ND + AC, Nature and Tangible Heritage are the most mentioned themes with little difference. Also according to the type of Destination and the activities available there, the most mentioned assets are: Nature (MD); Tangible Heritage (LM and HC); Leisure (MC and ID); Sun and Sea (LLD); and Agenda (LD). The correlations analysis widely supports the relationships between certain destination types and their most mentioned themes.

Themes Triggering the Most Reactions As shown in Fig. 1, although it is not the most mentioned theme by destinations, Cityscape is the general theme that triggers the most average total reactions of the public, followed by Nature and Tangible Heritage (which are among the most mentioned themes). However, it is some specific subcategories that trigger the most average reactions: Ecotourism (1,582), the Sun (1,493) and Sites (1,427), Architecture (1,313) and Rural Landscape (1,228).

As can be observed, the themes that have the most reactions from the public are varied but in all cases very imageable themes corresponding to unique or

Table 2 Average reactions to top posts per themes

	NDAC	LM	LLD	LD	HC	MC	ID	MD	Av. Lik	Av. Com	Av. Sha
Nature	106	13	53	13	25	9	5	23	767	19	125
Tang. Heritage	105	38	20	9	65	40	20	1	725	16	125
Cityscape	51	31	6	3	30	24	8	0	842	19	156
Intang. Heritage	41	18	28	8	22	29	13	0	224	7	49
Leisure	24	30	15	14	35	46	35	4	263	7	19
Sun and Sea	69	18	85	16	16	10	3	1	662	16	107
Business/ trade	4	2	5	0	2	1	0	0	54	3	7
Sports	9	13	21	4	12	5	3	6	287	7	23
Technology	8	10	4	0	7	3	0	0	209	8	78
Services	2	3	9	3	5	0	0	0	45	2	7
Agenda	24	25	60	30	44	38	29	5	70	3	16
Institutional	10	11	4	4	19	4	7	2	73	4	30
Non-tourist info	4	15	9	3	24	0	4	13	43	3	7

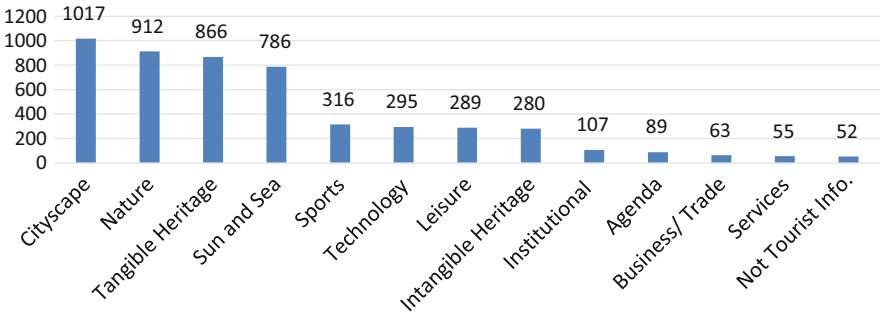

Fig. 1 Average reactions per theme

characteristic attributes of the Spanish destinations studied (Nature, Tangible Heritage and Cityscape). These themes follow a similar order if we just focus on Likes, Comments or Shares. On the other hand, the themes that provoke the fewest reactions of the public are the most generic: Agenda, Business/trade, Services and Non-tourist information or Business/trade. However other very unique subjects such as Intangible Heritage do not trigger as many reactions from the public.

Most Mentioned Brand Values The most mentioned brand value groups by destinations (Table 3) are Honest (especially Traditional (172)), Imaginative (remarkably Unique/different/diverse (104)), Outdoorsy, Down-to-earth (especially the Family-oriented subcategory (78)), and Wholesome, emphasizing Original (54) values. Similarly to themes, some of the most mentioned brand values

Table 3 Brand attributes and average reactions

	NDAC	LM	LLD	LD	HC	MC	ID	MD	Av. Lik	Av. Com	Av. Sha
Down-to-earth	21	22	20	14	18	2	18	3	315	8	49
Honest	69	60	61	20	46	6	18	2	420	10	64
Wholesome	25	22	26	5	14	0	9	1	370	7	54
Cheerful	26	19	18	9	19	0	3	1	458	10	64
Daring	19	10	11	3	18	0	2	3	524	13	61
Spirited	30	15	13	6	21	2	4	5	532	12	73
Imaginative	47	26	44	8	28	2	12	2	2,258	58	387
Up-to-date	4	3	0	1	1	0	0	0	919	19	168
Cosmopolitan	18	8	10	4	15	2	1	1	329	8	47
Reliable	4	3	2	3	3	3	2	0	233	6	42
Intelligent	12	4	13	0	1	2	1	0	561	13	148
Successful	17	5	12	0	6	3	0	0	922	23	199
Luxurious	5	0	18	2	3	0	0	0	80	3	15
Charming	28	6	22	4	15	1	1	1	662	16	107
Outdoorsy	29	17	36	5	23	0	19	6	319	8	41
Tough	2	5	2	0	1	0	0	0	572	13	153

emphasise the uniqueness, originality and traditional values of the destinations. They are also related to leisure values (Outdoorsy and Get-away) and are oriented towards their target public: families. Some remarkable aspects in the case of ND + AC, Spirited and Charming attributes have a relatively prominent position, which emphasises the beauty and exciting nature of the destination brands. For ID and MD, remarkably the most mentioned brand value is Outdoorsy, related to nature and outdoor activities. However, we observe that in terms of the transmitted brand values in posts the different types of destinations are quite indistinctive and transmit similar values.

Brand Values that Trigger the Most Reactions As seen in Fig. 2, the general values that trigger the most average total reactions from the public are Successful and Up-to-Date, followed at a distance by Charming and Tough. Then the most remarkable sub-values are Unique/different/diverse (3,797), Tough (1,854), Real (1,618), Leader (1,541), Powerful (1,541), most of them very strong attributes. However, apart from Unique/different/diverse and Imaginative, most of the brand values that trigger most reactions do not coincide with the attributes and values most mentioned by destinations in their posts.

Reactions to Certain Themes/Brand Values and Destination Types In **ND and AC**, the themes that trigger most average reactions are Cityscape, Leisure, and Sports. Remarkably, the most mentioned themes (Nature and Tangible Heritage) are not among the first themes with most reactions. In this case, some brand values

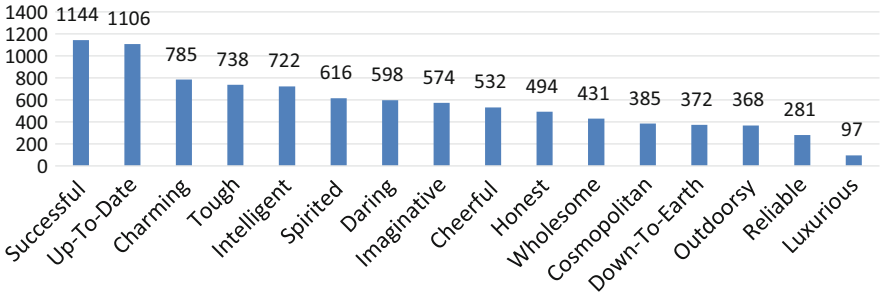

Fig. 2 Average reactions per brand value

have the highest reactions: Tough, Up-to-date and Successful, which do not coincide with the most mentioned values in ND + AC (Honest, Imaginative, Spirited).

In the case of **LM**, as capital cities and economic centres, the themes triggering most reactions are Cityscape and Business/trade followed by Tangible Heritage, which are mostly coincident with the most mentioned themes. The brand values that trigger the highest average reactions are: Reliable and Charming. Then come Tough and Successful; All related to values associated with capital cities.

Concerning **LLD**, surprisingly the theme that generated most reactions is not related to the Sun and Sea (the most mentioned) but is Non-Tourist Information, due to a specific tragic event that led to high numbers of comments in some posts. Concerning brand attributes, Reliable, Down-to-Earth, and Charming trigger most reactions. In the case of **LD**, the themes triggering most reactions (Nature, Sun and Sea, Cityscape) are relatively coincident with the general rank, and with the most mentioned themes in LD, except for Cityscape. Concerning brand attributes, Cheerful, Cosmopolitan and Spirited trigger most reactions but are not the most mentioned.

Concerning **HC**, unexpectedly Business/trade, Nature, Services and Intangible Heritage provoke most reactions, instead of themes more related to their attractions (Tangible Heritage, Cityscape). Concerning brand values, Tough, Cheerful and Luxurious have most reactions and are not coincident with the most mentioned values nor the general rank where luxurious comes last. In the case of **MC** the Institutional theme causes most reactions, followed by Technology and Cityscape (clearly related), which do not coincide at all with the most mentioned themes. Concerning attributes, successful, intelligent, honest and charming trigger most reactions and relatively coincide with the most mentioned ones.

Concerning **ID**, the themes triggering most reactions are Non-Tourist information, Sun and Sea (especially the Sun), Cityscape and Intangible Heritage. This does not coincide with the most mentioned themes (Leisure and Tangible Heritage), more related to this type of cities. Concerning attributes, intelligent, cheerful and daring come first, which are not coincident with the most mentioned by the destination. In the case of **MD**, as expected, the theme that triggers most reactions is Nature, which is also the most mentioned theme. Agenda and the Sun and sea (Sun subcategory) also trigger notable reactions. The values that most induce

reactions are charming and daring, which are related to the nature of these destinations.

5 Conclusions

The themes that generate most reactions from the public are diverse, but in general they are highly imageable themes and correspond to unique or characteristic attributes of the studied destinations. Generic themes (such as Agenda) cause less reactions of the public. These results can serve as practical recommendations for DMOs and NTOs, which should always try to increase interactivity with their publics. In this respect, destinations should mainly communicate themes and attributes that characterise and differentiate them from the rest of destinations, and not so much generic ones. However, some generic themes and attributes such as Agenda should also be communicated, although in a lesser proportion.

Moreover, the most mentioned themes in destinations' posts are not the ones leading to a major number of reactions from the public. In general there is a lack of congruency between the most mentioned contents and those which trigger most reactions in all destination types, and so tourist destinations should try to promote the communication of themes that generate most reactions among users, and thus achieve more interactivity, engagement, more navigation time and more positive attitudes towards the destination and its brand (Buhalis and Law 2008; Munar 2011). Concerning brand values, the ones which generate most reactions also emphasise the uniqueness, originality and traditional values of the destinations. They are also related to leisure and activities and to the public they are mostly directed at: families. However, in terms of the transmitted brand values in posts, the different types of destinations are quite indistinctive and transmit similar values.

Consequently, results demonstrate and corroborate on the one hand, that the communication of distinctive emotional values of the destinations' identity generates more user reactions, and hence, it is worth communicating them through the social media; and on the other hand, that the communication of differential and unique values generates most reactions. Therefore, tourist destinations should take good care of the communication of the emotional values of their brands, and especially try to associate unique and differential values to their territories, because if all destinations associate themselves to the same value, the social media lose their utility as differentiation tools.

Finally, brand values that trigger most reactions from users do not usually coincide with the values most mentioned by destinations in their posts. Therefore, an important incongruence can be detected. However, with respect to these results, we do not think that destinations should communicate the values that generate most reactions, but those that identify their place brand to achieve a suitable communication, despite the fact that these values can be taken into account to create their brand.

The analysis method we used has been very useful to achieve the initial objectives and can be helpful for tourist destination managers of social media communication, as it provides information about the themes and emotional values that trigger most reactions, and can be adapted to other types of destinations. But, apart from the utility it can have for social media managers, the main contribution and novelty of this study has been to illustrate that the communication of emotional values also generates reactions and interactivity by users. Research had previously shown that greater interactivity entailed a better brand image for tourist destinations (Munar 2011). But this study's results also assess the inverse relationship: that the communication of emotional brand values also entails more reactions and greater interactivity. Thus, we conclude that their communication is recommendable and necessary for effective and excellent communication of territories through the social media.

Nevertheless, this study has some limitations. Firstly, it was conducted for a specific and not very extended period of time. Secondly, it has been seen that a specific event can easily distort results. Thirdly, the sample of the study is specific and not very wide and should be expanded to other destinations and countries. We consider that future research should assess whether specific brand communication, with its attraction factors and emotional values, generates more reactions among users. That is to say, if there is a positive correlation between the proper communication of the attributes and unique/real attributes of places and the interactivity they generate.

Acknowledgements This work was supported by Spain's Ministry of Economy and Competitiveness [Grant id.: CSO2012-34824 "Uso e influencia de los social media y la comunicación 2.0 en la toma de decisiones turísticas y en la imagen de marca de los destinos"].

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@Spain Is Different: Co-branding Strategies Between Spanish National and Regional DMOs on Twitter

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Abstract Mutual influences between brands can have a strong impact on their perception, in particular in DMOs. This work analyses the mutual influence of the Spanish State and Community-level Tourism Organizations accounts on Twitter. We analysed to what extent the State account Spain diffused information about the Communities accounts and vice versa, and to what extent DMOs Twitter brands co-appeared in tweets. Analysing 127,337 posts between 1st January and 30th June 2014 containing the keyword @Spain, we found that Spain unequally diffused the information about Communities, and that there was a strong correlation between the retweets of messages posted by Spain, and the co-appearance of the State and the Community-level accounts. As in previous researches (Guerrero-Solé and Fernández-Cavia 2014), the Andalusian account was the most active and the most influential of the DMOs analysed.

Keywords NTO • DMO • Destination branding • Social media • Twitter • Diffusion of information

1 Introduction

Social media are good allies for destinations, being it for attracting potential visitors, for promoting brand assets and values, or for engaging with publics and stakeholders (Lim et al. 2012). One of the most prominent Social Network Sites (SNS) is Twitter and it is, as well, one of the most commonly used in the tourism sector (Sotiriadis and Zyl 2013). In this research paper, we will analyse how Twitter is used in the destination branding process, focusing in a single case study, that of the Spanish National Tourism Organisation official account: @Spain.

Destination branding can be applied to different levels of territories, mainly cities, regions and nations (Blain et al. 2005). These levels are often organised as

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_23

layers or Russian dolls including the smaller ones into the bigger ones in an umbrella brand strategy often applied to commercial products (Pauwels-Delassus and Mogos-Descotes 2013). There are mutual influences between them and the perception, image or reputation of the country brand (United States) has an impact in the perception, image or reputation of the region or city brand (Nevada, Las Vegas, for example) and vice versa.

In the case of Spain, the tourism promotion is organized in three different layers:

- on the top, the national brand, Spain
- in the middle, 17 regional brands (what is called "autonomous communities")
- at the bottom, and inside these regions or autonomous communities, the provinces and islands (territories) and the cities (urban areas placed inside the provinces)

The aim of this paper is to analyse how Twitter is used by the Spanish National Tourism Organisation (Turespaña) and what kind of impact the official tourism account generates in the social network. We will also focus on the influence it exerts as well as in the nature of the alliances forged with the Spanish regional brands.

2 Literature Review

A valuable definition of social network sites is provided by Boyd and Ellison (2008), who describe SNSs as

> web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system.

SNSs are important tools for public relations and marketing, and their relevance is perceived by communication professionals as still increasing (Verhoeven et al. 2012). Accordingly, their use has been widely implemented among tourism consumers—in the three phases of the travel planning process: pre-trip, during-trip and post-trip—as well as among tourism suppliers—in promotion, distribution, communication, management and research tasks (Leung et al. 2013).

Currently, social media play a basic role in online travel information search (Xiang and Gretzel 2010) and travellers use them for sharing tourism experiences, especially to help other people make good decisions (Munar and Jacobsen 2014). On the contrary, despite SNSs were all created with the aim of sharing content, it's not unusual that companies and organizations (for example, DMOs) employ them to promote their messages rather than to create relationships or engage in real conversations with users (Armstrong and Gao 2010). SNSs are also a basic communication tool for destinations. Indeed, as Hays et al. (2013) state, "social media offers DMOs with a tool to reach a global audience with limited resources".

Although some authors propose that "research on social media in tourism is still in its infancy" (Zeng and Gerritsen 2014), in the last 5 years has appeared a huge academic literature about Twitter focusing on users' influence (Cha et al. 2010),

communication patterns (Bruns and Stieglitz 2012), information diffusion models (Liu et al. 2012), homophily and political polarization (Himelboim et al. 2013) or voters' preferences for pacts (Guerrero-Solé et al. 2014), among others. Many of these works have confirmed the traditional models of the diffusion of the information that have their origin in the classic works of Katz and Lazarsfeld (1955).

Besides, some work has been done in order to understand the way Twitter is used by hotel chains (Chan and Guillet 2011), airline companies (Hvass and Munar 2012) museums (Kidd 2011) or sites and attractions (Canneyt et al. 2012). However, still little is known about how Destination Marketing Organisations (DMOs) use this SNS (Munar 2011; Lange-Faria and Elliot 2012; Tham et al. 2013; Zhou and Wang 2014). Hays et al. (2013) explain that the ten most visited countries established a Twitter tourism official account between 2008 (Malaysia, Germany and Spain) and 2011 (Turkey) and that the NTO strategies for Twitter vary widely, although they are inclined to use it "to simply advertise and market via an additional medium" (222), wasting or not taking full advantage of its conversational nature (Hvass and Munar 2012).

There is also little knowledge about how different DMOs from a same country cooperate or interact in social media platforms and if some kind of co-branding strategies are actually applied. Similar to commercial branding common practices (Kapferer 2012), these destination co-branding strategies could be considered suitable, as the national tourism brand can act as an intermediary for the regional brand before external targets, the union of both brands can enhance perceived quality, or it can increase the tourist's confidence. Co-branding has been explored in the academic literature between destinations and museums, theme parks, hotels (Dioko and So 2012), mega-events (Heslop et al. 2013) or tourism activities (Rong-Da Liang 2014). But few authors have explored how smaller destinations—regions, provinces, cities- adjust to and interact with national tourism brands (Scott et al. 2011), a phenomenon which cannot be precisely labeled as co-branding, but neither as umbrella brand or brand architecture (because, at least in the Spanish case, regional destinations have complete autonomy to develop and promote their own specific tourism brands).

3 Objective and Research Questions

In our study about the activity of the Spanish DMOs (Guerrero-Solé and Fernández-Cavia 2014), we suggested some strategies to increase their influence on Twitter. Among them, the encouragement of formal and non-formal agreements between users and the forging of alliances of mutual diffusion of information. This work is a step forward of our previous research. Thus, the present study analyses the contribution of the State-level Spanish Tourism Official Account (Spain) to the diffusion of the information, and increase of the influence, of the Autonomous Communities-level Tourism Official Accounts, and vice versa. We link these strategies of mutual diffusion of information to the concept of co-branding.

To do that, we first defined three main levels of diffusion of information:

- the first level is the diffusion of messages by the State-level NTO account, @Spain (Spain, from now on)
- the second level of diffusion includes the retweets of the messages posted by Spain, and all the posts mentioning the user Spain, by the rest of the Twitter community. We will focus our analysis on the Autonomous Community-level DMOs accounts
- finally, the third-level of diffusion is the retweeting of messages where Spain has been mentioned, in particular by the Autonomous Community-level DMOs accounts

Despite we are conscious of the cascading nature of the process of diffusion, we consider these levels to be the most influential for the dissemination of information.

Taking into account the objectives of the study, we propose the following research questions. To analyse the first level of diffusion, we will ask for:

RQ1a: What is the activity of the Spanish State-level DMO account?
RQ1b: To what extent Spain's activity is related to the diffusion of information published by the Autonomous Communities?

For the second level of diffusion, we will ask about:

RQ2: To what extent the Autonomous Community-level DMOs are related to the diffusion of information published by Spain?

And for the third-level, our research questions took the following form:

RQ3: To what extent Autonomous Communities mention Spain or diffuse the information where Spain has been mentioned?

Finally, we also ask about the co-appearance of the State and the Community-levels accounts, and for the influence of the Communities and the rest of the users in the conversation about Spain.

4 Measurements

To answer to our research questions, we defined the following variables. To analyse the diffusion of information by Spain of the posts published by the Autonomous Communities, we defined the variables:

P_S The activity (number of messages published) of Spain.
M_C The number of times the user Spain mentions each user Community.

We defined two variables to analyse the second level of diffusion of the information posted by or about Spain:

R_S The number of times each user retweets messages posted by the user Spain.

M_S The number of times each user mentions the user Spain.

To analyse the third-level of diffusion of information we defined the variables:

R_M The number of times each user retweets a message where Spain has been mentioned.
N_R The number of retweets each user received.

To analyse the relationship (co-appearance) between Spain and the Autonomous Communities, we defined the variable:

M_{SC} The number of times user Spain and user Community are mentioned together.

And, finally, to analyse the influence of the Communities in the conversation about Spain we added the following variables:

N_F The number of followers of each user.
N_M The number of mentions each user received.
RANK The algorithm we used to calculate influence (defined in Guerrero-Solé and Fernández-Cavia 2014).
N_I The number of impressions of the messages of each user.

5 Sample and Data Processing

To answer these questions, we used the Twitter API search to collect all those messages posted by the user Spain, and those where the user Spain was retweeted or mentioned. We collected 1,500 tweets per day. To summarize, with this method, we collected: (1) the original tweets posted by Spain; (2) the retweets of messages posted by Spain; (3) the original tweets where Spain was mentioned; and (4) the retweets where Spain was mentioned. The collection period expanded from 1st January to 30th June 2014. The total number of messages collected was 127,337. The number of original messages was 22,728, of which 3,124 corresponded to the user Spain (Ps). The number of retweets collected was 104,609, of which 77,593 where retweets to Spain, and 27,016 to other users' messages. For each post we basically collected the tweet identifier, the username, the text of the tweet and the time it was published.

6 Results

6.1 Activity of the Official Tourism Twitter Accounts

Our first research questions (RQ1a and RQ1b) were related to the activity of the user Spain (that we have already calculated), and the number of times Spain diffused the information posted by the 17 Spanish Autonomous Communities

Table 1 Autonomous communities DMOs Twitter accounts

Autonomous community	Tourism account	Autonomous community	Tourism account
Andalusia	@viveandalucia	Extremadura	@Extremadura_tur
Aragon	@aragonturismo	Galicia	@Turgalicia
Asturias	@AsturiasTurismo	La Rioja	@lariojaturismo
Balearic Islands	@TurismeBalears	Madrid	@TurismoMadrid
Canary Islands	@canarias_es	Navarra	@TurismoNavarra
Cantabria	@cant_infinita	Basque Country	@i_Euskadi
Castilia-La Mancha	@turismoclm	Murcia	@murciaturistica
Castilia León	@CyLesVida	Valencia	@c_valenciana
Catalonia	@catexperience		

Table 2 Number of times Spain mentions the communities

Autonomous community	M_C	Autonomous community	M_C
Andalusia	41	Extremadura	25
Aragon	29	Galicia	41
Asturias	0	La Rioja	5
Balearic Islands	8	Madrid	58
Canary Islands	27	Navarra	22
Cantabria	17	Basque Country	18
Castilia-La Mancha	20	Murcia	15
Castilia León	54	Valencia	18
Catalonia	13		

(see Table 1). In Table 2 we can see the number of times Spain mentions each Community account.

Thus, of the 3,124 messages posted by @Spain, in 411 the user @Spain mentioned the Community users (13.16 % of the total). Obviously, these were not the only messages where the Community or any of its places were mentioned: these were the messages where the DMO Twitter account was mentioned. The 127,337 messages were posted by 51,971 different users. All the 17 accounts of the Autonomous Communities (Table 3) participated on the debate, except the Galician and Asturian that had a null activity.

As we restricted our search in Twitter to Spain, we did not calculate the activity of each Community, but only the number of tweets posted by the Communities where Spain was reteweeted or mentioned. Among the Communities, the users that more contributed in the second-level of diffusion of the information about Spain (Table 3) were Andalusia (280), Aragon (99), and Madrid (86). We may note that three DMOs did not contribute at all to the diffusion of information related to Spain (Asturias, Galicia and Basque Country). However, Andalusia and Madrid practically did not contribute to the third-level of diffusion (the retweeting of messages where Spain was mentioned), while Aragon, Cantabria and Murcia were the DMOs

Table 3 Retweets of messages posted by and mentions to the user Spain, and retweets of messages where Spain was mentioned

Autonomous community	R_S	M_S	R_M	N_R
Andalusia	45	235	0	2,115
Aragon	52	47	26	212
Asturias	0	0	0	0
Balearic Islands	8	1	10	52
Canary Islands	15	26	8	245
Cantabria	14	16	25	71
Castilia-La Mancha	5	0	1	0
Castilia León	7	13	0	245
Catalonia	12	0	14	58
Extremadura	22	7	6	41
Galicia	0	0	0	0
La Rioja	7	2	4	19
Madrid	68	18	8	343
Navarra	14	2	6	4
Basque Country	0	0	1	0
Murcia	16	9	21	35
Valencia	42	11	15	34

with the highest contribution. Andalusia, Madrid and Aragon were also three of the five most retweeted DMOs in the conversation around Spain.

6.2 Co-branding

As we already mentioned, organizations promoting tourism brands in the different layers usually do not cooperate or align strategies because of political issues interfering mutual cooperation. Consequently, co-branding strategies are unusual. To answer to our third question about to what extent Communities and Spain were mentioned together (what we assumed as a co-branding strategy), we calculated the variable M_{SC}. The results are shown in Table 4.

Additionally, we performed a correlation test between the variables R_S, M_{SC} and M_C to prove whether the retweets of the Spain's posts by a Community were related to the number of times Spain mentions the Community and the co-appearance of both accounts in tweets (see Table 5).

Finally, we also used an algorithm developed in our previous work (Guerrero-Solé and Fernández-Cavia 2014) to classify the users by influence. As we can see in Table 6, the Andalusian account was the most influential, followed by Madrid, while the rest of the Communities had considerably lower ranks.

Table 4 Number of times user Spain and user community were mentioned together

Autonomous community	M_{SC}	Autonomous community	M_{SC}
Andalusia	5,217	Extremadura	893
Aragon	1,423	Galicia	243
Asturias	6	La Rioja	93
Balearic Islands	325	Madrid	2,017
Canary Islands	1,938	Navarra	416
Cantabria	791	Basque Country	419
Castilia-La Mancha	461	Murcia	716
Castilia León	1,507	Valencia	843
Catalonia	328		

Table 5 Correlations between R_S, M_{SC} and M_C

	R_S	M_{SC}	M_C
R_S	1	0.650^{**}	0.501^{*}
M_{SC}	0.650^{**}	1	0.589^{*}
M_C	0.501^{*}	0.589^{*}	1

Table 6 Rank and position in the rank of influence of the users in the conversation around Spain

Autonomous community	RANK	Position
Andalusia	3.429	2
Aragon	0.217	27
Asturias	–	–
Balearic Islands	0.048	91
Canary Islands	0.638	8
Cantabria	0.179	34
Castilia-La Mancha	0.024	161
Castilia León	0.362	16
Catalonia	0.367	15
Extremadura	0.119	44
Galicia	–	–
La Rioja	0.045	98
Madrid	2.598	3
Navarra	0.064	67
Basque Country	0.02	184
Murcia	0.203	31
Valencia	0.452	11

6.3 The Contribution of the Other Users to the Diffusion of Information Around Spain

The official accounts of the Communities DMOs were not the only users that participated in the conversation. As a final step, we identified the users with the highest number of impressions of messages containing @spain (retweets or mentions). The user with the highest number of impressions (more than 12 million) was, not surprisingly, the official account of Andalusia, with more than 40,000 followers and 292 messages retweeting or mentioning @spain. In a previous study (Guerrero-Solé and Fernández-Cavia 2014), we already found that this was the most active account among the main Spanish regional DMOs, and the user with the highest rank. Being official or not, we observe that the Andalusian DMO follows a rational and effective strategy in the diffusion of @spain's information. Other DMOs were among the 100 with the higher number of impressions: the Madridian (@TurismoMadrid, 89,000 followers and 7.52 million impressions), the Valencian (@c_valenciana), with 1.7 million; the Catalan (@catexperience), with 1.25 million, the Aragonese (@aragonturismo), with 1.13 million, or the Canarian, with 1.11 million impressions. However, the typologies of accounts that retweeted or mentioned @spain were diverse. Among them, we found Travel Agencies (@muchoviaje, 245,000 followers, and 2.2 million impressions), media (@expreso_info, with 16,000 followers and 1.76 million impressions; @hola, 920 million followers and 2.76 million impressions), photographers' and travelers' blogs (@TravelReportMX, with more than 325,000 followers and 9.76 million impressions), hotels (@AyreHoteles, with 5,214 followers and 1.17 million impressions), or museums (@museodelprado, 238,000 followers and 950,000 impressions). Of the 51,971 users that retweeted or mentioned @spain in the period analysed, 31 of them had more followers than @spain. Among them, *Hola*, the Spanish magazine specialized in celebrity news; the writer Ricardo Nester; *Epicurious*, a website about food and cookery; Axel Koster, an Australian recruiter in the luxury resort and hotel market; media agency *Europa Press*; Spanish airline *Iberia*; or the Madrilenian *Museo del Prado*.

7 Discussion and Conclusions

The Spanish NTO official tourism account on Twitter has a good level of activity, with 3,124 messages posted in the 6 months analysed. But regarding to the times the NTO account mentions the regional accounts, results are uneven. Spain diffuses information about the Communities, and the Communities diffuse information about Spain. However, this mutual contribution is not balanced: we found that Spain mainly retweeted or mentioned the Communities of Andalusia, Aragon, Castilia León, Galicia and Madrid, and that those accounts that more contributed to the diffusion of Spain were Andalusia, Aragon and Madrid. In this sense, we

found that the number of times a Community retweets messages posted by Spain (R_S) and the number of times Spain mentions the Community (M_C) were correlated (Table 5). It means that, deliberately or not, there is an interchange between the users: the more a Community retweets Spain, the more Spain mentions the Community.

Some regional accounts (especially Castilia-La Mancha, Castilia León, Basque Country and Galicia) are frequently mentioned by Spain but, in their turn, they seldom—or never—mention Spain. We also found that the Communities that appeared together with Spain were Andalusia, Madrid, Canary Islands, Castilia León and Aragon. We may note that there were certain communities that practically do not contribute to the conversation around Spain. In particular, Asturias, La Rioja and the Balearic Islands. We also may note that 13 of the 17 Communities were among the top 100 influential users in the conversation about Spain. The most influential of them was Andalusia (the 2nd most influential account).

In consequence, using our methodological approach we were capable to found how the different Spanish DMOs cooperated and interacted in Twitter. We may conclude that this cooperation is extremely unbalanced, despite we do not know the reasons why some Communities have strong ties with Spain and use State DMO account as an umbrella brand and other do not.

Obviously, a future work should consider to what extent these strategies respond to mutual collaboration and agreement, to political alliances or discrepancies or have a spontaneous nature. Besides, we should also consider the possibility that some of the Communities refuse a linkage with Spain, or consider their own brand as equally or more valuable than the Spanish one. It could be the case of Catalonia or Balearic Islands.

Apart from the Communities, we also found that there are many other users related or not to Tourism activities (media, celebrities, museums) that participated in the conversation around Spain. Some of them were more influential than the State-level account itself. Thus, we have to consider that tourism national brands in Twitter are also influenced by those users that consciously or not mention it in their tweets. Despite that was not the main purpose of our work, it leads us to think about the co-branding strategies not directly with DMOs but with other types of accounts that can be even more influential than DMOs themselves in promoting a certain State, region or city.

8 Limitations and Future Research

Our work has certain limitations. Among them, the fact researches highly depend on the reliability of the Twitter API Search (González-Bailón et al. 2012; Morstatter et al. 2013; Guerrero-Solé et al. 2014). Finally, we focused on the Twitter accounts, dismissing the mentions of the real names of cities and regions and rejecting any content analysis that could shed new light about the relationship between State and Community-level DMO accounts.

Acknowledgements This research work has been partially funded by the project "Online Communication for Destination Brands. Development of an Integrated Assessment Tool: Websites, Mobile Applications and Social Media (CODETUR)" (CSO 2011–22691), of the Ministry of Economy and Competitiveness of the Spanish Government. More information can be found at www.marcasturisticas.org (available only in Spanish).

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"This City Is Absolutely Fun and Trendy" A Destination Brand Personality Analysis in a Web 2.0 Setting

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Abstract The emerging technological dynamics and increasing consumer power requires pro-active strategies by Destination Management Organizations (DMOs). Furthermore, positioning a destination around the feelings it generates, and its ability to offer visitors unique experiences, relationships, meanings and self-expressions is a strong competitive advantage. This study analyzes a city's brand personality as reflected in online reviews from different service settings such as accommodation, sights, and restaurants. In addition, the study compares the results with tourists' connotations with the same city as collected in a conventional survey. The combination of content analysis and comparative analysis provides recommendations for DMOs on how to develop emotional links and use consumers' information exposed in an online setting.

Keywords Destination branding • Web 2.0 • Comparative study • Brand personality

1 Introduction

The new generation of Web 2.0 tools have revolutionised the way destination image is projected and how tourists search and gather information about tourism destinations (Camprubí et al. 2013). The obvious fact that social media websites, such as TripAdvisor, are becoming increasingly popular and are likely to evolve into primary online travel information sources, cannot be ignored by Destination Management Organizations (DMOs) (Jalilvand et al. 2012). Moreover, DMOs are realizing that actual costs for a destination occurs, when unsatisfied tourists share their experiences in Web 2.0 platforms, and potential visitors become deterred by the unsatisfactory comments (Camprubí et al. 2013). The need to understand the technological dynamics as well as the development of pro-active strategies to capture a strong position in the highly competitive tourism market is called for.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_24

DMOs can treat social media spaces as a new opportunity to reach out on the marketplace and hereby perceive it as a mechanism to learn about tourists' opinions about the destination (Boulin 2008). However, the functional attributes of tourist destinations alone no longer help destinations to attract travellers, mainly because of the high product similarity and growing substitutability of destinations (Pike and Ryan 2004; Usakli and Baloglu 2011). Therefore, positioning a destination formulating around the feelings it generates, and its ability to offer visitors unique experiences, relationships, meanings and self-expressions is a strong competitive advantage (Papadimitriou et al. 2013). Keller (2009) states that it is more critical as well as beneficial for destinations to understand what associations of a brand are advantageous over competitors (e.g. points of difference). The point of differentiation helps consumers to positively evaluate the brand and attach to the brand (Aaker 2009). Therefore, DMOs need to strive to develop a distinctive destination personality that meets travellers actual and symbolic needs. This also implies that research approaches need to be adapted accordingly. Despite the fact that companies increasingly draw on content created by tourists as a source for market research, we need to investigate if the content provided there is comparable to associations and opinions usually expressed in surveys to allow for an application of established theory in this new context. Previous research by Dickinger and Költringer (2011) investigating the perceived image of Vienna of tourists and non-tourists, revealed different dimensions and connections tourists make with the city of Vienna as a tourist destination. However, as Kötlinger (2012) argues, there is still a lack of understanding in which ways tourists connect themselves with Vienna, subsequently referring to brand personality. This requires an integrated approach understanding tourists' emotional experiences (Garcia et al. 2012; Blain et al. 2005). Subsequently, the main objectives of the study are (1) to explore the destination brand personality of Vienna expressed by tourists in social media spaces, (2) to compare the results with tourist connotations with Vienna from a conventional survey for a more holistic view (3) to provide recommendations how Vienna as a tourist destination can develop emotional attachments. The focus of this study will be social media spaces that give tourists the opportunity to review different elements of their experiences about sights, restaurants and accommodations in Vienna.

2 Literature Review

2.1 Destination Branding

Ritchie-Brent and Ritchie (1998) introduced the topic of destination branding as a hands-on marketing tool for DMOs to coordinate the different stakeholders in one theme, and support the values that destinations have to offer. The destination brand can act as an overarching role, providing an identity which links the various service

organisations together under a shared set of associations (Hankinson 2010). Destination branding enables the management of the intangibility of tourism products in a more efficient way, especially when communicating the tourism destination as an experience (Pike 2008). Therefore, Munar (2010) argues that the DMOs' lack of ownership of the destination products makes the taglines, slogans, logos and commercial campaigns the focus of the destination brand, and represents the formal elements of the brand. This will enable the tourist to make the associations between the different attractions, service and agglomeration services. Effective destination branding can, thus, give visitors an assurance of quality experiences, reduces visitors' search costs and offers destinations to establish unique selling propositions (Blain et al. 2005). However, destination branding is more than creating a catchy advertisement, slogan or logo (Ekinci et al. 2007). A strong destination is recognized instantly and establishes deeper connections with travellers' values and self-concept (Ekinci et al. 2007). Destination branding is, on one hand, a way to communicate the expectations of a satisfying travel experience that is uniquely associated with the particular destination (Blain et al. 2005; Pike 2008; Qu et al. 2011). On the other hand, destination branding is a way to communicate a destination identity uniquely by differentiating a destination from its competitors (Qu et al. 2011).

The process of branding starts with carefully choosing one or more brand elements to serve as trade makeable devices (e.g. logos) (Murphy et al. 2007). The trade makeable devices need to distinctly identify the destination and begin the formation of strong and consistent brand associations reflecting the attribute, affective, and attitude components of an image (Murphy et al. 2007). Attributes are defined as perceptual tangible and intangible features, characterising the destination. The affective components are representing tourists' personal values and meanings, deriving from the attributes. Attitudes are the overall evaluations based on attributes and affective feelings, acting as a basis for actions and future behaviour. The customer should remember the right attributes from a destination's perspective (Aaker 2009). Brand associations which aid the consumer information processing have been identified as anything linked in a memory to a brand (Aaker 1991, p.109). The aim should be to increase familiarity with the brand through repeated exposure and strong associations with the product category (Keller. 2003b). Keller (2003b) in addition argues that brand associations need to be strong, favourable and unique in order to increase the level of responses of consumers.

2.2 Destination Brand Personality

Brand personality, a rather anthropomorphic metaphor, is commonly used in organization studies, defining personality as enduring traits that differentiate individuals (Murphy et al. 2006). The theory of animism suggests that people have the need to anthropomorphize objects in order to facilitate interaction with the nonmaterial world (Murphy et al. 2009). Geuens et al. (2009) argue that consumers

use brands with a strong personality to build relations with the brand and to show their own personality. Therefore, consumers choose brands that fit with their personal style, or that can even compliment their status (Aaker 1996). Moreover, consumers have the tendency to view brands having human characteristics using words such as ‘’cool” and ‘’young”, for example to describe brands such as Coca Cola (Usakli and Baloglu 2011). In fact, the brand personality has the possibility to create symbolic effects for consumers (Aaker 1996). Moreover, a well-established brand personality influences consumer preferences and patronage (Sirgy 1982). Eventually it can be argued that brand personality has a positive effect on intention to return and intention to recommend (Ekinci and Hosany 2006; Ekinci et al. 2007). Given that consumers can use destination personality as an avenue for self-expression and/or helps them experience emotional benefits that the destination offers them. Studies on destination image explicitly show how self-congruity supports tourists' self-expression leading to higher level of satisfaction and intentions to return (Sirgy and Su 2000). Destinations can, thus, pose a personality that consumers use for self-expression or to experience the emotional benefits that differentiate the destination from competitors.

Different authors argue that brand personality becomes a representation for building destination brands for understanding tourist perceptions of the destination (Caprara et al. 2001; Ekinci and Hosany 2006). In fact, the brand destination personality has been used in different studies to explicitly illustrate tourists' attachment to a destination (Morgan and Pritchard 2004). Ekinci and Hosany (2006) define destination personality as the set of personality traits associated with a destination (Ekinci and Hosany 2006, p.127). According to Ekinci (2003) the development of a successful destination brand should involve establishing a positive relationship between destinations and tourists by satisfying their emotional needs (i.e. visit places that are relaxing and beautiful). Morgan and Pritchard (2004) claim that building a powerful destination brand is about developing a rich and appropriate brand personality. Hsu and Cai (2009) even claim that only branded destinations are able to establish an instant emotional link with customers, which can lead to greater loyalty. An individual who is satisfied with a brand might have an emotional attachment to it (Thomson et al. 2005), so the formation of emotional relationships between customer and destination can increase customer loyalty (Palmatier et al. 2006).

2.3 Brand Personality Scale in Tourism Studies

Aaker (1997) developed the Brand Personality Scale (BPS) where five personality dimensions based on sources of personality scales from psychology were selected. The BPS represents five dimensions; *competence, excitement, ruggedness, sincerity and sophistication*. Table 1 provides a detailed overview of key-words Aaker developed. Ekinci and Hosany (2006) examined BPS in the context of tourism destinations, and argue that tourists ascribe personality characteristics to

Table 1 Brand personality dimensions and related key-words (Aaker 1997)

Competence	Excitement	Ruggedness	Sincerity	Sophistication
Reliable	Daring	Outdoorsy	Down-to-earth	Upper-class
Hard-working	Trendy	Masculine	Family-oriented	Good-looking
Secure	Spirited	Tough	Small-town	Charming
Intelligent	Cool	Rugged	Honest	Feminine
Technical	Young	Western	Sincere	Smooth
Corporate	Imaginative		Wholesome	Glamorous
Successful	Unique		Original	
Leader			Cheerful	
Confident			Sentimental	
			Friendly	
			Real	

destinations based upon three salient dimensions: sincerity, excitement and conviviality. They argue that sincerity and excitement were found to be the main factors, and conviviality specifies destinations. However, there are only a few studies on brand personality of the tourist destination. This also implies that there is no valid instrument for measuring tourism destination brand personality (TDBP). In fact, the different studies are using different scales to validate the personality construct. Ekinci and Hosany (2006) established a three dimensional scale, based on Aaker's industry-based neutral personality scale. d'Astous and Boujbel (2007) found six dimensions (agreeableness, wickedness, snobbism, assiduousness, conformity and obtrusiveness) through unstructured interviews. Hereby, they developed a scale on a country level predicting tourists' choice for travel destination. Ekinci et al. (2007) employing Aaker's (1997) scale, found three dimensions (sincerity, excitement and conviviality). They state that host image has an important impact on brand personality perceptions and subsequently on future intentions. Murphy et al. (2006) also applied Aaker's (1997) scale and used open-ended questions comparing two destinations. Both destinations received different dimensions. Murphy et al. (2007) provide evidence for a link between brand personality and travel motivations. Their study provides four main dimensions (sophistication and competence, sincerity, excitement and ruggedness). Sanin and Baloglu (2009) drawing on Aaker's work (1997) analysed travel brochures and internet sites and found five dimensions: competence and modernity, originality and vibrancy, sincerity cool and trendy, and conviviality. They state that perceptions however do differ across nationalities. Murphy et al. (2007) established a three dimensional scale in one destination, and in another investigated destination, they found a TDBP of four dimensions. Chen and Phou (2013) also used Aakers (1997) scale and discovered five dimensions of excitement, sincerity, sophistication, ruggedness and contemporary. They found that brand personality has a positive effect on destination satisfaction. Moreover, destination personality mediates the relationship between destination image and future intentions (Chen and Phou 2013). De Moya and Jain (2013) performed a correspondence analysis based upon Aaker's

(1997) scale and found the four dimensions of popularity, sincerity, excitement and sophistication. Papadimitriou et al. (2013) used 16 items from Hosany et al. (2006) to test urban tourism and the brand personality concept. They found two main dimensions of sincerity and excitement, postulating that destination personality is an antecedent of destination image. Seljeseth and Korneliussen (2013) used Murphy et al.'s (2007) scale aiming to understand how the brand personality concept enhances co-creation. Their study found four dimensions (ruggedness, sophistication, naturalness and activeness) illustrating how tourists associate themselves with a destination, and subsequently co-create the experiences through the concept of brand personality. Conclusively, the use of Aaker's (1997) scale to measure brand personality can be perceived as reliable also for tourism studies.

2.4 DMOs Online Strategies

Tourists create many forms of content related to their experiences such as blogs, reviews, photos and videos. In fact, the content created can inform brand management for many products and also for destinations (Seraj 2012). However, destination branding tailored mainly by the wishes and desires of tourists can be problematic; tourists express their feelings and emotions which can be out of context and not feasible for DMOs (Munar 2010). However, travellers co-create the brand through their online comments (Presi et al. 2014). Accordingly, consumers' power is increasing and often marketers do not know how to react to this (Labrecque et al. 2013). Marketers may even ignore this form of social media because they do not understand what it is, the various forms it can take, and how to engage with it and learn (Pitt and Berthon 2011). However, DMOs have different options to deal with these challenges (Munar 2010; Marchiori et al. 2012; Morgan et al. 2011). Munar (2010) refers to the mimetic strategy where DMOs can copy the style and e-culture of social network sites to create their own web site. This type is a rather conservative strategy which is characterized by the organization keeping the main locus of control of web content on the organization (Munar 2010; Marchiori et al. 2012). The mimetic strategy is a rather easy and inexpensive way to participate in Web 2.0. In addition, it allows DMOs to keep control of the tourist generated content that is displayed; DMOs can remove unwanted and/or inappropriate content (Munar 2010). Morgan et al. (2011) state that DMOs can also re-direct ads and follow a rather static approach of online content management. Munar (2010) refers it as advertising strategies, illustrating how these strategies do not support DMOs to benefit from the pool of information provided by tourists. As Marchiori et al. (2012) state, DMOs can monitor and regulate their online reputation. Munar (2010) refers to this option as the analytic strategy where DMOs benefit more from tourist information than the other two dimensions, steered by activities of prevention and knowledge creation (Munar 2010). The analytic strategy is based

upon monitoring and trend analysis and can act as a valuable tool in forecasting for destinations (Munar 2010; Marchiori et al. 2012). Moreover, DMOs can transform a large amount of unstructured tourist created content into strategic knowledge by examining, selecting, classifying, monitoring and evaluating (Marchiori et al. 2012). This can support a DMO's understanding of image formation for their destination (Marchiori et al. 2012; Morgan et al. 2011). This also implies that DMOs need to enhance their skills and competences related to destination branding. This study therefore applies destination personality as a concept and investigates how it is reflected in a) online user generated content and b) a conventional study on a destination in form of an online survey. Accordingly, we compare what customers provide online in their reviews for free with what customers provide in terms of connotations with a destination triggered through a survey. Research on social media heavily draws on theory generated in other empirical settings employing survey research as means for collecting data. Therefore, researchers need to be cautious when employing theory in a social media context and critically reflect if it can be applied.

3 Method

3.1 Sample Selection

The data collected for this study is based on TripAdvisor reviews. TripAdvisor is a third-party review website used by millions of users daily to write reviews as well as to find relevant information for a new holiday. TripAdvisor allows consumers to write reviews on several elements of a holiday. This study focuses on three main service settings supporting the tourists' experiences in the city of Vienna: accommodation, sights and restaurants. In total 1,092 TripAdvisor reviews are collected in April 2014 and equally distributed among the three service settings, using the quota sampling technique. In order to aim for a candid reflection of customer opinions the same numbers of reviews range between negative, average and positive scores. Moreover, two open ended questions connected to the connotations of a traveller with the city of Vienna were included in a survey which yielded 599 respondents. The survey focused on visitors of the city of Vienna (Kötlinger 2012). Users report about their experiences in a destination may differ when provided in an anonymous social media platform as compared to an online survey.

3.2 Content Analysis

A computer-assisted content analysis is carried out in this study. Previous studies show that computer-assisted content analysis is useful for analysing large quantities

of data, and is more reliable than human coding. In addition, the word count has a preferred measure when to ascertain the importance of a topic in text (Pollach 2011). By the use of the software package WordStat the content analysis is supported. The programme allows various analyses and tests, reduces words in canonical form, and enables univariate frequency analysis and bivariate comparison between any textual field and any nominal and ordinal variable (e.g. age, of respondents). WordStat compares a list of words selected by the researcher (dictionary) against the text loaded into the software and returns the frequencies with which these words occur in the text (Pollach 2011).

4 Results

4.1 Brand Personality Dimensions

Table 1 provides an overview of the main dimensions and linked key-words originally from Aaker's (1997) BPS. Based upon Table 1, in total 555 words spread across the five dimensions with an average of 20 % represented in each brand personality dimension supported the computer-assisted analysis. This means the number of words are equally distributed and do not favour one personality dimension.

Table 2 provides an overview of the results based on the reviews reflecting the brand personality dimensions represented in social media compared to the results from the open-ended survey questions. The first dimension, Sincerity has been mentioned more often in the questionnaire than online (51.1 % and 39.9 % respectively). Whereas ruggedness does nearly not show up for the questionnaire. It seems that a different language is used in a formal setting of data collection like a survey than when travellers express themselves freely in a review. All other dimensions such as sophistication, excitement and competence are significantly different in the two settings but with significantly more difference in the social media spaces.

Table 2 Comparisons of brand personality dimensions in social media and questionnaires

Brand personality dimensions	Social media (%)	Questionnaire (%)	P-value
Sincerity	39.9	56.1	0.000
Sophistication	20.6	17.0	0.000
Excitement	18.8	16.4	0.000
Competence	12.7	10.6	0.000
Ruggedness	7.9	0.2	0.000

4.2 Comparison of Service Settings

Table 3 displays the presence of the respective brand personality dimensions for hotels, sights and restaurants as identified on TripAdvisor. The results are significantly different for all dimensions apart for ruggedness. Ruggedness is present for all three service products which implies that some travellers use critical or even negative language when talking about those three sectors. Sincerity is most present for hotels with 47.4 % whereas sights only receive 27.3 % and restaurants 40.7 %. Sophistication and excitement are most present for sights with 26.8 and 25.6 % respectively. For these two dimensions restaurants are following on the second place and hotels on the third place. Finally, competence is the highest by hotels, followed by restaurants and sights. The presence of the various brand personality dimensions provide an understanding of which service setting supports the presence of a specific personality dimension for the overall destination brand.

Considering the fact that different service settings provide different experiences the need to understand the specific service settings can be of great relevance. In Table 4 explicit examples are provided. In the case of sincerity, sights in fact support the dimensions the least. This can be considered as a point of attention. For the dimension sophistication the category of accommodation supports the dimension the least. For excitement sights received the highest percentages, whereas accommodation the lowest. This finding is intuitive as sights are usually the main attractions in a destination and a major contribution to the overall travel experience. Competence is equally divided, however, sights received the lowest percentage and thus attention needs to be paid to that.

5 Conclusion

The importance of consumer attachement to a brand and the emotional links to a product and or service have been proven to successfully develop a brand among competitors. Also, in the field of tourism this trend has been recognized and the call for DMOs to respond to this is needed. Considering the pertinent role of ICT and the networked position of consumers in their daily lives as well as their role as tourists

Table 3 Service setting and presence of brand personality dimensions

	Social media				Questionnaire
Brand personality dimensions	Restaurants	Sights	Hotels	p-value	Connotations with Vienna
Sincerity	40.7	27.3	47.4	0.000	56.1
Sophistication	20.5	26.8	16.8	0.012	17.0
Excitement	17.7	25.6	15.2	0.001	16.4
Competence	12.4	11.6	13.6	0.000	10.6
Ruggedness	8.7	8.7	6.9	0.192	0.2

Table 4 Examples per service category and brand personality dimensions

Brand personality dimensions	Restaurants	Sights	Hotels
Sincerity	"So, good service, friendly and HOSPITABLE"	"The museum is a GENUINE AND REALLY CHARMING slice of eccentric modern Vienna"	"The rooms were VERY MODERN & clean and it seems each room has a funky theme to it"
Sophistication	"ABSOLUTELY AMAZING. Even my picky kids were so satisfied that we had to go back"	"Such a STUNNING PLACE, palace is as GRAND AND BEAUTIFUL ENTRANCE to a building anywhere in the world"	"The staff members were mostly NICE AND COURTEOUS"
Excitement	"This was a great find and a REALLY COOL atmosphere!!"	"This zoo was FANTASTIC's and very ENJOYABLE considering the limits on expansion"	"VERY FRESH, HIP HOTEL WITH a super cool bar on the top floor"
Competence	"The service was very prompt, COURTEOUS, and intensely precise and proper"	"I felt SAFE walking around doing the tourist thing everywhere"	"We ENJOYED our stay in shermin hotel, its intimacy and smart design"
Ruggedness	"The two MALE staff members were RUDE and boorish at an enquiry about the menu"	"The staff is KIND OF RUDE and make the place seem UNCOMFORTABLE, but it wouldn't be a proper art museum if it wasn't uncomfortable"	"VERY BAD IDEA if you want return customers. We also HATED the pillows"

does make this topic more significant. Consumers do want to aim for unique experiences with value, and subsequently emotions do play an important role. The confirmation of emotional experiences can function as an important part of DMOs marketing strategies as well as for higher levels of consumer satisfaction, positive word-of-mouth and future intentions. On the level of brand personality dimensions, the study provides insights in the fact that tourists do feel and mention them, and subsequently consider it as an integral part of their experiences. In fact, the critical and self-aware tourists are becoming more active in an online setting reflected in the continuously growing numbers of blogs, reviews, and posts. Consumers aim to develop products that fit their needs and are the best is the current state-of-art. Both, researchers and practitioners have to keep in mind that travellers are co-creating online content and accordingly co-branding destinations with their postings. Accordingly they influence the brand personality communicated. Moreover, this study shows that consumers have a rather straightforward way of expressing their actual experiences in social media spaces which often is not in line with the language imposed by measurement theory. Therefore, theoretical

concepts have to be cautiously transferred to new contexts such as social media. The comparative element used in this study shows the significance for marketers to consider both research approaches enhancing their understanding of consumer behaviour and subsequently develop emotional attachments. The study illustrates that by employing innovative methods a diversity of information can be retrieved from and about consumers. However, many marketers do not (yet) know how to deal with the quantity as well as the quality of the information provided. Consumer engagement is an important element for marketers. Not only considering the fact that consumers are active actors in their experiences, but also the diverse devices (i.e. tablets, smart phones) support the development of consumer engagement even more. This study shows a rather passive form of consumer engagement into marketing strategies. Research on brand personality is further developing and only up till now a few studies have included this topic into destination co-branding. Therefore, there is a need for more studies including destination brand personality as represented in diverse online sources as well as traditional survey. Moreover, considering the fact that the dimensions are closely interlinked and can be expressed intertwined, a qualitative perspective would enrich the understanding how the different brand personality dimensions are exposed in social media spaces.

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Reframing the Image of a Destination: A Pre-Post Study on Social Media Exposure

Elena Marchiori and Irem Önder

Abstract The majority of the studies on destination image have so far mainly focused on the cognitive and affective components, and there is still a lack of research on the conative component of destination image (i.e., the declaration of a behavioral intention). Moreover, less research has been done on verbally reported self-perception on the baseline image (prior belief about a destination), and the enhanced image (after an exposure to online contents). This study shows the effect of social media exposure on the perceived image about tourism destinations. In particular, declarations of the intention to visit the destination (image conative component) were found on the reported perceived image about a destination. In general intention to visit the destination was influenced by the stimuli and in the same direction, if it was positive the results show an interest in visiting the city and vice a versa.

Keywords Destination image • eWord-of-mouth • Social media • Content analysis

1 Introduction

Contents published online on social media have been shown to substantially effect visits to a destination by prospective travellers (Gretzel 2006; Tussyadiah et al. 2011; Xiang and Gretzel 2010; Yang et al. 2008). Moreover, several researchers (Morgan et al. 2003, 2004; Govers and Go 2009; Xiang and Gretzel 2010; Marchiori and Cantoni 2012) have noted that social media have forced destination managers to consider the monitoring of those online conversations as the first phase of any destination marketing strategy. Indeed, a better understanding of the destination's image projected online by social media can be crucial for managers in their promotion of the destination.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_25

Previous research (Li et al. 2009) analyzed the components (cognitive and affective) that affect the perceived image of a destination before and after an online browsing session (baseline image and enhanced image, respectively), showing that an active search of online information may change the image participants had of a destination, particularly its affective aspects. A related study by Marchiori et al. (2013) focused on the investigation of the importance of various messages contained within online conversations as proxies for public opinion (i.e., online reputation). This study demonstrated that message characteristics such as message sidedness, consistency, and the overall argument strength of the message as well as the attitude of users to be "reputation seekers" tend to have a significant impact on the perceived dominant opinion expressed online about a destination in social media.

Agapito et al. (2014) recently empirically confirmed the hierarchical nature of the cognitive, affective, and conative dimensions of destination image, as proposed by Gartner (1993). However, the majority of the studies on destination image have so far mainly focused on the cognitive and affective components, and there is still a lack of research on the conative component of destination image (i.e., the declaration of a behavioral intention). Moreover, less research has been done on verbally reported self-perception on the baseline image and the enhanced image (e.g., after an exposure to online contents). Furthermore, there is still a gap in the literature in the investigation of the conative dimension expressed in contents publicly available online.

This research posits a study design that captures answers to open questions on what users know about a destination before and after their exposure to online contents might allow to further understand potential under-investigated information processing dynamics on the perception of a destination image. Therefore, this study aims to investigate the effect of social media exposure on the perceived image about a destination. In particular, a focus on the declaration of the intention to visit a destination (conative component) is analyzed on the reported perceived image of a destination. Finally, the goal of the study is to contribute to the current literature in destination image, showing how self-reported perception regarding what we have learned about a destination tend to generally contain also conative components, such as an intention to whether or not visit the destination. This study also aims to support destination managers in their analysis of online contents, suggesting to expand their focus not only to topic and sentiment expressed online, but also to the behavioral intentions generated by the exposure to those contents. Theoretical and practical implications are discussed in the conclusion.

2 Conceptual Development

2.1 Destination Image Components

The destination image literature has been focusing on investigating the destination image components, and those studies derived mainly from the tripartite model of tourism destination image (Crompton 1979; Gartner 1989; Echtner and Ritchie 1993).

Cognitive components	Affective components	Conative components
Mental responses to the stimuli in the environment	How one feels about this knowledge	Behavioral/attitudinal components

Fig. 1 Image components (Gartner 1986; Crompton 1979; Um and Crompton 1990)

As seen in Fig. 1, the three main components of image can be summarized as follows: two components relate to mental responses to stimuli in the environment, (a) cognitive components (i.e. what someone knows or thinks he or she knows about a destination) and (b) affective components (i.e. how one feels about this knowledge); and a third component, introduced by Um and Crompton (1990), is related to behavioral/attitudinal components; (c) conative components (i.e. how one acts on the information and how he or she feels about it).

The conative image component is defined as visit intention and incorporates the probability of potential tourists to visit or revisit the destination in the future that emerges from cognitive and affective images. Moving from this theoretical background, Li et al. (2009) proposed the terms baseline image (mental representation derived from passive or ongoing information gathering), and enhanced image (mental representation built from active information search), in order to distinguish the different stages of image development in tourists' mental representation before and after active online information search. Results of this study shown that active online information search may change participants' destination image, particularly its affective aspects.

However, there is still limited research in the conative component, particularly declaration of visiting or not the destination after the exposure to online contents. Therefore, this study wants to contribute to the existing conceptualization of the *enhanced image* towards a destination, focusing on how narratives about a destination might be reframed after an exposure to social media contents, with a particular focus on the presence of conative component.

2.2 Online Information Search in Tourism

Studies on attitude determinants in tourism destination choice (Um and Crompton (1990) reveal that external and internal inputs concur on the formulation of a tourism destination choice at different levels. In particular, online contents can be considered part of the external inputs—social stimuli (Howard and Sheth 1969) (e.g. electronic word-of-mouth), which can affect the information processing in a passive phase (which turns on awareness), and/or in an active information search (which turns on selection of a place to be visited). Studies from Beerli and Martin (2004) applied the Um and Crompton (1990) approach, and revealed that information source factors (primary and secondary sources), along with personal factors such as motivations, vacation experiences, and socio-demographic characteristics,

are the main factors influencing destination image formation. As in Um and Crompton (1990), the secondary-source information (external inputs) is the official information from institutional sources, autonomous sources (i.e. magazines, guides sources), and organic sources (i.e. recommendations from friends, family and word of mouth). In particular, the organic source seemed to be the most influential sources of information in destination image formation. Bringing these issues into the online domain, organic sources can be represented by online conversations, and thus the need to understand their effect should thus be investigated. Furthermore, recently, several researchers have noted that the role of recommendations from several second-hand sources is crucial in the tourism decision-making process (Fesenmaier et al. 2006; Passow et al. 2005; Yang et al. 2008).

3 Research Design

The data for the study was collected using an online survey. The sample included 120,000 American adults (18 years and older) who requested travel information about U.S. travel destinations from the travel website VacationFun.com. To have a representative sample of destinations, three main geographic American regions (East Coast, West Coast and Central) were pre-screened and eight destinations were chosen. The selection was based on the population of the destination (had to be equal or higher than 300,000 inhabitants) and the polarity of the dimensions (at least one negative polarity). To have variety in the destination sample two destinations that had extreme polarities were selected: San Francisco (positive in all dimensions) and Detroit (negative in all dimensions), in addition six other destinations that differed in terms of popularity and character are chosen, which include Kansas City, Las Vegas, New Orleans, Orlando, Phoenix, and Seattle. The data collection effort focused on the destination image formation prior to and after the exposure to "authentic" online conversations (i.e., stimulus materials) about a tourism destination.

A pilot study was conducted to test the reliability and validity of the constructs and necessary adjustments were made. The panel included 120,000 American travelers, who were divided into 15,000 contacts per destination. The data was collected between July 23, 2012 and August 20, 2012 and resulted in 4,116 responses of which 2,658 were usable, with an average of 332 completed responses per destination. The study sample included 2,153 respondents who have not been to the destinations that were asked questions about. Table 1 shows the distribution of respondents according to the destination.

The survey included four parts. In the first part, the respondents were given a destination and asked if they have visited it in the last 5 years. The second part had 20 links to original online postings (stimuli material) about the destination and respondents were asked to click at least one of them. The stimuli material for the destinations included five main tourism-related topics: value for money, culture, overall image, weather and safety. The five thematic dimensions reflected the

Table 1 Study sample distribution

	Visited	Not visited	Total
Detroit	28	301	329
Kansas	45	281	326
Las Vegas	96	220	316
New Orleans	68	284	352
Orlando	106	250	356
Phoenix	64	288	352
San Francisco	57	256	313
Seattle	41	273	314
Total	**505**	**2,153**	**2,658**

tourism destination reputation components emerged from Marchiori et al. (2010) and Marchiori and Cantoni (2012).

After the respondent navigated the links, he/she was asked follow-up questions about the destination and the last part included demographic questions. Table 2 shows the sentiment in the stimuli used in the study.

3.1 Data Analysis

This study followed a purely qualitative approach to understand the evolution of the most common themes in each destination after the exposure to the stimuli. The sample includes the respondents who have not been to the destination in the last 5 years only. The data was analyzed by using NVIVO version 10 qualitative research software. The analysis was conducted in three stages. In the first stage, the data was arranged into two files for each city as before and after the exposure to the stimuli. The word frequency analysis was conducted in the before files and top five words were identified to find out the main themes in the files. In the second stage, concurrence analyses of the identified top five words in before and after files were conducted separately to see the evolution of these terms after the exposure to the stimuli. In the last stage the conative component in the concurrence analysis was identified. The keyword searched in the dataset related to the conative components was referred to statements about respondents' intention to visit or not the given destination. If the conative component was not found in the first five words then the next word was analyzed the same way. This procedure was needed only for New Orleans, for the other destinations the conative component in the after the stimuli exposure files were already in the first five words analyzed.

The same procedure was done for all the destinations. This procedure is followed by an in depth analysis of the conative component comparison between the before and after files. The conative component includes intention to visit or not to visit the destination. The negative and positive stimuli the respondents have seen may affect their intention to visit the destination as well. Thus the percentage of conative

Table 2 The sentiment represented in the online content by destination

	Money	Culture	Image	Weather	Safety
Detroit	L	H	L	L	L
Kansas	H	H	L	H	L
Las Vegas	L	H	H	L	L
New Orleans	H	H	H	L	L
Orlando	H	H	H	L	H
Phoenix	H	L	H	H	H
San Francisco	H	H	H	H	H
Seattle	H	H	H	L	H

L Low: majority of sentiment expressed on the URLs is negative, *H* High: majority of sentiment expressed on the URLs is positive

components for before and after the stimuli exposure, specifically intention to visit or not to visit were calculated based on the raw data.

4 Results

4.1 Themes Represented in Destinations

The main themes that are mentioned by the respondents were identified by examining the word frequencies in before and after stimuli exposure files. Furthermore, the results were also double checked by the authors to see whether the words are meaningful and represent a theme. The following Table 3 shows the main themes for each destination before they were exposed to the stimuli.

4.2 The Influence of the Stimuli on the Themes

After the exposure to the stimuli, the respondents were asked what they learned from what they have read about the destinations. Table 4 shows the weighted percentage of the most frequent words for before and after the exposure to stimuli. Results show that overall the image topic before the exposure to stimuli tends to decrease after the navigation through the stimuli (= after the exposure to stimuli, participants tend to do not mention about their previous image) only in two cases increased.

Even if the mostly frequently words were also in the stimuli, the respondents mention the new topics, they do not repeat what they already know and see in the stimuli. This result might be important for marketers, who in their official communication, should enrich the personality traits of their destination (iconic image) with

Table 3 The main themes represented in each destination

Destination	Themes	Words
Detroit	Attractions and city characteristics (automotive industry)	Cars, Detroit, industry, known, city
Kansas	Attractions and things to do (e.g., barbecues and sports)	Know, city, Kansas, barbecue, royals
Las Vegas	Attractions and things to do (e.g., gambling and shows)	Gambling, La Vegas, shows, know, casinos
New Orleans	Events and food (Mardi Gras and Cajun food, drinking, partying)	Gras, mardi, active, food, drinking, city
Orlando	Attractions and things to do (e.g., theme parks)	Disney, parks, Orlando, known, studios
Phoenix	Weather, outdoor activities (e.g., golfing) and resorts, natural attractions (e.g. Grand Canyon)	State, warm, communities, city, good
San Francisco	Attractions and places to see, public transportation (cable cars) (e.g., Golden Gate bridge, Alcatraz, China town)	Golden, activism, cars, going, community
Seattle	Attractions and places to see (e.g., space needle, Pike Place Market, Pioneer Square), coffee and weather (rain)	Needle, food, famous, weather, place

additional aspects that enhance the knowledge of the place, as those new contents tend to be noticed more by users.

Table 5 shows the links (stimuli) that included negative and positive postings about the destination taken from online travel communities such as Virtualtourist.com and TripAdvisor.com. The new popular themes emerged after the stimuli tend to reflect the contents viewed. For instance, safety was one of the mostly viewed stimuli for Detroit and it was also reported as a dangerous city after the stimuli exposure. For San Francisco, value for money was one of the mostly viewed stimuli and it was also reflected as cost of visiting San Francisco in the popular themes after the exposure. Although the respondents were never asked if they would visit the destination, most of the users, after their exposure to the stimuli, indicated their interest to visit the destination thus showing the conative component in the data. Therefore, results suggest that users, after a browsing session, tend not only to report/remember what's new compared to what they already knew about a destination, but they tend to express their intentional behavior towards the destination itself (e.g. intention to visit or not to visit the destination).

In order to understand the conative component in the data, further in depth analysis was conducted, taking into account the effect of the positive and negative stimuli seen by the respondents. Table 6 shows the percentage of conative components regarding intention to visit the city based on what they have read (stimuli). It includes the percentage of the negative stimuli that were seen compared to overall stimuli that were in the study for each city. Intention to visit the city was identified by coding each response that consists of the word "visit", as negative, positive or neutral. Since the goal was to identify the respondent's intention to visit, the general comments about the city were ignored. For instance, comments such as "seems like

Table 4 Most frequent words before and after the exposure to stimuli

City	Most frequent words used	Before weighted % (similar words)	After weighted % (similar words)	City	Most frequent words used	Before weighted % (similar words)	After weighted % (similar words)
Detroit	Cars	14.15	0.39	Orlando	Disney	15.85	0.99
	Detroit	6.31	3.70		Parks	5.28	1.41
	Industry	5.28	0.14		Orlando	3.56	2.58
	Known	2.88	0.04		Known	3.46	0.21
	City	2.48	1.69		Studios	3.15	0.04
Kansas	Know	6.39	0.33	Phoenix	State(d)	4.55	0.33
	City	4.40	5.29		Warm	3.18	1.00
	Kansas	3.98	1.89		Communities	2.68	–
	Barbecue	3.04	0.36		City	2.10	1.95
	Royals	2.10	–		Good	2.09	1.69
Las Vegas	Gambling	14.79	0.67	San Francisco	Golden	5.53	0.27
	Las Vegas	5.68	2.16		Activism	4.40	–
	Shows	5.28	0.59		Cars	4.05	0.18
	Known	4.58	0.23		Going	3.66	0.07
	Casinos	3.98	0.31		Community	3.18	0.93
New Orleans	Gras	10.08	0.43		Needle	6.85	0.46
	Mardi	8.84	0.26	Seattle	Food	2.98	0.64
	Active	3.55	–		Famous	2.64	–
	Food	3.45	0.59		Weather	2.58	0.62
	Drinking/drink	3.03	0.67		Place	2.39	3.65

Table 5 Effect of exposure to stimuli viewed

City	Stimuli most viewed	New popular themes after the stimuli	%*	City	Stimuli most viewed	New popular themes after the stimuli	%*
Detroit	Culture (+)	Place/ location	2.84 %	Orlando	Image (+)	Time/season	2.58 %
	Image (−)	Visit	2.32 %		Value for money (+)	Good/safe	2.53 %
	Safety (−)	Safe	2.31 %		Value for money (+)	Visit	1.90 %
	Culture (+)	Comparable to	2.24 %		Value for money (+)	Place/locals	1.89 %
	Safety (−)	Dangerous	1.24 %		Image (+)	Experience	1.47 %
Kansas	Value for money (+)	Place/ location	3.24 %	Phoenix	Image (+)	Activities	2.07 %
	Image (−)	Visit	2.80 %		Image (+)	City	1.95 %
	Image (−)	Good/safe	2.63 %		Weather (+)	Good	1.69 %
	Culture (+)	Weather	2.01 %		Weather (+)	Personally	1.56 %
	Image (−)	Culture	1.46 %		Value for money (+)	Culture	1.47 %
Las Vegas	Value for money (−)	Place/ location	2.35 %	San Francisco	Weather (+)	Changes	2.19 %
	Image (+)	Good/safe	2.22 %		Value for money (+)	Cost	1.43 %
	Value for money (−)	Hotels	2.01 %		Value for money (+)	Person	1.21 %
	Safety (−)	Time/season	1.73 %		Value for money (+)	Cultural	1.14 %
	Image (+)	Hot/heat	1.63 %		Image (+)	Place	1.07 %

(continued)

Table 5 (continued)

City	Stimuli most viewed	New popular themes after the stimuli	%*	City	Stimuli most viewed	New popular themes after the stimuli	%*
New Orleans	Image (+)	City	2.83 %	Seattle	Image (+)	City	3.37 %
	Weather (+)	Activities	1.68 %		Weather (−)	Changes	1.53 %
	Culture (−)	Good	1.53 %		Culture (+)	Hotels	1.51 %
	Culture (−)	Events	1.51 %		Culture (+)	Good	1.30 %
	Image (+)	Areas	1.31 %		Image (+)	Place	1.20 %

%* = Weighted % (similar words)
(+) = positive; (−) = negative

a great place to visit" or "good place to visit" were in this category since these statements show the perception of the respondent about the city but not his/her intention to visit. On the other hand, there were more concrete statements that indicate their visit intentions such as "still not a place I want to visit" or "I have never been there, but am thinking of visiting next summer". Only the statements that indicated clear intentions regarding visiting or not visiting the destination was coded. Then the percentages of the negative and positive ones were calculated relative to all the comments that showed any conative component regarding the visit. The same procedure was conducted for before and after the stimuli exposure comments.

In Table 6 it is shown that the percentage of conative component increased after the exposure to the stimuli, regardless whether the stimuli were positive or negative, which indicates the influence of the stimuli on the perception of the city and about the respondents' intention to visit. In the next step, the influences of positive and negative stimuli were analyzed more in depth to see if the positive stimuli result in intention to visit the city and vice a versa. In the cases of Detroit, San Francisco, Orlando and Seattle, intention to visit was in the same direction with the stimuli. For Detroit, majority of the stimuli were negative and it resulted in not wanting to visit the city. Opposite was true for positive stimuli and intention to visit for San Francisco, Orlando and Seattle.

New Orleans had mixed number of stimuli (40 % negative) and the intentions about visiting the city was also mixed, where 5.76 % indicated intention to visit and 8.77 % indicated no interest in visiting the city. Las Vegas had 60 % negative stimuli; however, this did not affect the intention to visit this city. On the contrary, there were no indication of not wanting to visit the city but 4.35 % of the conative remarks were about visiting Las Vegas. This result suggests that a popular tourism destination, already known for its iconic negative aspect (Las Vegas as "Sin City")

Table 6 Conative component results

City	% before	% (−) stimuli seen	% after	Intention to visit (%)	Intention not to visit (%)
Detroit	2.45	60	14.68	4.17	27.08
Kansas	2.46	60	20.00	13.85	12.31
Las Vegas	2.54	60	7.30	4.35	0
New orleans	1.41	40	17.25	5.26	8.77
Orlando	1.42	0	14.25	2.00	0
Phoenix	2.78	0	16.32	1.75	5.26
San Francisco	2.63	0	15.04	13.04	2.20
Seattle	4.03	20	22.34	14.06	6.25

might be accepted by users with its flaws that were mentioned in the online contents and in return do not influence intention to visit the city.

Results from two cases suggested how less popular destinations, such as Kansas and Phoenix, tend to generate unbalanced results depending on the type of stimuli to which participants are exposed. Indeed, for Kansas, which had also mostly negative stimuli but shows contents about tourism attractions and overall image of the destination, the intention to visit (13.85 %) was a bit higher than not to visit (12.81 %). The case of Phoenix, where all the stimuli were positive but show contents about topics like weather and value for money, the results indicate 1.75 % intention to visit whereas 5.25 % showed not wanting to visit the city.

5 Conclusions

This study shows the conative component and the effect of the stimuli on the intention to visit the destination. In general intention to visit the destination was influenced by the stimuli and in the same direction, if it was positive the results show an interest in visiting the city and vice a versa. Las Vegas and Phoenix were the two exceptions that had opposite effect of the stimuli on intentions to visit.

It is important to note that the respondents may already have a preconceived image of the destinations in the study, which cannot be controlled and thus affect the impact of the stimuli on visit intentions. The stimuli materials also have an influence on the results and if the respondents have chosen different material, the influence on visit intentions may have been different as well.

This research suggests managerial implications, as the results assess the importance of analyzing the online contents, focusing not only on cognitive and affective aspects, but also considering their potential conative implications. Indeed, the understanding of the image components of destination can be used as predictor variables of tourists' behavioral reactions to destinations as studied also by Agapito

et al. (2014). Moreover, this study contributes to literature on image formation and social media exposure, providing methodological and theoretical insights regarding the relevance of investigating the image conative component when it comes to online content analysis.

In particular, destination managers might enrich the personality traits of their destination in the official communication: managers might stress mainly the coverage of the affective aspects in order to increase the knowledge of the place, as those type of contents tend to be noticed more by users and generate conative/behavior intentions towards it.

There are some limitations associated with this study which are important to acknowledge. First the research design considered a set of pre-defined stimuli materials (i.e., 20 pages per destination), thus, this work cannot extensively cover the online representation of each destination. Second, the online domain were limited to the social media context. Thus, further research may find interesting to investigate the conditions analyzed in a real web navigation; and, test it with people who have not visited the destinations and people who visited the destinations, since the destination images may differ within the two groups; and, finally extend the investigation to the exposure to official sources compared to social media.

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Studying Online Contents Navigation: A Comparison Between Eye-Tracking Technique and Self-Reported Investigation

Elena Marchiori and Lorenzo Cantoni

Abstract This study posits that an eye-tracking approach, together with a self-reported research design, represent valid alternatives to study tourism-related web browsing behavior. Users might form their idea about a future vacation and/or about a destination from the contents presented online, which are based on relatively impersonal textual resources provided by other users. Thus, the ability to evaluate what prospective customers are looking at in online contexts represents a new way to enhance the promotion of a destination. An eye-tracking technique was therefore compared with the results gathered from a previous study which considered a user test with self-declaration of which features on the pages capture users' attention the most. Results of this study assess the presence of a common recognition by untrained users of the dominant topic and sentiment expressed on tourism related social media pages. The results obtained from both user tests performed in different research settings revealed also potential biases in data interpretation if only one technique is used.

Keywords Eye-tracking • Topic recognition • Sentiment expressed recognition • Social media • eTourism • Tourism destinations • eWoM

1 Introduction

Success in online promotion and communication is a key factor for successful destination marketing. The way destination marketers project the image of their tourism destination in a digital context is reflected in message cues presented on web pages, such as sentences/words with positive or negative statements, title position on a page, choice of images and their position within pages, etc. However, also social media contents contribute to the destination image projected online and can be perceived as more credible than official sources, which may affect the decision to visit a destination (Go and Govers 2005, 2009; Xiang and Gretzel 2010).

In this context, while a significant amount of research has been done around the classification of online contents in the tourism domain (Marchiori and Cantoni 2012), little research has been done on the analysis of the appearance and

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recognition of contextual elements on tourism social media websites (Kim and Fesenmaier 2008; Dickinger et al. 2011; Gefen et al. 2008; Yoo and Gretzel 2008).

Research on the classification of online contents tend to use trained coders for content analysis and only little investigation has been done in order to understand if untrained coders recognize similar dominant topics within social media pages. A recent study conducted by the authors (Marchiori and Cantoni 2013) addressed this issue using a self-reported investigation on social media contents. The study revealed insights on which kinds of characteristics of pages are perceived as prominent by web users. However, self-reported design might not fully represent the actual browsing activities of users.

With the advent of technologies such as eye-tracking, it is possible to track contingent responses and pupil dilation, which might be useful for further investigation of the behavior of online users. This study posits that an eye-tracking approach, together with a self-reported research design, represent valid alternatives to study tourism-related web browsing behavior. Moreover, the ability to evaluate what prospective customers are looking at in online contexts represents a new way to enhance the promotion of a destination. The eye-tracking technique was therefore compared with the results gathered from the previous study, which considered a user test with self-declaration of which features on the pages capture users' attention the most. Both user tests consisted of a content evaluation of online pages gathered from popular websites about tourism destinations representing a variety of international tourism sites.

Thus, this study aims at evaluating users' agreements on recognizing the dominant topic, and the dominant feeling expressed on social media pages, responding also to the tourism industry need to better understand how to perform effective online communication between tourism players and prospective travelers. Indeed, Destination Management Organizations (DMOs) need to design online communication that can persuade travelers to visit their destinations, and to satisfy information needs. Moreover, the eye tracking technique allows to identify the message cues that particularly affect the attention among web users, comparing the results from an actual navigation to a self-reported perception on what features of the pages capture users' attention the most.

This study has also managerial implications as it might help destination managers to have a more comprehensive picture of how a destination is portrayed in the digital context, and which kind of technique can be used in order to identify web users' behaviors. This might enable DMOs to design more effective web strategies to attract prospective travelers and promote the value of a territory.

2 Literature Review

2.1 Online Content Analysis

In the online environment, users might form their idea about a future vacation and/or about a destination from the contents presented online, which are based on relatively impersonal textual resources provided by other users (Brown et al. 2007).

Online pages evaluation measures have been proposed in various contexts and fields as they are crucial for the understanding of the performance of online communication (Fogg 2003). This is particularly relevant in the hospitality and tourism field, where the massive use of internet by prospective travelers who need to search for information, inspiration and purchase for their next holidays, has open to research the communication spread via web and the perceptions by users. Park and Gretzel (2007) analyzed the main critical factors for the development of successful tourism websites. Nine factors are actually the main research topics in this field: (1) information quality; (2) ease of use; (3) responsiveness; (4) security/privacy; (5) visual appearance; (6) trust; (7) interactivity; (8) personalization; and (9) fulfillment. Scholars argue that website evaluation (hence their quality) can provide benefits such as customer retention, positive return on investment, and leadership within the competition (Park and Gretzel 2007). Even if the main focus of these studies is the content of the websites, and the overall evaluation of the browsing experience (Gretzel 2006; Kim and Fesenmaier 2008), an increasing attention is devoted to the contextual elements present in tourism websites. Studies on destination websites' persuasiveness (Loda et al. 2009) underline the importance of message credibility, which can impact on the decision to visit a destination. Scholars underline how the first impression that a user has about a webpage is crucial in order to proceed or not with the reading of the contents (Li et al. 2009). As in Kim and Fesenmaier (2008, p. 1), the perception of credibility of contextual elements can influence the decision to continue (or not) to visit a website, and "this decision is based primarily on visitors' overall impression toward the website, and on their perception of the site inspirational value, and these factors are closely followed in importance by involvement, and by destination knowledge".

2.2 Eye-Tracking Technique

Eye-tracking is a technique that allows to measure where a person is looking or the motion of an eye relative to the head (gaze plot) (Nielsen and Pernice 2010). Eye-tracking is used in research, particularly in psychology and marketing, as it provides powerful insights for interpreting users' behaviours (Gidlöf et al. 2013; Venkatraman et al. 2014). As in Glockner and Herbold (2011) fixation (when the eye is resting on something) durations techniques revealed that shorter fixations are typically associated with implicit and automatic processing while longer fixations are associated with deeper processing. Wan Adilah Wan et al. (2013) have recently investigated the use of eye tracking analysis of users' behavior in online social networks, revealing the dynamics of fixations on social media. In the digital context, eye-tracking is used also to evaluate website's usability (Nielsen and Pernice 2010; Katsanos et al. 2010). Research from technology persuasion studies tend also to apply this technique in order to investigate the prominent signals on the web pages, and users' online dynamics (Nielsen and Pernice 2010). Eye-tracking

has been used in the tourism research, particularly in the hospitality sector (Russo and Leclerc 1994; Lorigo et al. 2008; Pan and Zhang 2010) in order to investigate mainly hotel guests decision-making. However, a clear understanding of the potentiality of this technique in the tourism research is still under-researched.

3 Research Design

The comparison between the two different techniques for user testing consisted of a content evaluation of 13 online pages gathered from popular websites about 13 US destinations representing a variety of tourism sites (Baltimore, Boston, Cape May, Charleston, Chicago, Everglades, Lancaster, New Orleans, New York, Philadelphia, Pittsburgh, Virginia Beach, and Washington). The eye tracking technique was therefore compared with the results gathered from a previous study (Marchiori and Cantoni 2013) which considered a user test with a self-declaration of which pages' features captured users' attention the most.

Therefore, both tests were performed within the following parameters:

(1) selection of the social media pages as *stimuli* materials: four pages from Facebook.com, five pages from TripAdvisor.com, and four blog pages (mainly from TravBuddy.com) were selected, as those websites represented the main social media platforms used in the tourism online domain (Xiang and Gretzel 2010).
(2) Original comments about destinations were left on each page.
(3) Users were asked to indicate the dominant opinion expressed on each presented page, classifying the dominant topic according to destinations' categories (Marchiori et al. 2011), and were:

- Products and services at the destination
- Society: culture, residents and traditions of the place
- Governance: tourism industry, institutions, and organizations
- Environment: weather, safety
- Overall image of the destination

(4) Users were asked to indicate the dominant judgments rendered about the destination on each page. The scale used was a 5-point Likert scale (1 = positive value judgments expressed; 5 = negative value judgments expressed; with the additional point 6 = the contents do not express any value judgment). Users were not given specific guidelines for their content analysis, leaving them free to evaluate all the cues presented on the pages.

Research Settings The previous user test (Marchiori and Cantoni 2013) involved a self-declaration of which pages' features capture users' attention the most, and it was used Qualtrics (www.qualtrics.com), a professional online survey tool, for the development of the online questionnaire used during the user test. The Qualtrics online survey platform allowed for a heat map analysis, asking respondents to pick

a spot on the page, which helped to underline how pages' features captured the respondents' attention. Users were asked to select the area of the page that communicated the most dominant opinion about the destination (i.e. main topic with positive or negative opinions presented within the page) by moving the cursor on the most interesting area and clicking on it. If users saw many topics within the page, they were asked to indicate the one that captured their attention the most. Heat maps were generated by summing the data points taken from all respondents.

The second user test was performed with an eye-tracking technique, using the Tobii *X*2-60 Eye Tracker and the Tobii Studio Professional edition (www.tobii.com), which allowed to record eye tracking data during the navigation of users between different visual stimuli. After an eye tracking calibration procedure for each participant, they were left free to explore the pages thanks to a great freedom of head movement. Heat maps were generated by summing the eye tracking data taken from all respondents.

Sample For the first user test: 28 international graduate students (female: 16; male: 12; age range: from 22 to 46) from an European university were selected to participate in the user test, which was conducted in May, 2012. A room equipped with PCs was used, and the researcher was present in the room during the user test in order to ensure that the instructions were clearly understood by all participants. Participants received an account to login to a given PC and were asked to browse 13 pre-selected online pages from tourism websites, and to provide their opinions using an online questionnaire. The test took around 30 min to complete.

For the second user test: 12 international graduate students (female: 7; male: 5; age range: from 22 to 34) from an European university were selected to participate in a user test, which was conducted in August, 2014. A room equipped with a PC with the hardware installed was used; the researcher was present in the room during the user test in order to ensure that the instructions were clearly understood by all participants. The user test was performed individually, each user was asked to browse the same 13 pre-selected online pages used in the previous test, and to provide their opinions using a questionnaire. For each participant the test took around 30 min to complete. Data were then analyzed at the aggregate level.

4 Results

A comparison of the results of the self-reported investigation and the eye-tracking technique on online contents navigation shows that in an untrained coding context, a majority of users agreed on the recognition of a prominent feeling expressed. Participants in both research setting were exposed to the same stimuli, so that the specific question from the self-reported investigation to identify the area of the page that capture their attention the most, and the free navigation in the eye-tracking setting have not interfered with the identification of the main sentiment expressed in the pages. In particular, TripAdvisor pages resulted in generation of more

agreement; then came blogs, and, lastly, Facebook pages. This result suggests that Facebook and blog pages are characterized by a wide variety of comment types, as divergent posts and comments are allowed on these pages. Conversely, TripAdvisor tends to have more consistent comments on each page, as it allows users to create specific topic discussions. Regarding the coding results for the topic recognition task, the tendency reported from the previous study (Marchiori and Cantoni 2013) was confirmed also in the eye-tracking test. Seven out of thirteen pages clearly communicated an identical message (>50 %) regarding a specific topic. In particular, pages from TripAdvisor seemed to generate more consistent perceptions of a common topic recognition.

Results from the secondary investigation revealed interesting insights on the actual navigation of participants (reading of the page), which has proved to be quite different if compared with the self-declaration of which pages features captured their attention the most. Figures 1, 2, and 3 show the graphical representations of the respondents' attention on the pages, which are represented as bright spots in the map. The brightest areas in Figs. 1, 2, and 3 indicate the most visually interesting areas on the social media pages. The screenshots with grey background show the areas of the page where the majority of users selected that area. The screenshots with white background show the areas of the page where the majority of users gazed at the most (the time spent on each page by participants was on average 1.76 min). As the figures show, there is (apparently) an inconsistency among the areas within the pages that capture users' attention the most. In the results from the previous user test, titles, pictures, and presences of ranks and ratings were indicated by users as being those that captured their attention the most. On the contrary, eye-tracking results show that users quite neglected those areas while looking at those pages.

The eye-tracking technique allowed also for a Gaze Plot analysis, displaying the movement sequence, order, and duration of gaze fixation. According to a recent report from Nielsen (2011), users often leave web pages in 10–20 s. Moreover, literature on persuasive technology (Fogg 2003) confirms that users tend to evaluate a page in the first seconds. Thus, the first two and ten seconds of navigation have

Fig. 1 Two pairs of examples of heat maps for Facebook pages from the self-reported test (*grey background*) and eye-tracking test (*white background*)

Self-reported test on New Orleans page | Eye-tracking test on New Orleans page | Self-reported test on Baltimore page | Eye-tracking test on Baltimore page

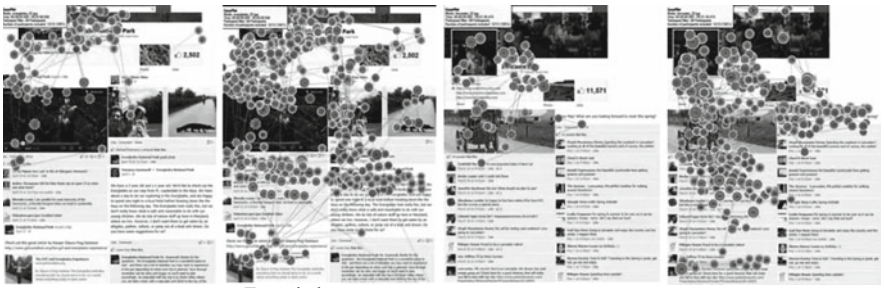
Fig. 2 Two pairs of examples of heat maps for TripAdvisor pages from the self-reported test (*grey background*) and eye-tracking test (*white background*)

Self-reported test on Boston page | Eye-tracking test on Boston page | Self-reported test on Cape May page | Eye-tracking test on Cape May page

Fig. 3 Two pairs of examples of heat maps for blog pages from the self-reported test (*grey background*) and eye-tracking test (*white background*)

been considered for a further investigation. Figures 4, 5, and 6 show the graphical representations of the respondents' gaze plot on the pages for the first 2 and 10 s of navigation. The gaze plots are represented as numerical dots in the maps. A closer look at the gaze plot data shows that users had a quick look at the pictures, titles, and ranks and ratings during the first seconds of their navigation, but for no more than 1 s, and therefore only little or not at all represented in the heat maps presented earlier.

These results suggest that the eye-tracking technique is a powerful tool for understanding which elements of the pages are seen. In particular the movement sequence, order, and duration of gaze fixation generate the identification of the dominant topic and sentiment expressed. However, a combination with a self-reported identification of the features of the pages that capture the attention the most is advised. When participants are asked to verbally identify the elements that capture their attention the most, they tend to identify elements that in a real-life navigation they quickly look at. Therefore, if researchers investigated only the real-life navigation they might encounter biases in data interpretation of this emerging technique and vice versa.

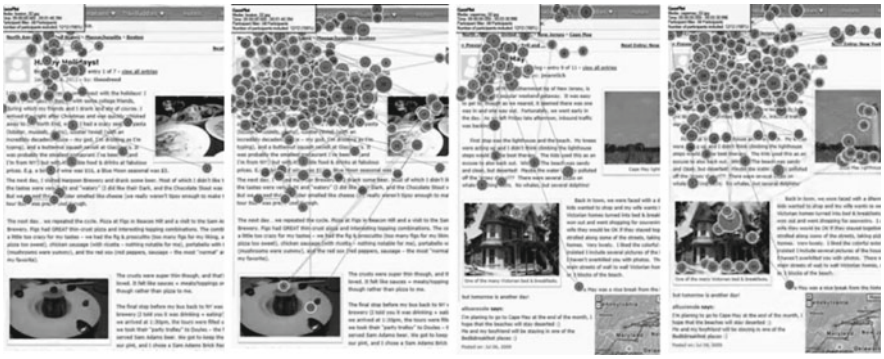


Everglades page: gaze plot at 2 sec. | Everglades page: gaze plot at 10 sec. | Lancaster page: gaze plot at 2 sec. | Lancaster page: gaze plot at 10 sec.

Fig. 4 Two pairs of examples of gaze plot for Facebook pages after 2 and 10 s of navigation

New Orleans page: gaze plot at 2 sec. | New Orleans page: gaze plot at 10 sec. | Baltimore page: gaze plot at 2 sec. | Baltimore page: gaze plot at 10 sec.

Fig. 5 Two pairs of examples of gaze plot for TripAdvisor pages after 2 and 10 s of navigation



Boston page: gaze plot at 2 sec. | Boston page: gaze plot at 10 sec. | Cape May page: gaze plot at 2 sec. | Cape May page: gaze plot at 10 sec.

Fig. 6 Two pairs of examples of gaze plot for blog pages after 2 and 10 s of navigation

5 Conclusion

Results of this user test assess the presence of a common recognition of the dominant topic and sentiment on a web page, and provide different strategies for information processing across individuals in the eTourism domain. The results obtained from both user tests performed in different research settings revealed potential biases in data interpretation if only one technique is used. For example: the presence of text on a page can lead to a longer gaze fixation of that area of the page. However, the same user may not be interested or affected by this specific area of the page even if he/she fixated it longer compared to the time spent in viewing a photo in the same page. Indeed, a user could indicate that the most significant area of the page is the photo instead of the text. This potentially contradictory result should be considered from a different perspective: if we are asked to identify the main feature/content that most captures our attention on a page, we may be influenced by the desire to choose the most prominent element, such as ranking, photo, and stronger statement as it has been revealed by this study. Therefore, as this study is still at the stage of exploratory research, this research, and overall those results, require an interdisciplinary frame for their interpretation including a cognitive perspective. Indeed, the two tests tackle different stages in the visual process where eye-tracking tend to focus in the early stage of perception, and self-reported is generally closed related with cognition. In this direction, one of the main challenges in visual perception theories has been to determine the very moment where perception finishes and cognition process begins in the whole visual process. Thus, future research should reflect and answer to this question in order to provide useful insights for a managerial perspective.

Moreover, results from the gaze plot analysis confirmed principles from technology persuasion studies, for example, the tendency of users to look at prominent signals on the page like titles, ranks, and to start their navigation from the top corner of the screen. However, the predefined stimuli might have biased the users navigation, thus a real navigation is suggested in order to further test the validity of this study. Additionally, as suggested also from the studies on web usability (Nielsen and Pernice 2010), further studies on the foveal vision (in human vision is the central area with high resolution), and the peripheral vision (vast majority of the visual field with less resolution) are recommended in order to further investigate human vision during a web browsing. Other limitations need also to be addressed: the subjects used are not the same across the tests; moreover, there is a lag of nearly 2 years, and the groups are not balanced in number and those aspects might have led to bias the results even if data have been treated at aggregate level. Thus, future research should replicate the same tests with the same subjects, and extend the theoretical foundation to a cognitive sciences perspective, such as from Gidlöf et al. (2013).

Finally, this study aimed at contributing to current tourism literature on cues/features from social media pages, which might affect the perceived dominant topic and feeling expressed within a page, which in turn might affect the decision making towards a destination. Indeed, the ability to evaluate what prospective customers are looking at in the online context represents a new way to enhance the promotion of a destination, and glimpse practical implications for designers and managers who want to better design online messages. For example, destination managers might benefit from this study as the proposed framework for a user test which comprises self-reported and eye-tracking technique could be used for testing the effectiveness of an online marketing campaign, or a website interface, or a new mobile application.

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Part IV
eTourism and Smart Destinations

Smart Tourism Destinations: An Extended Conception of Smart Cities Focusing on Human Mobility

Carlos Lamsfus, David Martín, Aurkene Alzua-Sorzabal, and Emilio Torres-Manzanera

Abstract Smart Cities are paving the way for the development of new services in the field of tourism. The "smart" concept is based on the intensive deployment of Information and Communication Technology infrastructures, as well as on the proliferation of mobile technology and its apps. However, a destination is not smart because it makes intensive use of technology. It is smart because it also uses technology in order to seek a deeper understanding about the characteristics and meaning of human mobility. It uses latent knowledge and capacities to empower local institutions and industries to create knowledge-based policies and advanced mobile services for visitors. This paper presents a new approach to the Smart Destination concept and a cloud-based infrastructure designed to reach that vision. This infrastructure promotes the creation of advanced mobile tourism applications by tourism stakeholders with tools adapted to people with no programming skills.

Keywords Smart destination • Mobile • Context • Tourism

1 Introduction

The deployment of Information and Communication Technologies (ICTs) is nowadays essential in order to make a destination competitive (Buhalis 2000). The latest developments in Intelligent Systems (Staab et al. 2002; Lamsfus et al. 2012a, b), advances in Cloud Computing (Q. Zhang et al. 2010a), Linked Data (Bizer 2009), Social Networks and the Internet of Things (IoT) (Guinard et al. 2011) are having a remarkable impact both on tourism destinations and the tourism experience. A very well-known case is related to the mobile industry, where smartphones have changed

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_27

the tourism experience in a way, which was not even imaginable just a few years ago. Mobile devices have become an open window to information and services at any time and place (Lamsfus et al. 2013) opening up the field of advanced services applied to the travel and tourism industries.

With this new ICT mediated environment in mind, a key challenge for a destination to evolve towards a Smarter Destination consists of empowering tourism stakeholders with an ICT infrastructure in order to deploy mobile tourism services that customize the information provided according to visitors' needs. Also, it is crucial to find out how to make visitors feel at home when they are travelling to new destinations and determine which technology-based solutions could be used to fulfill their requirements to achieve that ultimate goal (FIA Research Roadmap Working Group 2012).

This way, the ICT infrastructure has to be focused not only on technology based companies, but also on tourism domain experts, that is, people that do not have technical skills but are experts in the travel and tourism sector. This is crucial since tourism stakeholders are the ones who better know the visitors' needs. Empowering tourism experts with the right ICT based infrastructure to develop and deploy mobile services will improve the quality of information that is consumed by visitors on the move, and will help to boost the competitiveness of the destination.

In order for these mobile services to be able to adapt their information to the visitor's needs, they have to take into consideration data about people, objects and their surroundings, which are known as context (Lamsfus et al. 2012a). A common example of context data is the location of the visitor. For instance, Location Based Services (LBS) (Steiniger et al. 2006) use this context parameter in order to filter the results of a mobile search. This way, the management of context data by the ICT infrastructure is a key aspect to provide visitors with the right information according to their situation, enhancing the tourism experience.

This research work presents a theoretical framework on Smart Destinations and describes a use case of a cloud-based ICT infrastructure to support the creation of context-aware mobile services by tourism stakeholders. This way, the creation of mobile services by small tourism companies is democratized, promoting innovation in the travel and tourism industries. The three main modules of the ICT infrastructure are described: a mobile web contents editor to generate tourism information, a context-aware platform to deliver those contents to visitors on the move and a mobile analytics platform to get knowledge from people on the move.

The paper is organized as follows. In Sect. 2, the importance of Intelligent Systems in the travel and tourism industries is presented as a starting point for the theory of Smart Destinations. Section 3 presents the general framework of a Smart Destination. Section 4 describes a use case of an ICT infrastructure designed to foster the "smart" aspect of tourism destinations, based on a cloud platform to allow the creation of context-aware mobile services by tourism stakeholders with no programming skills.

2 Intelligent Systems in the Travel and Tourism Industries

Over the past decade, ICT infrastructures have become much faster, smaller, more intelligent and more embedded in the user's environment in the form of intelligent objects. The main characteristics of these objects are their low resources in terms of energy, storage capacity, computing power, communication bandwidth, heterogeneity and evolution (Atzori et al. 2010; Gama et al. 2012; Qin and Gu 2011). The pervasive presence of these non-living things is setting the ground for the implementation of a recently established concept, the Internet of Things, IoT, (Atzori et al. 2010; Giusto et al. 2010).

The IoT is full of opportunities to produce and deliver new information intensive products and services by interconnecting mobile electronic devices (Komninos et al. 2011) and more importantly, by connecting devices carried by people. Sensor networks and mobile devices enable the creation of ubiquitous mobile services based on users' context. These technologies set the ground for the creation of a new wave of intelligent context-aware systems in a wide variety of application domains, in which travel and tourism industries are predominant for these kinds of systems because of the general complexity of the tourism experience.

This complexity stems from the mobile nature of tourists (Hall 2004), the increased risk and uncertainty experienced in unfamiliar environments, information contained in distributed sources, the idiosyncratic quality of tourism decision-making, the multi-faceted nature of tourism experiences and the interdependency of sub-decisions (Jeng and Fesenmaier 2002). Thus, intelligent context-aware systems can provide significant value if they support the collection and processing of information according to various factors, including personal and situational needs of the user.

Intelligent Systems in travel and tourism represent next generation information systems that promise to supply tourism consumers and service providers with more relevant information, greater decision-support, mobility and ultimately, more enjoyable tourism experiences. They encompass a wide range of technologies relevant to travel and tourism such as recommender systems, context-aware systems, autonomous agents searching and mining Web resources and Ambient Intelligence (Gretzel 2011). These kinds of Intelligent Systems can be considered as the basis to evolve a certain destination into a Smart Destination.

3 Smart Destinations

One of the most important aspects and focus of the existing approaches to the conception of Smart City is its citizens, i.e. usual/permanent residents of a city. These approaches do not necessarily include short-term visitors in the design and creation of new communication channels among objects, entities, services or people. Hence, they leave aside temporal citizens, which make it difficult for them to make use of the Smart City services, since they are not aware of their existence.

So, (1) considering the importance of Intelligent Systems in tourism, (2) the increasing availability of technology infrastructure in the Smart City, (3) the complexity of the tourism experience and (4) the opportunity this new technology-mediated world provides for researchers to have a new approach to the human mobility phenomenon, this paper presents an extended definition of the Smart City conception focused on tourism, which is the Smart Destination. This extended definition turns the focus on to cities' temporal citizens, i.e. visitors and travellers, and on how they can either participate in the creation of new information intensive tourism products or they can become more aware of already existing services. In addition, this new vision of the Smart Destination also focuses on the new contexts of travel that emerge, which may serve as the foundation for understanding the tourism experience within a mobile environment. Following, there are some well-established definitions and ideas in order to set a solid grounding to the concept of Smart Destination.

First of all, Tourism is defined as a social, cultural and economic phenomenon, which entails the movement of people to countries or places outside their usual environment for personal or professional purposes (United Nations 2010a). That is, there are places where some of their citizens are not permanent or usual citizens, but temporal visitors who find themselves in environments they are not necessarily familiar with. Having made the distinction between what it entails to be within or outside a usual environment makes it necessary to establish what a usual place means.

The place of usual residence is the geographical area where an individual usually lives. It is defined by the location of her principal dwelling. There is just one usual environment for each person and it has two dimensions, i.e. vicinity and frequency. The literature shows different approaches when it comes to define what the usual environment entails (Govers et al. 2008; Canadian Tourism Commission, Instituto de Estudios Turísticos, and World Tourism Organization 2003; Govers et al. 2008). The conception of Smart Destination concept presented in this paper will stick to the UNWTO definition, where the concept of "usual environment" is central to the definition of tourism. They define it as the geographical area (though not necessarily a contiguous one) within which an individual conducts his regular life routines (United Nations 2010a).

Thus, the visitor is an individual who has travelled to a location outside her usual environment and finds herself hence in what is usually called a 'tourism destination'. In the literature, different authors have proposed a number of definitions for this concept. For instance, Buhalis (2000) explains the concept of destination as amalgams of tourism products, offering an integrated experience to consumers; Bornhorst et al. (2010) point out from the stakeholders' perspective that a tourism destination entails a particular geographical region, political jurisdiction or major attraction, which seeks to provide visitors with a range of satisfying visitation experiences. Moreover, Hernández Martín et al. (2012) suggest that a spatial unit of statistical analysis characterized by a high density of establishments of tourism characteristic industries, homogeneous statistical tourism information, and a spatial continuity may be considered a micro-destination. Out of all of the available definitions, the one taken for the purposes of this research note is focused on the decision-making process of someone planning to travel, as put forward by United

Nations 2010b: 'The main destination of a tourism trip is defined as the place visited that is central to the decision to take the trip'.

Thus, following the UNWTO's definition, a visitor is defined as an individual who is travelling to a country other than that where he usually lives for a period not exceeding 12 months and whose main purpose of visit is other than the exercise of an activity remunerated from within the place visited.

Considering what has already been explained about the concepts of Intelligent Systems, Tourism, Visitor and Destination, this paper proposes the following definition for Smart Destinations:

> A Tourism Destination is said to be Smart when it makes intensive use of the technological infrastructure provided by the Smart City in order to: (1) enhance the tourism experience of visitors by personalizing and making them aware of both local and tourism services and products available to them at the destination and (2) by empowering destination management organizations, local institutions and tourism companies to make their decisions and take actions based upon the data produced in within the destination, gathered, managed and processed by means of the technology infrastructure.

The main and basic difference with previous concepts related to the Smart idea is the fact that the focus is not put on permanent citizens that live in a city or a region, but temporary visitors who are travelling for different purposes. Commonly, tourists do not participate in local governance and in addition, they have specific needs and requirements in terms of products and services derived from their condition of travellers, which already implies a very strong context. In addition to that, despite the fact that Tourism Destination Management Organisations and other interested parties may benefit from the Smart City infrastructure, they also provide different services to those provided to local citizens and have other information requirements and needs in order to perform their managerial tasks.

4 A Use Case of an ICT Infrastructure for the Smart Destination

Based on the aforementioned Smart Destination principles, this section describes an ICT infrastructure that has been designed to enhance the tourism experience of visitors by providing tourism stakeholders with the right tools to create mobile services that are able to personalize their information according to the visitor's context. Apart from that, the infrastructure is able to gather data about the visitor's experience that can be used to make strategic decisions, design tourism policies and take actions. The architecture of the infrastructure is shown in Fig. 1.

The design of the architecture has been based on the Cloud Computing Paradigm (Zhang et al. 2010b). This way, the infrastructure can be deployed in any third party server and can easily be configured by tourism stakeholders and ICT companies using any connected device. The architecture is easily scalable and its maintenance can also be externalized. Also, principles of the Internet of Things (Guinard et al. 2011) have also been taken into consideration within the design of the infrastructure. This offers ICT companies high level layers of abstraction over the

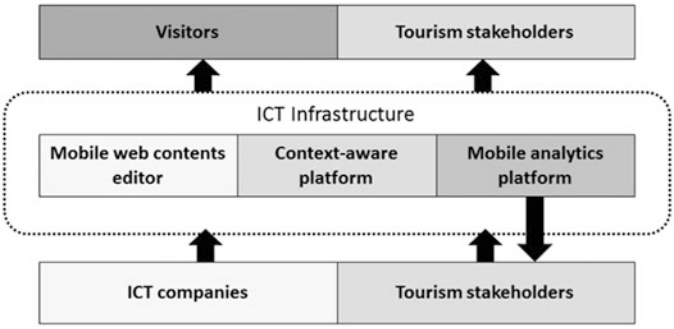

Fig. 1 Architecture of the smart destination ICT infrastructure

drivers and low-level mechanisms that connected things (i.e. mobile device, GPS) expose in order to get data from them. Finally, the End-User Programming (Lieberman et al. 2006) paradigm has been considered in order to involve tourism stakeholders in the development process of mobile applications and services. These kinds of users have the knowledge about the domain but lack programming skills (Bellotti and Edwards 2001). In this sense, previous research works evidence that the involvement of people without programming skills in the development of software systems is possible and desirable (Martín et al. 2013).

Three are the main modules of the developed ICT infrastructure. The mobile web contents editor is a tool to create mobile web pages with no programming skills. This module has been designed having tourism stakeholders in mind. This way, they can create contents according to visitors' needs without the intervention of ICT companies. The context-aware platform delivers mobile web contents to visitors on the move, according to context parameters, e.g. location, time and date range. Finally, the mobile analytics platform gathers the digital fingerprint of mobile users and provides tourism stakeholders with analytic reports in order to transform the usage of mobile apps into knowledge.

ICT companies and tourism stakeholders are the entities that use the infrastructure to create smart applications and services to be delivered to visitors on the move. All these entities and ICT infrastructures are the key to promote an innovation ecosystem with the aim of producing new services to improve the competitiveness of the travel and tourism industries. Next sections describe the three main modules of the technological infrastructure in detail.

4.1 Mobile Contents Editor

This module eases the creation of mobile web contents and applications by tourism stakeholders. The main characteristic of the tool is that it is designed to create mobile contents with no programming skills, thanks to the user interface shown in Fig. 2. In the literature review some similar tools can be found (Athreya et al. 2012; MIT Centre for mobile learning 2012; Danado and Paternò 2012; TapCanvas 2013;

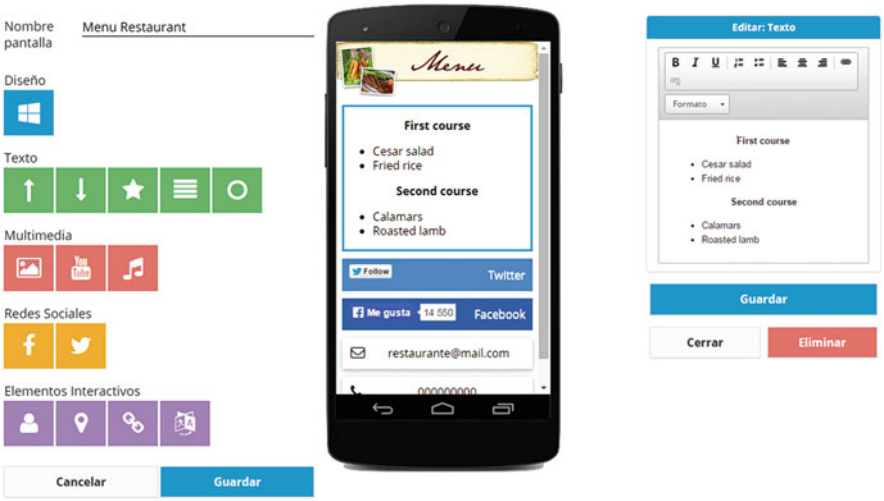

Fig. 2 Mobile contents editor

Calvium 2011). The main drawback of these approaches is that users still need some technical skills in order to create a mobile web or application.

With the implemented platform (it3LAB 2013a), tourism stakeholders can use the mobile contents editor to create and manage mobile web sites and applications. It provides users with a visual environment in order to create and edit information blocks. The editor contains three main areas. The left side of the editor shows the elements that can be used in order to design a mobile page. In the right side of the screen the selected element can be edited. When the user creates or edits a page element, the preview can be seen in real time in the emulator that is placed in the middle of the editor, which is helpful for non-technical users.

The tourism product is intangible (Werthner and Klein 1999), so it is important to provide a vast variety of information elements in order to enrich the tourism information that visitors consume with their mobile devices. The platform provides users with multimedia components such as images, audio and video. Also, text resources are available, like headers, footers, paragraphs or titles. Telephone and email contact elements can be added to the designed mobile pages as well. Another important feature that can be used is the map editor. This tool supports the creation of custom maps where different tourism resources can be placed.

In addition, social networks are gaining popularity as an alternative source of tourism information (Sigala et al. 2012). Visitors are increasingly adopting them in order to search for products or as a recommendation source. This way, the mobile editor provides users with social media web elements in order to embed Facebook and Twitter widgets in the created mobile web pages. These components connect tourism stakeholders with visitors on the move and they can be used as a social recommendation channel.

4.2 Context-Aware Platform

The context-aware platform is a push notification service that sends personalized information to visitors' mobile devices according to their context on a defined area (Martín et al. 2011). This service that is provided by the implemented ICT infrastructure can be combined with the previously described mobile contents editor, in order to push information to the visitors' smartphones according to their situation.

These kinds of platforms have been widely studied by the research community (Dey et al. 2001; Fahy and Clarke 2004; Bardram 2005; Chen et al. 2004; Gu et al. 2005). The main drawback of these approaches is that they are designed for programmers, providing low level application programming interfaces that cannot be used by tourism stakeholders. Apart from that, not all of them can be used in the tourism domain because they do not manage the location of moving entities.

As shown in Fig. 3, the implemented tool provides users with visual components to set the context parameters that will trigger the mobile content delivery process. This way, an area or virtual fence can be created in order to set a place where the absence or presence of the visitor can be detected. Apart from that, a time and date range can be specified. Finally, the data that has to be delivered to the visitor's mobile device when the context conditions are fulfilled can be specified in a text field. Like that, tourism domain experts can configure the conditions or rules to send information to the visitor on the move by using the web interface of the platform.

The platform has a mobile software component that can be integrated in any mobile application as well, so it can be used by any ICT company. This module has been designed in order to receive push notifications from the context-aware platform and to ease the gathering and sending processes of context data (location) from the mobile device of the visitor.

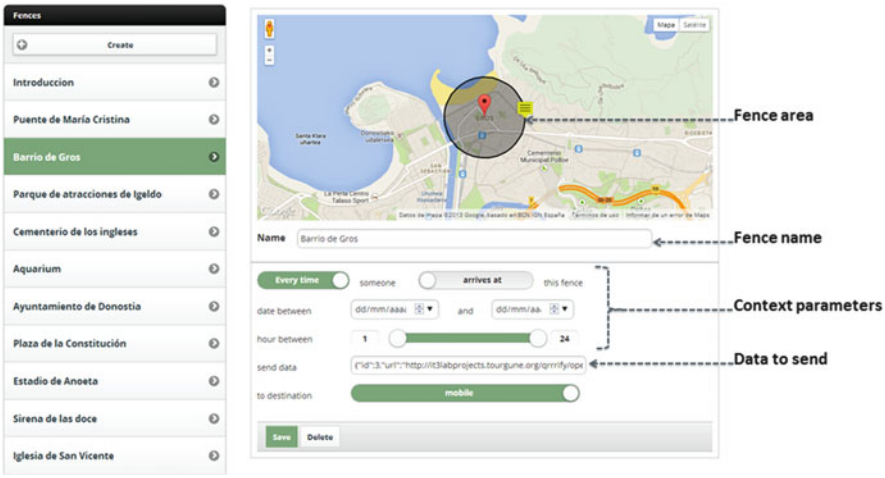

Fig. 3 Context-aware platform

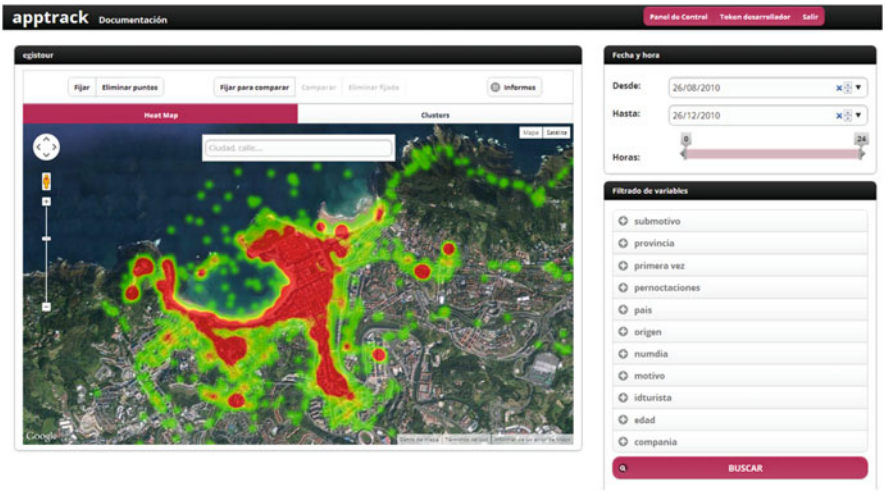

Fig. 4 Mobile analytics platform

4.3 Mobile Analytics Platform

The third module of the designed ICT infrastructure is the mobile analytics platform (it3LAB 2013b). This module gathers the location data from the mobile device of the visitor and processes them in order to be analyzed using the web interface shown in Fig. 4. The dashboard is used to visualize location data by means of a heat map or a cluster map. These data can be filtered using a date range and some other predefined visitors' parameters.

Tourism stakeholders can make used of the information that has been gathered and processed in order to generate knowledge about the mobility of visitors within the destination. For instance, these data could be used to find out the most meaningful points of interest of a certain destination or to generate visitor profiles according to their traveling paths. All these conclusions can affect the promotion policies of the destination itself, improving the competitiveness of the territory and the visitors' satisfaction.

4.4 An Example of a Tourism Mobile App Developed with the ICT Infrastructure

The described infrastructure has been used to create a mobile application called "33 secrets of Donostia". This mobile app provides visitors on the move with information according to their context (i.e. location and date and time ranges). The information is related to different not very well known cultural heritage issues

(secrets) about Donostia, which is a city located in the Basque Country (north of Spain).

In order to get all the secrets, the visitor has to move around the city and find the places (virtual fences) that have been created using the context-aware platform. When the visitor is inside one of these fences, new information is received in the mobile device and it vibrates showing a notification. Then, the visitor can access the contents and discover the secret using the application. This app promotes de mobility of visitors and tries to engage them to discover all of the secrets. The mobile application is available for download on Google Play (it3LAB 2013c). The app has been entirely designed by tourism experts with no programming skills thanks to the developed ICT infrastructure.

5 Conclusions and Implications

Today's world is highly technology-mediated. All facets of our live and all industries have been importantly impacted by recent technology development, including the remarkable mobile technology evolution. This is also true for the travel and tourism industries.

This remarkable technology development, together with the fast adoption of mobile technology by visitors represented by smartphones and their apps are also changing the whole panorama in the tourism sector. On the one hand, mobile technology enables visitors to consume highly personalized information at any time and place. On the other hand, new technology infrastructures allow tourism stakeholders to easily create technology-based services as well as to have the means and mechanisms to access and create data that will provide a new insight about how visitors consume a destination. This opens new opportunities not only for destination management, but also, for the development of tourism and innovation policies, as well as for designing new information-intensive products, within the vision of constructing the so-called Smart Destination.

Thus, this work represents a first step within a larger research work towards defining the concept of Smart Destination. Its conception is originally based on the technological infrastructure provided by the Smart City and also, on the rapid proliferation of mobile devices by travellers and visitors. The paper presents a cloud-based infrastructure and emphasizes on the usage of technologies in order to improve the efficiency and competitiveness of the travel and tourism industries and destinations. The use of the mobile services that can be produced by means of this new infrastructure will also boost the cultural and urban development of the destination, this way enriching the overall tourist experience at the destination.

ICTs development and deployment strategies at a tourism destination need to promote the active role of tourism stakeholders, as they have the knowledge about visitor needs and requirements. Hence, the ICT infrastructure has not only been designed to provide advanced mobile services in intelligent mobile environments. More importantly, it has also been designed to empower tourism stakeholders in

collaboration with ICT companies in order to promote the creation of innovation ecosystems that trigger the transformation of the destination into what has been defined earlier like a Smart Destination. In addition, the use of these applications by visitors, generate vast amounts of data that can be analysed to provide a new insight to stakeholders about destination consumption.

These kinds of infrastructures can democratize the creation of new applications and services for the travel and tourism industries, improving the competitiveness of destinations, which is the key to transform the tourism sector and to start a new exploratory era of Smart Destinations.

Acknowledgements This research has been performed in the framework of the *Etortek Strategic Research Programme 2011–2013—SmarTUR: El turismo en destinos inteligentes* of the Basque Government, coordinated by CICtourGUNE. We would like to express our gratitude to all the public states and organisations that have made the development of this research activity possible.

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Smart Tourism Destinations Enhancing Tourism Experience Through Personalisation of Services

Dimitrios Buhalis and Aditya Amaranggana

Abstract Bringing smartness into tourism destinations requires dynamically interconnecting stakeholders through a technological platform on which information relating to tourism activities could be exchanged instantly. Instant information exchange has also created extremely large data sets known as Big Data that may be analysed computationally to reveal patterns and trends. Smart Tourism Destinations should make an optimal use of Big Data by offering right services that suit users' preference at the right time. In relation thereto, this paper aims at contributing to the understanding on how Smart Tourism Destinations could potentially enhance tourism experience through offering products/services that are more personalised to meet each of visitor's unique needs and preferences. Understanding the needs, wishes and desires of travellers becomes increasingly critical for the competitiveness of destinations. Therefore, the findings in the present research are insightful for number of tourism destinations.

Keywords Smart tourism destinations • Personalisation • Tourism experience

1 Introduction

It is said to be a challenging task to manage and market a destination due to variety of stakeholders involved in the process (Buhalis 2000). Destination should form strategy that covers the entire range of tourism activity, from visitation to environmental problem as well as seasonality problems and sensitivity to local culture (Evans et al. 1995). These factors are among many other aspects that need to be managed properly as tourism becoming an increasingly competitive marketplace which leave only the best-managed destinations to prosper (Buhalis 2000). Ritchie and Crouch (1993 as cited in Buhalis 2000) argued that competitiveness is a function of wide range of elements including numbers of factor in internal and external environment which need to be combined and synergise to determine the attractiveness of a destination.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_28

Bringing smartness into tourism destinations requires dynamically interconnecting stakeholders through a technological platform on which information relating to tourism activities could be exchanged instantly. One of the challenges in tourism sector is the presence of many stakeholders, which have different interest between one another. In Smart Tourism Destination, tourism service providers could make use of centralised information platform in order to make better business decision.

Instant information exchange has also created extremely large data sets known as Big Data that may be analysed to reveal patterns and trends. Smart Tourism Destinations should make an optimal use of Big Data by offering right services that suit users' preference at the right time. With availability of massive tourists' data, destinations are expected to offer personalised services to each different type of tourists in order to exceed their prior expectation and subsequently enhance their tourism experience. Presumably, such experience would enrich how tourists value their trip.

The significance of this research reflects on industry as well as academic. Starting from the industry perspective, it is important to draw attention to the gaining ground of smartness development, especially within destinations. This growing trend is currently and will exponentially affect the sector in the near future. However, not many publications have covered this issue as most of the literatures are focusing on the development of Smart City. Tourism destinations, and all the related stakeholders, will increasingly have to face number of challenges in regard with the smartness development in order to maintain their competitiveness. By conducting this study, researchers would like to provide a little hint to the industry, on types of personalised application expected by tourists during their time in destination as well as prior to the trip and after the travel takes place. Moreover, this study also captures tourists' perception and their perceived challenges upon Smart Tourism Destination as well as personalised service.

2 Theoretical Background

2.1 The Development of Smart Tourism Destinations

Bringing smartness into tourism destinations meaning that destinations need to interconnect multiple stakeholders through a dynamic platform mediate by ICT in order to support prompt information exchange regarding tourism activities through machine-to-machine learning algorithm which could enhance their decision making process (Buhalis and Amaranggana 2014). Since one of the challenges in tourism sector is the presence of many stakeholders, which have different interest between one another, the smartness approach is then deemed necessary. Zhu et al. (2014) argued that the development of Smart Tourism Destinations benefits tourism industry by providing convenient access to information for both tourism organisations and tourists through integrated and centralised data platform. Smart Tourism Destinations also harnessing the true essence of technology by building framework to facilitate multiple visualisations in a common direction.

To establish true data openness in Smart Tourism Destinations, tourism authorities should ensure that any information generate from every development of new application should be made openly available subject to their commercial and legal agreement without unreasonable additional cost (Buhalis and Amaranggana 2014). Users could use this information to identify problems as well as customised potential solutions to overcome those problems.

It is vital to bear in mind the fact that in regard with ICT system there is no size that could fits all. Local context would trigger different patterns of ICT usage. To this end, destinations should enact bottom-up approaches that are not just based on the deployment of complex technological platforms, but rather on tailoring them to the local needs (Neirotti et al. 2014). For instance, customers have been mentioned as an important knowledge source for innovation (Foss et al. 2011). Thus, smartness emerges when creative people dynamically sharing their knowledge to the system that is well supported by decent learning environment (Buhalis and Amaranggana 2014). Real-time feedback loop is essential in the hospitality sector to give appropriate follow-up while guests are still at the location in order to fix the problem immediately and ward off guests posting unsavoury review online. Centralised operation systems must not only monitor their people but also engage with their human capital. To this end, by using Living Lab methodology, Smart Tourism Destinations could gain insights about customers' actual needs and preferences. Within this approach, active engagement between tourists and tourism service providers are being encouraged in order to continuously offer innovation on destinations' products that best suit users' preference (Schaffers et al. 2011). For Smart Tourism Destinations, the use of Mobile Living Lab is suggested to capture tourists' needs and preferences in real settings. Benefit of applying this approach is the main characteristic of mobile devices that could go on 24/7, which opens up the possibility for users to test the product prototype in its authentic environment and time frame precisely when they use it and give valuable feedback on how it could fit into their valid usage context. Interactive manner among different stakeholders, namely government, companies and researchers is essential in conducting this method (Ståhlbröst et al. 2009).

2.2 Personalisation

Ever since personalisation becomes a gaining ground, number of customer expectations across all industries has significantly increased (InterContinental Hotels Group 2014). Blom and Monk (2003 as cited in Popescu-Zeletin et al. 2003) have defined personalisation as a process that escalates the content of information to its relevance for individual. Essentially personalisation is the process of collecting and utilising personal information about the needs and preferences of customers to create offers and information, which perfectly fits the needs of the customers (Frank and Harnisch 2014 as cited in Yang et al. 2005). Within the service industry, personalisation refers to a state where consumers increasingly expect service that

moulds to them. As a consequence, tourism service providers are starting to adapt their approach to meet this expectation by collecting proper information in order to be able to provide right offer at exactly the right time. The challenge for tourism industry is to ensure employees are armed with related information they need for crucial moments. Using location-based and proximity-awareness system, destination could deliver real-time marketing message in a means that customers in a place where they are most likely interested in the offered deal. The biggest benefit from personalisation as experienced by travellers is an increased comfort level in both emotional and physical, such as getting things just the way they like and the feel of being looked after (InterContinental Hotels Group 2014). In general, different travellers have their own preferences and requirements, which range from the preferred hotel location to type of meals the want to have during their trip (Michopoulou and Buhalis 2013). Tourism industry should also note that different type of devices used by travellers also predispose their decision making process. Having multiple screens has fundamentally altered guests' consumption experience by which tourism service providers could create additional simultaneous touch points to offer their products and services.

A study conducted by InterContinental Hotels Group (2014) found out that travellers from emerging countries (e.g., China and Russia) put higher expectations for personalised services compare to travellers from developed markets (e.g., UK and US). In general, service personalisation in hospitality industry is trying to (1) encourage speedier check-in system and saving time on booking process; (2) deliver better content delivery; and (3) form better guest experience through in-room distinctive services (i.e., auto-brewed coffee pot and television set on a specific channel upon guests arrival) as well as giving the ability for guests to control their room (i.e., ability to lock the room and room temperature through guests' smartphone) (InterContinental Hotels Group 2014).

Furthermore, from the customer point of view, personalisation of information assist them in the decision making process by showing only relevant information since decision making can be ineffective due to a large volume of data that becomes obsolete very quickly. Information about the user can be obtained from a history of previous sessions (implicit method) or directly through survey (explicit method) which gathered from the user input to the system, where they might be presented with simple questions such as their interest, demographic data and duration of the trip and uses this feedback to build a user profile and make recommendations accordingly (Losada et al. 2013 as cited in Mahmood and Salam 2012).

Profiling customer with Big Data assistance is beneficial as it provides better services. However, it also possesses a significant thread to users' privacy (Habegger et al. 2014). A study performed by Chatfield et al. (2005) had shown gaining concern over users' privacy; users want control over who has access to their private data and feedback on the use of their data. Hence, tourism service providers must facilitate users with proper information so they could understand the importance of sharing information and enable them to weigh risks with potential benefits. Other challenge is the risk of 'closing down' discovery of new things due to the fact that it recommends things that they already know they like (InterContinental Hotels

Group 2014). Furthermore, overdoing personalised services or making errors in judgement on the targeting could cause guests to opt-out from the offer as this trust-based bond must not be abused and marketing must be consistent, gentle and wholly appropriate pull for the guests to avoid uncanny factors while bringing out enchanted promise of ICT and enhancing hospitality.

2.3 Tourism Experience

Since tourism experiences are the core product in tourism industry with direct impact on tourist's satisfaction and revisit intention, it is a critical issue for Destination Management Organisations (DMOs) to examine the main construct of tourism experience and how to enhance a positive tourism experience. In tourism, the value of the experience is not only created by the service providers and its customers but is embedded in a larger social and physical context of what is being experienced (Hoarau and Kline 2014). Experiences can also be formed within any part of a service process which are not controlled by the company (Juttner et al. 2013) considering the fact that experience develops throughout all contact points during the interactive process (Mascarenhas et al. 2006). Furthermore, travel could be seen as a sense-making process in which tourists are able to enhance their experience by exploring local culture embedded in the visited place (Jennings and Weiler 2004). The places visited and cultures experienced are connected to tourists through stakeholders, including tourists, service providers, governments as well as local communities. As such, stakeholders mediate tourists' travel experience through taking part in the tourism context to reflect the experience as a whole (Wang et al. 2012). Hence, destinations marketers need to put focus on the entire tourism experience instead of examine only the core service suppliers (Zouni and Kouremenos 2008). The fact that tourism experiences are multidimensional in nature, various involvements along the trip (including before, during and after) could also affect overall tourism experiences (Stickdorn and Zehrer 2009). Pine and Gilmore (1999) indicates that experiences exist only in the mind of an individual who has been affianced in various level of engagement (i.e., emotional, physical, intellectual and spiritual) which makes experience is inherently personal (Jennings et al. 2009).

Moreover, Kim and Ritchie (2013) suggested that visitors are more likely to gain a memorable experience on the trip when they could immerse in activities within destination. The increasing proliferation of ICTs has allowed tourism companies to ameliorate their relationship with the customer by offering distinctive service mediate by ICTs (Tussyadiah and Fesenmaier 2007). As argued by McCarthy and Wright (2004), ICTs could function as mediator of experience as well as the core experience itself. Through their engagement with ICTs, tourists could gain richer experience within their actual physical setting (Neuhofer et al. 2013).

3 Methodology

In order to analyse tourism experience as perceived by tourists, individual in-depth interview followed by content analysis were chosen to allow researcher delve deeply into personal matter (DiCicco-Bloom and Crabtree 2006). It is stated by Jordan and Gibson (2004) that researching humans' experiences is achieved most conveniently by using interview considering the possibility to seek clarification and elaborations as special features from this method (Finn et al. 2000). Furthermore, semi-structured personal interview was chosen as a tool for this research because the purpose of the study is to analyse participant's perceptions upon several matters and this method enabled researcher to gather descriptive data with an opportunity to respond to open-ended questions. For these interviews a standard set of open-ended questions were prepared in order to achieve uniformity in following the research intentions while the questions sometimes adapted and changed emphasis during the course of the interview as the investigators learn more about the subject (Patton and Cochran 2002). Using a set of semi-structured interview questions, 13 interviews with technology savvy tourists age 20–25 were conducted to capture the voice of the visitor about the types of experiences they are seeking, their opinion upon the development of Smart Tourism Destinations as well as personalised services and type of service they expected to get from such development. All were taped and transcribed word by word to serve as tangible sources for data analytics. Respondents were chosen to represent range of nationalities and different characteristic (i.e., age, gender, profession).

4 Findings and Analysis

Respondents were asked about several factors that positively affect their tourism experience on their last trip as well as expected experience for the upcoming trip to reflect what visitors are actually seek during their travel. Answers were varies from typical services given by Tourism Service Providers in destinations to specific context such as weather, access to proper broadband connection and authenticity of localness. As comparison, researcher also asked their negative experience during their last trip and things they would like to avoid on their forthcoming trip. In order to enhance tourism experience, destinations have to address factors that positively affect tourism experience while also help tourists to avoid negative tourism experience that likely to occur. During the interview, questions on typical use of ICT services during travel were also asked (i.e., Seeking for information, sharing, booking, etc.). Results were combined to see ICT potential in addressing factors that not yet covered by current ICT usage in order to enhance tourism experience. Responses were summarised as depicted in Table 1.

To date, tourists mainly use their ICT devices to seek for information to help them form decisions in regard with their trip. However, there are few aspects that

Table 1 Current state of typical ICT usage during travel

Factors affecting positive experience	ICT usage to address positive experience
Proper broadband connection	Not applicable
Localness/authenticity from destination (culture, meals, lifestyle)	Seeking for information, share experience
People (local and fellow traveller)	Seeking for information, communication
Weather	Seeking for information
Attraction (architecture, landscape)	Seeking for information, share experience
General services (accommodation, transport, gastronomy)	Seeking for information, booking service, share experience
Tourism activities (adventurous, relaxing)	Seeking for information, booking service, share experience
Factors affecting negative experience	ICT function to avoid negative experience
Problem in navigation	Seeking for information, communication
Security concern	Not yet addressed
Less informed (on opening hours, prices)	Seeking for information
Waiting time (delay, long queue)	Not yet addressed
Lost luggage	Not yet addressed
Service below expectation (rude staff, dirty buses, unclean rooms)	Not yet addressed
Bad broadband connection	Not applicable
Weather	Seeking for information
Language barrier	Seeking for information, communication

influence tourism experience that still has not been addressed properly by current state of ICT use amongst tourists. Smart Tourism Destinations through its service integration and capability to produce real-time information come as one possible solution in answering the gap between current state of ICT use and its possibility to enhance tourism experience.

When asked on what to avoid in the development of Smart Tourism Destinations, 46% of respondent mentioned they have concern in regard with their data privacy, along with several other concerns namely rely too much to technology, less interaction with people, errors in given information, not experiencing destination as it is, difficulties for older people and losing job as tour guide. In 2013, UK's Department of Business, Enterprise and Skills (BIS) has listed 'Trust in data privacy and system integrity' as a barrier to smart city projects (Dowden 2014). There is an opportunity cost to be considered between privacy and efficiency. Thus, clear communication with users on how destination would use and protect their data to benefits them is needed to build trust bond between tourists and destinations.

In the next section, most of the respondent is positively welcoming personalisation of services. However, there were also few concerns regarding personalised services, which fall into several categories namely privacy concern, abusive marketing activity, limiting discovery and security concern. In the case of Smart Tourism Destinations where information can be exchange instantly, respondents have been asked about their willingness on their data being shared between

Tourism Service Providers. Unexpectedly, majority of the respondents had responded with negative reaction within this option as argued that they would lose control over consequences. This finding are in contrast with study performed by Engage Customer (2014) which argued that millennial, which described as the demographic cohort with birth years ranging from the early 1980s to the early 2000s, are happy to share their information. Furthermore, this outcome should be treated as potential obstacle in the development of Smart Tourism Destinations. In the last section, respondents were asked about type of personalised service they expect to be offered to them in Smart Tourism Destinations which covers various involvements along their trip (before, during, after) that arguably affect their overall tourism experience within five destination dimensions.

Unfamiliar destinations and their transport systems can present a forbidding challenge even for more adventurous travellers. These factors combine and create a tension between the desire to explore and the frustrations of getting around. Moreover, respondents also demand the availability of recommender system in the form of trail package, which could assist them in narrowing down decision in regard with the use of transportation inward, within as well as outward. In addition to the recommender system, tourists also attracted to discount and offer, which consider those two among other factors in shaping their final decision. As a form of personalised approach, number of tourists also expects the system to send reminder through their device regarded the service they have booked.

Meanwhile, within accommodation setting, tourists put expectation in receiving personalised service in the form of updated information regarded location, reviews, room type, price as well as information on surrounding events prior to their arrival. Again, content plays an important role in serving this kind of information to potential guests, as they are not expecting to end up with information overload. Tourists are also seeking for personalised welcome message even before their trip equipped with several list on what to do and what to see while in destination. Furthermore, option to secure their preferred room by enabling tourists do perform online booking and check-in are also need to be properly addressed since it will save tourists time while in destination (Table 2).

Smartness approach within gastronomy setting would allow restaurants, pubs as well as cafes in destination to communicate with users' devices through sensors and LBS. The use of dynamic technological platform would allow them to instantly exchange real-time information on users' location and profiling so service providers could offer real-time information upon variety of meals, food ingredients, nutritional data, restaurant general information as well as latest promotions. LBS could alert users on promotional offers in restaurants that are close to them at any given time. Estimated wait times in restaurants are accurately quoted, to the minute, so guests can get a drink in the bar while waiting for their table. This allows tourists to get much more from their travel and helps realise the potential of the destination. In addition, almost every respondent finds that it is necessary for service providers to be aware on customers' special dietary condition in regard with their medical condition as well as religion restriction in order to personalise their service to them. By having access to personal data, service providers would have proper

Table 2 Tourists expectation on personalised services

Dimensions	Phases		
	Before	During	After
Transportation	1. Planning: navigation and information (duration, types of transportation, schedule and fare) 2. Recommender system: trail package and offerings 3. Time savings: booking, check-in	1. Real-time schedule 2. Personalised greetings 3. Personalised meals 4. Suggest alternative 5. Universal card	1. Feedback loop 2. Promotional update 3. Luggage finder
Accommodation	1. Planning: navigation and information (location, reviews, room type, price and surrounding events) 2. Time savings: booking and check-in 3. Personalised welcome message	1. Personalised welcome message 2. Awareness on customer preference 3. Personalised customer service 4. Room control over customer services	1. Feedback 2. Promotional offers 3. Maintaining engagement 4. Post customer service
Gastronomical	Information (special dietary, variety of meals, navigation, food ingredients and restaurant information)	1. Integration service 2. Real-time information: customer awareness and social context	1. Promotion 2. Prolong engagement
Attraction	1. Recommender system 2. Information provider	1. Co-creation through digital maps 2. Real-time information 3. Information on surrounding events	1. Sharing platform 2. Prolong experience 3. News update 4. Recommender system
Ancillaries		1. Navigation 2. General information 3. Instantly exchanging information	

amount of information so they could avoid making their customer feeling uncomfortable by explaining their personal condition while ordering meals. Most of the respondents also find that the presence of recommender system on available attraction is deemed important prior to their trip especially for business traveller who only has limited time in destination.

Personalisation applies not only at the planning stage but also when people reach their destination. During their actual trip in destinations, respondents expectation within transportation settings are ranging from basic personalised greeting by name to more personalised on-board meals that suits their preference, be it due to medical condition as well as personal predilection over meals. Furthermore, intelligent mobility harnesses new technologies to create seamless journeys, where transport is smart and connected, and delays and congestions are a thing of the past. Optimum use of data could tackle congestion and improve tourists' experience by providing

real-time information about where they're going, which particular direction to get on and also the ability to respond (i.e., by suggesting alternatives) to unpredictable events in real-time. Moreover, as tourists these days are probing more simplicity, they demand the use of universal card, which they can use in different countries for different purposes. This would require collaboration among authorities, but also industries, including companies that may usually be in competition. Meanwhile, within accommodation settings, guests could also obtain essential information including maps, city guides, and weather forecasts through their in-room TV, which also allow them to also share their experience with relatives using their social network. This automation also let guests to set the room to their liking (Philips 2014). As guests also expect the service providers to notice their personal preference, hotels need to dynamically keep tracks on guests' predilection upon meals and any other condition. Guests can also request extended services of a bellboy, left luggage service or order a taxi to the airport (Cisco 2008).

Furthermore, destinations could also achieve distinctive service by integrating social aspect within their service. The fact that tourists enjoy sharing their experience in social network through checking-in and posting imageries as well as communicating with their network and having desire to meet new people along their trip; should be picked up by destination through enabling them to see who is around them, who is share a common interest in their food or drink selection in order to open up possibility of engage with fellow tourists as well as local people. During the actual visit to tourist attractions, tourists are looking for a more real-time access to information in regard with their preferred attraction. A number of respondents agrees that it would be helpful if destinations could provide real-time information on how long they have to queue for an attraction, and give them alternative nearby attraction if they have to queue for long as well as the case of severe weather condition. Furthermore, none of the respondents have stated that they include ancillaries' service during their planning stage as well as for their post-trip since they consider this as supporting service, but use ancillary services while they are actually in destination. Thus, they are expecting to receive real-time information in regards to navigating function, working hours, as well as access emergency call for hospital. In addition to the emergency service, respondents also expecting a seamless access of information between health care (hospitals) in handling their personal data upon emergency situation so they do not have to deal with forms and other bureaucracy procedures. Another ancillary service that perceived as important is the use of banking service in destinations. Respondents are expecting to receive a secure transaction process during their trip. Language barrier and different use of currency should not be a limitation in delivering a secured transaction within Smart Tourism Destinations (Farah 2012).

After their journey, few respondents are willing to prolong their engagement with destination through subscribing to their news update and promotional offers as long as they find it relevant to their condition. Destinations could use point reward for guests to redeem later. To ease the practice, destinations should enable the integrated use of users' device that would count the point upon payment being made. Destinations could also extend guests' experience through sending them

relevant imageries, group pictures or typical playlist during the time that could relive their prior experience. Service providers could activate an all-seeing network of video cameras that are supposed to capture tourist moments. This is a modest and slightly frivolous example of executing internet-of-things in destinations. Meanwhile, a value-added service on a post-trip phase within the transportation setting (i.e., luggage finder facility at the airport) is also valued by tourists. Airline could put RFID tag on the luggage during check-in in order to make it easier to locate the luggage after the plane lands in destination.

5 Conclusion and Limitations

Applying smartness concepts within destinations is deemed necessary to potentially enhance tourism experience through advance feedback loop, enhanced access to real-time information and advance customer service through Internet of Things to address factors that potentially shape negative experience (See Table 1) namely lost luggage, security concern, delay and long queue as well as services that are below expectation (i.e., rude staff, unclean rooms). This study also discovered number of personalised services expected by tourists to be offered within Smart Tourism Destinations in order to enhance their tourism experience which characterised as (1) Before Trip: To support planning phase by giving all the related real-time information based on user profiling in order to make a more informed decision; (2) During Trip: Enhanced access to real-time information to assist tourists in exploring the destination, direct personalised service as well as real-time feedback loop; and (3) After Trip: Prolonged engagement to relive experience as well as decent feedback system which allows tourist to review their holistic tourism experience.

Finally, Smart Tourism Destinations are essential on offering personalised service to their tourists by considering several aspects namely access into real-time information to collect users' data, instant feedback loop to help reveal users' opinion upon offered service, dynamic platform which enabling different stakeholders exchanging data to promote service integration; and ability to precisely predict what visitor wants through historical data (pattern analysis) to formulate distinctive services and dynamic recommender system.

Having revealed number of potential insights from the development of Smart Tourism Destinations, it is also noteworthy to mention that this study has limitations to notice as it was limited only by gathering response from 13 tourists within the same range of age (20–25). Thus, findings of the study were, therefore, indicative rather than conclusive, as it cannot capture perceptions from other type of visitors, namely technology illiterate and disabled person. As Smart Tourism Destinations have the potential to become enabling environment by empowering the disabled individual through a procedure that automatically adapts the devices to the personal needs of the user, it is then necessary to seek their opinion and expectation on such development.

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Conceptualising Smart Tourism Destination Dimensions

Kim Boes, Dimitrios Buhalis, and Alessandro Inversini

Abstract The term 'smart' represents a marketing word for all things that are embedded or enhanced by technology. One smart concept, which has gained momentum in recent years, is Smart City. It mainly focuses on how to increase the quality of life of citizens by using Information and Communication Technologies (ICT). This paper aims to explore which dimensions except technology are critical for the development of a Smart City and a Smart Tourism Destination. Following a multiple case study approach, this paper develops a framework for smartness in cities and tourism destinations. This exploratory research argues that leadership, innovation, and social capital supported by human capital are the fundamental constructs of smartness. Technology applications and ICTs are enablers, which support the core constructs of smart destinations. Results open the ground for discussing how to transpose 'smartness' to tourism and destination levels.

Keywords Smart city • ICT • Smart tourism destinations • Technology

1 Introduction

Over the last few decades the development of Information and Communication Technologies (ICT) introduced new technologies such as the Internet, Social Media, NFC, Augmented Reality, Ubiquitous Computing, and Machine to Machine (Gartner 2014). Recently, technologies such as Cloud Computing, the Internet of Things, and their application to complex logistic problems within cities, triggered a 'new' concept, in the public, private and academic sector alike (Kitchin 2013; Su et al. 2011). Smart City as a concept strategically introduces ICTs within an urban area to incorporate urban processes in contemplation of enhancing the competitiveness of the city (Caragliu et al. 2011) while simultaneously enhancing the quality of life for its citizens (El Segundo 2014). The concept especially gained

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_29

popularity within the policy area and a large and growing body of literature has been published (e.g. Caragliu et al. 2011; Cocchia 2014; Nam and Pardo 2011; Su et al. 2011). Literature first and foremost, discusses the importance of the implementation of ICT for the successful development of a Smart City (Cosgrave et al. 2013; El Segundo 2014). Still, topics such as innovation, intellectual capital and redesigning internal operations are of importance as well (Cosgrave et al. 2013; Lombardi et al. 2012).

Recently, the notion of Smart Tourism Destinations emerged, expanding from the Smart City concept (Zhu et al. 2014). To date there is little research conducted in the field of Smart Tourism Destinations, where researchers essentially focussed on the importance of ICTs in destinations (Guo et al. 2014; Wang et al. 2013). This research analyses the fundamental constructs of a Smart City and aims to provide a holistic framework for Smart Tourism Destinations to take full advantage of ICT infrastructures and technological applications in order to supply co-creation of value and experiences for travellers and competitiveness and profit margin for destinations.

2 Literature Review

2.1 Smart Cities

Nowadays, a growing global movement of governments, and public and private agencies are incorporating the 'smartness' concept in contemplation of developing new policies and strategies to target sustainable development and economic growth (Center on Governance 2003). With the growing popularity of Smart Cities, scholars have tried to define this concept. Currently, multiple descriptions are available, which are used in different circumstances all around the world and there is no one-size-fits-all definition (Nam and Pardo 2011). The term 'smart' seems to have become a catch phrase for technology embedded within services and products (Center on Governance 2003) and often ICTs are positioned at the actual core of the Smart City concept (Nam and Pardo 2011; Su et al. 2011). Still, ICTs have long been linked to economic growth and ever since the development of computers people have expressed the importance of technology for economics (Avgerou 2003; Porter and Millar 1985).

Therefore, Caragliu et al. (2011) argue that ICTs are not the sole success factor for Smart Cities and issues such as innovation, creativity, human capital, and being able to signify the attractiveness of products and services should equality be included (Center on Governance 2003). Nam and Pardo (2011) emphasise the importance of a knowledge workforce, collaborative spaces, innovation, and social capital. Also Lombardi et al. (2012) stress the significance of human and social capital, innovation, and relationships and inter-connections that can be supported via a triple-helix model. Within this topic of Smart Cities, Cohen (2011)

conceptualised the Smart City Wheel, which defines six smartness dimensions important for the development of a Smart City including (1) Smart Governance, (2) Smart Environment, (3) Smart Mobility, (4) Smart Economy, (5) Smart People, and (6) Smart Living. Still, these dimensions may only be seen as outcomes when the fundamental constructs of a Smart City are in place. The underlying construct of the Smart City Wheel is therefore built on theories of regional competitiveness, social and human capital, ICT, infrastructures, and economics (Lombardi et al. 2012). Consequently, Caragliu et al. (2011, p.70) claimed that cities can be defined as smart "when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance". Overall, a Smart City can be perceived as an "organic whole" and as a linked system where the people, visitors and citizens alike, are the most important aspect (Kanter and Litow 2009).

Still, the Smart City concept does not stand on its own and covers a variety of industries, including the tourism industry (Guo et al. 2014). Even though the main purpose of a Smart City is to increase the quality of life for its citizens, this research points out the need to focus on tourism as, in most of the cases, it is a source of income for many European cities (Taaffe 2014).

2.2 Smart Tourism Destinations

Tourism destinations are known to be amalgams of touristic products and services (Buhalis 2000) and they are perceived as complex systems which are difficult to manage (Fyall 2011). The interdependence of a high variety of stakeholders and industries complicates management while at the same time it is causing fragmentation within the control and development of the tourism destination. Besides, different values and cultures, and the interrelated impacts on the local population all make for a complex planning system within tourism destinations (Jamal and Jamrozy 2006). Initially, a tourism destination is structured with a supply and a demand side where the success of the destination is initiated by the development of the critical resources known as the six A's (attractions, accessibility, amenities, available packages, activities, ancillary services). These A's are amalgamated in contemplation of adding value to the touristic experience while simultaneously increasing the profit and benefits for the destination (Buhalis 2000).

To ensure the success of a tourism destination Ritchie and Crouch (2005) stress the importance of human resources and innovation in combination with cooperation and collaboration on a local and regional level. Similar, Prats et al. (2008) emphasise the importance of innovation while including the local community within the innovation process. An environment with high quality relationships is of utmost importance for knowledge development and therefore tourism entrepreneurs should harmonise their objectives to enhance the tourism experience (Murphy 1997). Cooperation is significant, still leadership conducted in a collective and network

manner is essential (Zehrer et al. 2014). Over the last two decades more information has become available on interdisciplinary integration, structural innovation, partnerships, and collaboration in order to successfully manage destinations (Jamal and Jamrozy 2006). Still, greater attention is required to their implementation in tourism destinations (Jamal and Jamrozy 2006). Cohen (2011) argues that especially the previous mentioned concepts are perceived as the cornerstones of smartness, which are enabled and supported via the integration of ICTs throughout the Smart City.

Up until now literature regarding Smart Tourism Destinations argues that such tourism destinations are incorporating ICTs within the development and production of tourism processes (Wang et al. 2013). Consequently, Smart Tourism Destinations can be perceived as places utilising the available technological tools and techniques to enable demand and supply to co-create value, pleasure, and experiences for the tourist and wealth, profit, and benefits for the organisations and the destination. Still, research conducted on the smartness of tourism destinations primarily focuses on the implementation of technology (Guo et al. 2014; Wang et al. 2013; Zhu et al. 2014). Only the theoretical paper of Buhalis and Amaranggana (2014) has touched the notion of building Smart Tourism Destinations as a generic framework of inherited concepts that incorporate competitiveness, sustainability, and inclusiveness bases on the concept of Smart Cities. Hence, this paper tackles the 'smartness' concept and aims to provide a holistic framework for Smart Tourism Destinations.

3 Methodology

In order to explore the factors influencing the smartness of a Smart Tourism Destinations, this paper has been conceived with an exploratory research nature based on case studies. Case studies are here utilised to identify which factors contribute to the development of a Smart City and Smart Tourism Destination. The case study methodology is often implemented when research is still in its early, formative stage (Benbasat et al. 1987). The Smart City field of research is particularly multidisciplinary and even though scholars have focused on this topic, this field is still rather young. In addition, this area of research is typically characterised by the constant change in innovation and technology. Hence, the case study methodology enables to gain knowledge, and to explore how three established Smart Cities develop their smartness. This study conducts a multiple-case study research as it allows for cross-case analysis and a more general overview of the research results (Bonoma 1985).

To date, there are different rankings available for Smart Cities. This paper uses first the "Mapping Smart Cities in the EU" European Parliament study, which conducted an in-depth analysis of the EU28 cities with at least 100,000 residents on their Smart City initiatives. The selected Smart Cities include Barcelona, Amsterdam, and Helsinki. Particularly, those cities have been selected as the cities yielding the most innovative Smart City solutions (European Parliament 2014).

Table 1 Sources for case studies

Smart city	Case study sources
Barcelona	Bakici et al. (2013). A Smart City Initiative: the Case of Barcelona Department of Business Innovation & Skills (2013). Global Innovators: International Case Studies on Smart Cities European Parliament (2014). Mapping Smart Cities in the EU PWC (2014). Barcelona as a Smart City Lessons learned from the evolution of the concept and the influence in the city attractiveness.
Amsterdam	Amsterdam Institute for Advanced Metropolitan Solutions (AMS) (2014) Amsterdam Smart City (2014). Knowledge Centre Baron (2013). "Smartness" from the bottom up a few insights into the Amsterdam Smart City Programme Dameri (2014). Comparing Smart and Digital City: Initiatives and Strategies in Amsterdam and Genoa. Are They Digital and/or Smart European Parliament (2014). Mapping Smart Cities in the EU
Helsinki	ENoLL (2014). Helsinki Living Lab—Forum Virium Helsinki European Parliament (2014). Mapping Smart Cities in the EU Forum Virium Helsinki (2014). Smart City
	Hielkema and Hongisto (2012). Developing the Helsinki Smart City: The Rold of Competitions for Open Data Applications Schaffers et al. (2012). Smart Cities as Innovation Ecosystems Sustained by the Future Internet

Additionally, the sample selection is based on the ranking developed by Boyd Cohen (2014). This syndicates a high variety of global and regional rankings of Smart City components and, also in this ranking, Barcelona, Amsterdam, and Helsinki are located in the top 10 of Smart Cities in Europe.

The case studies presented are based on secondary research of existing government, academic, and Internet sources (see Table 1). For the analysis of these documents, this study conducts a content analysis for the separate case studies. A coding scheme is developed based on the analysis of secondary research on Smart Cities (Caragliu et al. 2011; Cocchia 2014; European Parliament 2014; Lombardi et al. 2012; Nam and Pardo 2011). The collected data has been summarised for the individual documents and subsequently coded using the coding scheme. This is followed by cross-case examination and within-case examination along with literature review to develop coding clusters and to support external validity.

4 Results

The analysis of the case studies indicate that Smart Cities are developed with the utilisation of four fundamental constructs including leadership, entrepreneurship and innovation, social capital, and human capital. The findings of this study imply that these constructs are supported and enabled via the implementation of technology applications and a strong ICT infrastructure.

4.1 Leadership

The findings of the case studies indicate that the leadership styles implemented in the three researched cities differ. Whereas Barcelona is implementing a top-down approach (Bakici et al. 2012) Amsterdam and Helsinki are both applying the bottom-up approach (Baron 2013; Forum Virium Helsinki 2014). For managing the Smart City of Barcelona, the council created the Urban Habitats group, which is situated under the third deputy major of Barcelona. This group has an umbrella function where it incorporates departments previously working independently such as environment, human services, energy, and water. In line with the Urban Habitats, the city also created a Smart City Personal Management Office, which is coordinating all the projects related to the Smart City (Department of Business Innovation Skills 2013). On the contrary, Amsterdam and Helsinki both created platforms based on partnerships between businesses, authorities, research institutions, and residents (AMS 2014; Hielkema and Hongisto 2012). The Amsterdam Smart City partnership, responsible for executing the Smart City project, was initiated by KPN (telecommunications and IT service provider), Liander (grid manager), Amsterdam Economic Board (collaboration between governmental agencies, research institutes, and businesses), Hogeschool Amsterdam (higher educational institution), and the Council of Amsterdam (AMS 2014). The City of Helsinki created the innovation unit Forum Virium Helsinki, which is a subsidiary of the City of Helsinki Group and a cooperation of companies, the City of Helsinki, public sector organisations, and citizens (Forum Virium Helsinki 2014). Even though the City of Helsinki is the owner of Forum Virium Helsinki, it is a diverse cluster including a high variety of different partners and members (Schaffers et al. 2012). Despite the difference in leadership styles, all three cities successfully created a central office (Urban Habitats, Amsterdam Smart City and Forum Virium Helsinki), who act as a go-between for ideas and initiatives, and incorporates all stakeholders to facilitate the coordination of ideas and projects (European Parliament 2014).

4.2 Entrepreneurship and Innovation

At the core of the Smart City notion lays entrepreneurship and innovation which is strongly influenced by the power of ICT (European Parliament 2014) and the promotion of innovation is one of the key objectives of all three cities. One prominent project is the 22@ Barcelona district (PWC 2014), where a variety of companies and institutions collaborate and cooperate on the development of urban innovations. The district functions under a knowledge-city model and focuses on topics such as, economics, mobility, green infrastructures, and inclusiveness where ICTs provide the infostructure for the development of innovations (Bakici et al. 2012). Another example of innovation is the Living Lab in Nieuw-West in Amsterdam where citizens, academics and developers are collaborating on products

and services enhancing the quality of life. Topics of focus within the Living Lab are e.g. new media, co-creative designs, and also tourism (Amsterdam Smart City 2014). The Living Lab of IJburg in Amsterdam is an area where a high variety of green energy and urban planning innovations are being tested (Dameri 2014). Amsterdam is putting great emphasis on the integration of technology on all urban levels. This is enabling a variety of innovations while simultaneously simplifying the collaboration between the various stake- and shareholders (Amsterdam Smart City 2014).

Within the previously mentioned Forum Virium Helsinki, the city is placing innovation at the core of three project areas, of which Smart City is one of them (Forum Virium Helsinki 2014). One of the larger innovation projects of Helsinki is the Mobile Application Cluster. Within this cluster participants have access to open data and are encouraged to take part in various innovation competitions. The openness of the government enables its citizens to gain knowledge about processes and developments through which they simultaneously have an increased awareness of the city. This drives competitiveness within the cluster and results in highly innovative ideas through a competitive community which is simultaneously attracting new firms to the area (Hielkema and Hongisto 2012). Another project is the Helsinki's Living Lab (Arabianranta) where companies, academics, and citizens collaborate in developing innovative solutions. It stimulates innovation in the field of citizen-centric service by implementing a demand and user driven innovation in which open data is used to address the needs of all stakeholders. It is owned by the people living in the area and supported by the Forum Virium Helsinki in terms of the development of digital services (Schaffers et al. 2012). All in all, entrepreneurship and innovation are core constructs of all three Smart Cities analysed, which is for the larger part empowered by the implementation of ICTs (European Parliament 2014).

4.3 Social Capital

The creation of social capital is a fundamental construct of a Smart City (European Parliament 2014) and collaboration and cooperation are at the forefront of this (Caragliu et al. 2011; Lombardi et al. 2012). Barcelona, Amsterdam, and Helsinki are all emphasising the development of collaborative networks (Bakici et al. 2012; Dameri 2014; Forum Virium Helsinki 2014). Barcelona is implementing a triple helix model, incorporating public and private agencies, academics, and residents (Bakici et al. 2012) and promoting this amongst the stakeholders is of paramount importance to the city (PWC 2014). The Smart City Amsterdam is initiating a quadruple helix structure where private and public agencies as well as residents and academic institutions are involved. The city refers to itself as an organic ecosystem (Baron 2013) and is actively supporting the connection and collaboration between its residents, developers, academics and the public (Dameri 2014). The success of the Amsterdam Smart City platform can be found in its participative approach

where collaboration, co-creation, and co-development are of great importance (European Parliament 2014). Social capital and innovation are two intertwined concepts in Helsinki. Within the innovation forum the city is enlisting collaboration as one of its core concepts and competences. The innovation ecosystem and the network of participants is in particular present within the Living Labs and the Mobile Application Clusters (Forum Virium Helsinki 2014). Apart from the obvious collaboration between citizens and developers, Helsinki finds its smartness in particular in the collaborations between citizens, public and private agencies, and academics (Schaffers et al. 2012). Overall, the strategic objective of these projects is to improve the quality of public services based on the input of its residents and obtained via the platforms empowering social capital (European Parliament 2014).

4.4 Human Capital

The innovations that lead to economic growth and the increase of quality of life is underpinned by well-developed human capital (European Parliament 2014) and all three cities perceive their residents as the core of the Smart City strategy (Bakici et al. 2012; Dameri 2014; Hielkema and Hongisto 2012). In contemplation of enhancing the knowledge-based economy, Barcelona aims at developing the educational system within the city (PWC 2014). They created the Smart City Campus located within the 22@ district (Department of Business Innovation Skills 2013) where knowledgeable people have the opportunity of working closely together with academic faculties. Empowered by ICTs and networking companies, entrepreneurs can apply this collective knowledge to generate new business opportunities (Bakici et al. 2012). Only recently, Amsterdam developed the Amsterdam Institute for Advanced Metropolitan Solutions (AMS), which empowers the collaboration between the TU Delft, Wageningen UR (two Dutch universities), MIT, and the independent research group TNO (AMS 2014). Helsinki created the Arabianranta Living Lab which attracts creative people to the area and is becoming a hub for knowledge transfer, currently housing 13,000 students (ENoLL 2014). The success of innovative developments in Helsinki is very much reinforced by the city's human capital (Hielkema and Hongisto 2012). The analysis indicates that people are one of the success factors of becoming a Smart City as the participation of relevant stakeholders and residents is of utmost importance for the development of collaborations, the cross-linking of knowledge and consequently, innovation (European Parliament 2014).

5 Discussion

Nowadays, smartness includes the innovative and transformative changes enabled via ICTs. Still, social factors should be considered as well and therefore it is of significance to understand the socio-technical view of smartness (Nam and Pardo

2011). Evidence from the best practises shows that cities strive to become a Smart City to increase the quality of life for their citizens while simultaneously increasing competitiveness (Caragliu et al. 2011). This is similar to the goal of tourism destinations where the visitor is in the centre of importance (Fyall 2011). Regarding the development of Smart Cities, Cohen (2011) introduced the previously discussed Smart City Wheel where the implementation of these dimensions is enabled via ICTs. Smart Tourism Destinations are amalgamations of touristic products (Buhalis 2000) and initiated out of Smart Cities (Zhu et al. 2014). Therefore, Smart Tourism Destination should be built on top of the constructs of Smart Cities. As with Smart Cities, Smart Tourism Destinations can increase their competitiveness (Ritchie and Crouch 2005) and with the implementation of technologies enhance its tourism experiences (Neuhofer et al. 2012).

Still, in order to imply the constructs of Smart Cities, a city should entail certain endowments that enable this. The analysis of the case studies point out four fundamental components influencing the smartness of a city and these should be explored by destinations that need to enhance their smartness. Figure 1 depicts an overview of the outcomes.

The first component is leadership. The case studies indicate that although there is no common leadership style responsible for the success of Smart Cities it is critical to have strong leadership and determination of authorities to deliver smartness. Whereas the three cities are implementing different leadership styles these differentiations may be explained by cultural differences, where Spain has a hierarchical-society and The Netherlands and Finland a rather decentralised one (The Hofstede Centre 2014). Within the tourism industry, destinations have to cope with the individual interests of the complex stakeholder environment, where competition plays a vital role (Jamal and Jamrozy 2006). Nevertheless, leadership is critical for becoming a Smart Tourism Destination and the willingness and commitment to collaborate is one of the core competences of Smart Cities (European Parliament 2014). This corroborates with the research of Fyall (2011), and Jamal and Jamrozy (2006) who argued that the short-term benefits of individual competition within a tourism destination will have a severe negative effect on the long-term development and sustainability of the tourism destination. Therefore, competition between stakeholders with the same vision should be eliminated (Fyall 2011) as social capital is of utmost importance for the competitiveness of a city and tourism destination (Caragliu et al. 2011; Neuhofer et al. 2012). Instead there should be co-opetition, where there is a combination of collaboration and competition offering greater opportunities (Ritchie and Crouch 2005).

In line with the importance of social capital are entrepreneurship and innovations, which are interrelated factors. The projects and Living Labs integrated within the analysed Smart Cities all aim for innovative developments, Innovations are vital for the competitiveness of a Smart City (Hielkema and Hongisto 2012) as well as to the competitiveness of tourism destinations (Pirnar et al. 2012) and are driven by human capital (Berry and Glaeser 2005). The case studies show that human capital is at the centre of the success of Smart Cities where knowledgeable people co-create on innovations and increase the competitiveness of the city. Kogan (2014, p. 9) suggests: “the true essence of smart comes down to people.” Destinations can

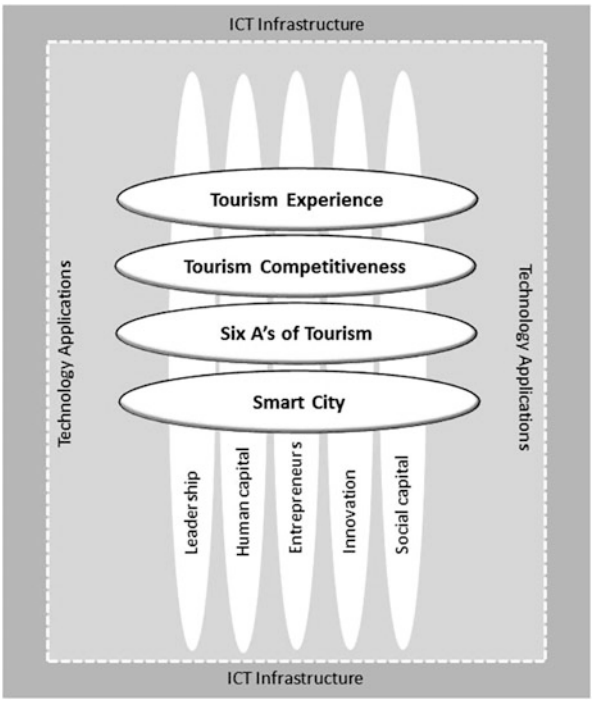

Fig. 1 Framework for the dimensions of the Smart Tourism Destination

therefore develop their smartness by aligning the key dimensions leadership, social capital, innovation and human capital while using ICTs as the infostructure to facilitate for co-creating value/experiences for their visitors and margins/competitiveness for their industry (Ritchie and Crouch 2005). As demonstrated in Fig. 1, by enhancing the smartness of the Smart City dimensions (people, living, mobility, environment, economy and government), destinations create the conditions to support the development of Smart Tourism Destinations where everything is interconnected, co-created and value orientated via the implementation of technology applications and ICT infrastructures such as Cloud Computing and the Internet of Things (Nam and Pardo 2011). Synergies between interest and preference ensure that all stakeholders benefit from the process and that better experiences and quality of life is developed for all stakeholders that participate in the tourism destination.

Overall, the fundamental constructs of a Smart Tourism Destination are first of all human capital, which forms the base for the leadership, entrepreneurship and innovation, and social capital constructs. Subsequently, these are supported and enabled via technology applications and ICT infrastructures.

6 Conclusion

The concept of Smart Cities has gained in popularity over the last couple of years and recently the topic of Smart Tourism Destinations occurred (Buhalis and Amaranggana 2014). Where the focus of Smart Cities is on its citizens, Smart Tourism Destinations emphasise the importance of enhancing the tourist experience enabled via the integration of ICTs (Neuhofer et al. 2012). The integration of ICT within a destination solely will not be sufficient for becoming a Smart Tourism Destination. It is important to understand that Smart Tourism Destinations require the four fundamental concepts explored namely human capital, leadership, social capital, and innovation. Advanced ICT infrastructures such as Cloud Computing and the Internet of Things will provide then the essential infrastructure for developing a Smart Tourism Destination.

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Strategic E-Tourism Alternatives for Destinations

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Abstract Destinations face the already well known problem of a proper positioning in the electronic market place. This includes, besides other issues, mainly the problem of a sustainable business model and booking support. In this paper the Austrian case is described, which is somehow special since Austria was once a leader in e-tourism, both w.r.t. to academic as well to industrial achievements. However, this has changed over the last years. This change was also recognized by major stakeholders, leading to a study to (a) analyse the current situation, and (b) to identify strategic alternatives as future options. These strategic alternatives were based on the results of a status quo analysis of the national and international e-tourism situation, including a website analysis of national and international tourism organisations, interviews with representatives of Austrian organisations and an analysis of IT trends relevant to the tourism industry. The paper describes the results of these analyses, specifies the problem and, finally, presents the identified alternatives. Regarding the latter, the focus is on the description of a so-called "open service platform", which contains means to support cooperation, online distribution, innovation as well as research.

Keywords Strategic options • Destinations • Platform strategy • Service platform

1 Introduction

Austria was a leading destination in the international online tourism. It had early industrial starters in the field, such as Tiscover and other well-known IT companies. Leading conferences such as the ENTER conference, as well as networks of international e-tourism experts (International Federation for Information Technology and Travel & Tourism—IFITT) have been founded in Austria (Buhalis and Law 2008). This position, however, was not maintained due to several reasons not to be discussed in depth here. One issue was—although always underlined—the difficulty to keep up with the speed of innovation, due to the lack of "political" support, as well as missing venture capital. However, this is not only an Austrian

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_30

case. Destinations increasingly have problems to maintain their position and to develop a proper sustainable business model. Initial hopes as well as forecasts that in the Internet service providers will directly access their clients, did not come true. On the contrary, strong middlemen using positive network effects in double sided markets and information asymmetries could occupy a strong and dominating position.

In Austria, as in other countries, the booking market is concentrated on only a few (non-Austrian) players, with a very strong market position (Werthner 2011). Starting with some initial rather informal talks and workshops, this situation was also recognized by central political stakeholders. In consequence, the Austrian Federal Ministry of Science, Research and Economy commissioned a study to identify strategic alternatives as basis for future options, taking into consideration the views of the various Austrian stakeholders. The project "etOpt—eTourism Options Austria" started in November 2012 and concluded in May 2013.

The basis of the work was an analysis of the current situation in Austrian as well as major international destinations. This included an analysis of the tourism websites of all nine Austrian states, several national tourism organisation websites and various Austrian regional websites. Services with regard to e-commerce transaction phases and used technologies were evaluated, with a special focus on booking channels. In addition, some best service practices from each of these tourism websites were identified. Furthermore, interviews with representatives of some of the states' tourism organisations as well as with local tourism organisations were conducted. Finally, innovations and new technologies together with their relevance and benefit for the online tourism sector were assessed. It should also be noted, that all these steps were discussed with e-tourism experts as well as an advisory board, consisting of representatives of each Austrian state's tourism organisations, the Austrian Tourist Office, the Austrian Hotel Association, the Austrian Chamber of Commerce as well as representatives of various Universities and Universities of Applied Sciences.

The structure of the paper is as follows: Section 2 presents the different methodological steps, Sect. 3 highlights some results of the status quo analysis, Sect. 4 sharpens the problem definition, and Sect. 5 presents the different alternatives with a focus on an open service platform.

2 Methodological Phases

The study followed a design approach, starting with a proper analysis and problem description. The scope was to develop an overall strategic framework, sketching conceptual alternatives without implementation. Thus, a proof of concept could and cannot be provided. However, feedback by major stakeholders provided valuable feedback and improved the "system's" framework.

The first part, the status quo analysis, was divided into two packages, each consisting of different methods (see Fig. 1). Step one included a national and

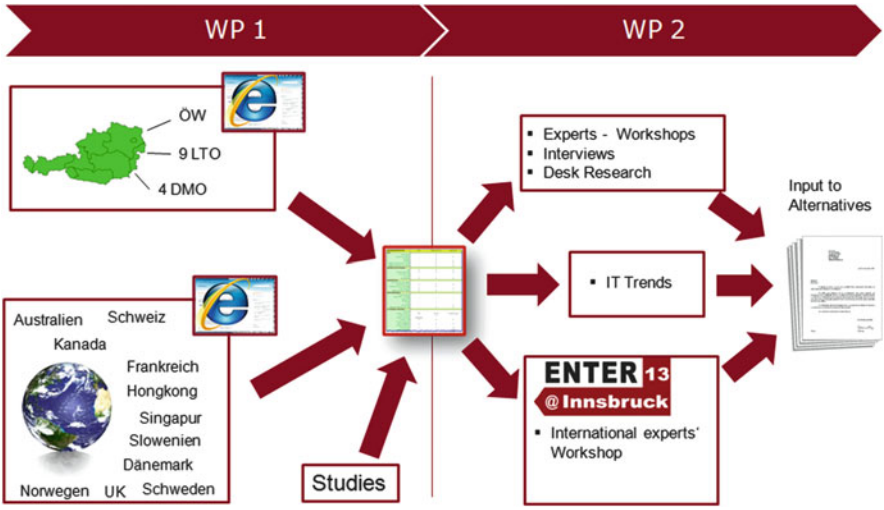

Fig. 1 Steps in the analysis part

international destination website analysis on the basis of a criteria catalogue. This phase also included an investigation of the different booking channels of DMO websites as well as the research results of external academic studies. Both, primary and secondary data were used. The latter were used to develop the design for the primary data collection:

- Primary data
- Analysis of national and international DMO websites
- Interviews with representative of the LTOs, RTOs and NTOs
- Workshop of the Austrian Computer Society on ICT Trends 2020
- Workshop at the ENTER conference 2013 with international experts
- Secondary data (mainly studies)
- Analysis of the national and international e-tourism distribution
- Analysis of external DMO (Destination Management Organisation) websites
- IT trends

Finally, the status quo analysis provided the input for the definition of the alternatives.

For the empirical evaluation, the study included an analysis of national and international DMO websites. The analysis was divided into two steps: first, the creation of a criteria catalogue according to which, services, functionalities and contents were examined, and second, the evaluation of the tourism websites.

The choice of international destinations to be evaluated was based on Buhalis and Wagner (2013); as well as in Gallob (2012); and it also considered best practise DMOs; the choice of the latter based on experts' input. The evaluation looked at 24 destinations (see Table 1), of which 11 were NTOs, 9 RTOs and 4 LTOs. All were examined using the developed criteria catalogue (for details of the criteria

Table 1 Destinations analysed

Local destinations (LTO)	Neusiedler See, Salzburger Sportwelt, Sölden, Zillertal
Regional destinations (RTO)	Burgenland, Carinthia, Lower Austria, Salzburg, Styria, Tyrol, Upper Austria, Vienna, Vorarlberg
National destinations (NTO)	Australia, Austria, Canada, Denmark, France, Norway, Singapore, Slovenia, Sweden, Switzerland, United Kingdom

used see Hörhager (2014)). In the case of a destination providing its website in several languages, national DMO websites were investigated using the German version and international DMO websites, the English version.

To include the views of the tourism stakeholders, personal interviews were conducted. These interviews were based on a general list of questions, which were then amended according to the specific field of work of the interviewee. The representatives of each destination work in different fields within their respective organisations and can be found in Hörhager (2014). The topics of these conversations were based on the first results of the status quo analysis and first drafts of the alternatives. Issues such as online booking, innovation, strengths and weaknesses of the transaction phases and data management were discussed.

With the results of this analysis and the input of an experts workshop at the ENTER 2013 conference as well as feedback from the advisory board meetings, five alternatives were created in the second phase. The problem definition resulting from this status quo analysis (see Sect. 5) showed the importance of cooperation networks and the offer of entire service bundles, as well as products from other tourism segments, rather than standalone products. The definition of the alternatives was also based on the e-commerce transaction phases, i.e., Awareness, Information, Negotiation, Settlement and After-Sales as in Werthner and Klein (1999). All this was accompanied by several discussions with the advisory board. A detailed list of all the identified problems can be found in Hörhager (2014).

3 The Current Situation: Status Quo

3.1 Internet Penetration and Online Channels

In Europe in 2012, 36 % of all holiday sales were made online, in comparison to the U.S. where it was 39 %. Of this online sales share, almost 40 % was handled by Online Travel Agencies (OTA). Only 9 % of the e-tourism online sales were made directly through hotel bookings, tour operators or traditional travel agencies (Tourismlink 2012). Kohl and Partner (2011) reports that in Austria in 2011, 76 % of all hotel booking were made online, including e-mails, online forms, etc. At the same time the OTA market is highly concentrated. In the DACH area (German speaking countries Germany, Austria and Switzerland) two thirds of the

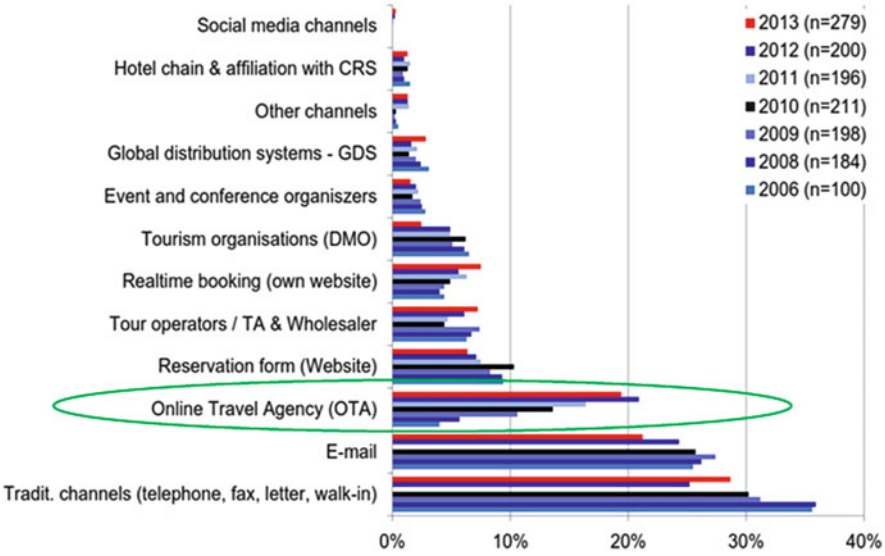

Fig. 2 Booking channels Switzerland 2006–2013 (Schegg 2014); Attention: Market shares in % of all bookings for 2006–2012 and in % of overnights in 2013

bookings via OTAs are handled by only two portals (Booking.com with 35 % and HRS with 28 %). "Hotel.de" takes the third place and has a market share of 13 %. All other platforms only have a small share (above 3 %) of the hotel bookings via OTAs (Schegg and Fux 2012).

In addition, the share of OTAs is rapidly growing. Figure 2, based on the Swiss booking channels from 2006 till 2013, shows that their share is growing much faster in comparison to all other channels. These were more or less constant, some even decreasing. Note that DMOs were not able to keep pace with the OTA trend.

3.2 Website Performance

The Austrian tourism websites achieved fairly good results in many external studies. This is also confirmed in an older study from 2003 (Baggio 2003), where the Austrian NTO page was third out of 16 surveyed destinations behind Switzerland and England.

In two recent studies (Buhalis and Wagner 2013; Gallob 2012) Austria achieved in both cases the fifth place in an EU country ranking. A slightly different result is shown in Duerr et al. (2013) which compared the NTO Websites of Switzerland and Austria. In this case, the Swiss destination website provided, in 8 out of 11 categories, a better service. Only in the three areas "trust", "navigation & usability" and "legal aspects" Austria offers a better service.

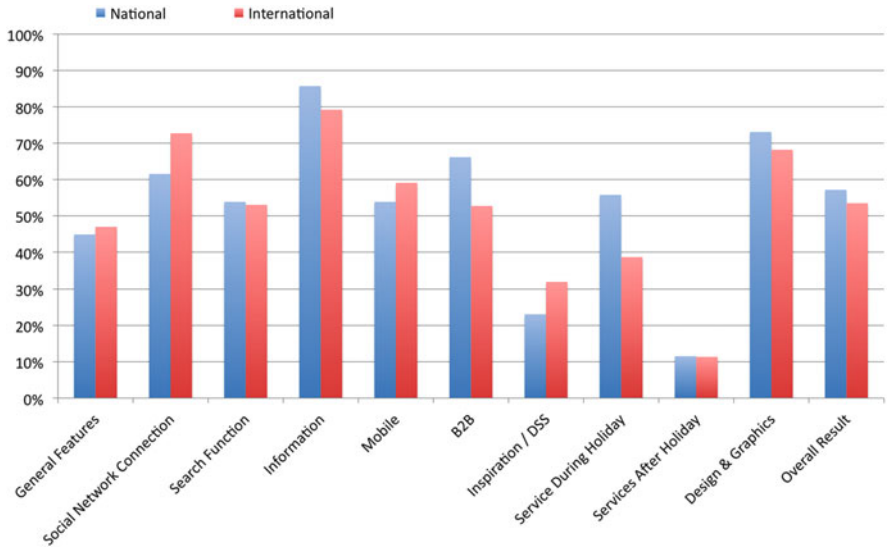

Fig. 3 Comparison of national and international websites (organisations of Table 1)

The project not only used secondary data, but developed also its own website analysis framework. This focused on comparing national and international DMO websites, with a specific focus on services supporting B2B, mobile, post-trip activities and inspirational features. The analysis was based on binary variables. Figure 3 shows that Austrian websites slightly outperform their international competitors.

Special focus was laid on the booking process, not being part of the previous analysis. This is also due to the fact that there are several ways of integrating booking features, which cannot be easily evaluated by simple binary categories. In overall, 20 out of the 24 analysed destinations offer the opportunity of performing bookings, specified by the following process:

- A special web form to specify search parameter
- As result offering a result list with the search query
- A button for booking

An explicit booking process was provided—at the time of the project—only by two NTOs (Norway, Switzerland). All other destinations which provide bookings on their websites, handled this with the help of external partners. None of the national destinations analysed (RTOs and LTOs) had their own booking solution or used a meta search engine. The other tourism organisations analysed used external partners, either by integrating the external service on their own website or explicitly forwarding the customer to the booking engine.

3.3 The View of the Stakeholders

This study also included interviews with several representatives of tourism organisations (in total six persons), showing the following results:

- DMOs see their main job as the provision of information. This is also in accordance with the website analysis.
- They are aware that without an own booking engine, they do not cover the complete tourism life cycle. They knew that they "lose" these data and have no information concerning the buying behaviour of the customer.
- The opinion of the interviewed DMOs on the booking issue varies. Some destinations do not feel responsible for this issue, while for others it is a central aspect. Those working closely with service providers on a local level recognize the problem, in contrast to those who are not directly involved.
- An important issue is the uncertain legal situation. Some DMOs are concerned about the legal consequences, having already encountered problems in the past.
- Nearly all interviewed representatives are sceptical about an Austrian booking solution. A major issue is the fierce competition with the big booking platforms, pointing at the rather high advertising expenditure.
- Finally, the interviews also showed that the DMOs have no revenue model in the digital area.
- In summary, they showed a rather pessimistic view of the future, at the same time, however, they are looking eagerly for joint innovation activities.

4 Problem Definition

A major conclusion of the analysis part was the dominant role of OTAs, related with the fact that DMOs have problems to cover the entire tourist life cycle. The tourist life cycle refers to all phases of a tourist and his/her experience, starting with the "pre-trip" phase, followed by the "on trip/on site" phase and ends with the "after trip" phase. The tourist life cycle can also be divided into the e-commerce transaction phases such as "Awareness", "Information", "Negotiation", "Settlement" and "After-Sales" (Werthner and Klein 1999). This implies not only a loss of revenue but also of data. However, the tourism organisations were aware of this problem and the resulting marketing and strategy disadvantages.

In addition, these organisations have different views concerning the usage of booking engines. In general, one can state that the closer they are to the service providers, the more they see the necessity of a booking solution, and the higher they are in the regional hierarchy, the more they see the legal and political problems. This results in a rather unclear role in the market and understanding of their tasks. This was also observed in the website analysis, showing overall good results, but shortcomings in central transaction phases. The analysis also indicated that e-tourism shows a strong heterogeneity of systems (but this is not only in Austria).

There is a lack of a uniform exchange format for the tourism branch, with all its shortcomings with respect to cooperation. It would be important for DMOs, as they have to work across the various Austrian regions and states.

4.1 "Paradoxical" Spiral

Finally, the analysis showed that the importance of OTAs will continue to grow. At the same time, it is evident that a concentration trend on a small number of OTAs has already begun and that this will also continue. Due to positive network effects in the double-sided market, the already strong platforms will become stronger with every additional input (hotels, customers, reviews, etc.). The more hotels distribute their rooms via the different platforms, the greater the market power of the latter. Owing to the competition and the importance of the OTAs in the booking channels, hotel owners are forced to be present on these platforms. Accommodations are shown in a direct comparison, the products are standardised and usually reduced to rooms and price. Such comparison with only a few parameters eases the cognitive load of customers, with the, for the service provider negative, consequence of lowered prices. In addition, when almost all hotels of a region are present on such a booking platform, the platform may control the booking situation for this region, as it is able to decide in which order the hotels are ranked.

As for OTAs, service providers are in a similar situation with respect to search engines, in most cases Google and its AdWords. The more hotels bid for the same keyword, the hotels outbid each other and consequently increase the respective price. Thus, hotels end up increasing each other's marketing expenditures, while strengthening Google. The more hotels that market their products and website on Google search, the more customers use Google search and the more powerful the search engine Google becomes.

Both activities (OTAs sales and search engine bidding) increase the expenses of the service providers and strengthen the network effects of the platforms. This creates the paradoxical spiral: the expenditures of the service provider for OTA platforms and search engine marketing increases their dependence on the latter, including increased costs. This can be explained by the network effects. The spiral is like a vicious circle. The more effort is made by hotels for selling and marketing their products, the weaker becomes their position with regard to these "central" organisations.

5 Service Platform as Major Option

5.1 Innovation and Platforms

Innovations, also in the tourism market, are often connected with platform strategies. Such platforms offer technologies and services for a broad ecosystem of users and companies (Cusumano 2010a). External innovations create these ecosystems around the platform (Cusumano 2008). The functionalities are provided by partners or competitors, which also use these services at the same time. The platform operator provides the basic functionality and opens the platform to enable external innovation on it. This presents a competitive advantage over so called pure product solutions that have to constantly implement and integrate their own services and innovations.

Platforms have to meet two conditions: first, there must be at least one open technical interface as "a system of use" and second, it has to be easy to be connected. Switching costs and bundling form a strategically important part of platforms by attracting users to their platforms and by offering many different features for one low price and retain users by making it technically difficult to move to another platform (Cusumano 2010b). Obviously, the value of a platform increases with the number of participating companies and/or users.

Tourism destinations would nearly perfectly meet the prerequisites for an industry service platform. They already have the required regional/national ecosystem (users, service providers, complementary services & products, content, advertisers and channel partners) to form a successful platform. There is a kind of a structural equivalence of a Web network/platform strategy and a destination's cooperation strategy. Destinations could use a platform strategy in three different ways: firstly, they could create critical mass and increase their distribution possibilities; secondly, such a strategy would facilitate a faster technological and innovation process due to its openness; thirdly, tourism organisations could also promote the cooperation with other branches. This is especially important, since tourists look for a bundle of comprehensive tourism experiences, not only hotels or individual activities. Finally, such a platform would enable the bundling of know-how, with a closer relationship between research and innovation. One could also imagine that such platforms could provide data for the analysis of consumer behavioural or product development, with a short as well as a long term perspective.

5.2 Open Service Platform

The following alternatives were defined in an iterative way integrating the comments of the advisory board as well as a number of external experts:

1. Keep the status quo
2. Data harmonization
3. Comparison platform
4. Booking platform
5. Open service platform

These alternatives are conceptually defined and cover different problem domains and needs of the Austrian e-tourism industry, with the exception of the first alternative, which reveals the problems of the e-tourism environment and the resulting consequences. However, it also contains suggestions for improvements leading to a modest change of the situation. Alternatives 2–5 build on each other. Hence, certain technical or conceptual structures can be, and indeed have to be, partially integrated across the different alternatives. This means, for example, that the result of alternative 2 (the uniform exchange format) is also necessary for alternatives 3, 4 and 5. Alternatives 3 (comparison platform) and 4 (booking platform) are classically orientated according to the e-commerce transaction phase model, covering the phases "Search" and "Negotiation" (alternative 3), while alternative 4 covers all five transaction phases. Alternative 5 (open service platform) is a new approach and is not structured according to the transaction phase model. However, since this is an open and flexible platform with core functionalities to external service providers that develop add-on services, this alternative may also cover all transaction phases and the touristic life cycle.

The service platform operates and cooperates on three different levels:

- Integrating tourism service providers for a critical mass
- Bundling different tourism offers to packages
- Integrating offers from different branches (health, agriculture, education, etc.)

More generally, it can be seen as an intelligent "service bus" offering open interfaces for market players. These market players have access to both services and content. The platform is open to all players in the tourism area: tourism organisations, service providers, suppliers, operators, industry partners, science and research as well as service consumers. The core functionality and the basic innovations are provided by the platform owner. Add-on services and innovations could be developed by the afore-mentioned tourism players. Thus, the platform constitutes an open and flexible distribution and innovation platform.

The core system includes a uniform data (exchange) format, various interfaces and rules of participation. On the one hand, the system is able to exchange data and services and on the other hand, the system connects software extensions of IT service providers. Customers do not access the platform directly, but use the applications of these partners. In this way, the platform serves as the backbone for creating new services. Basically, this solution works like a tourist market place with open interfaces. In addition to the distribution of tourism services and data, it is a market place ("Austrian Tourism App Store") for further applications. The data management is decentralized and thus, it allows each participant an on-demand availability of the data. Each operator runs its own business according to the

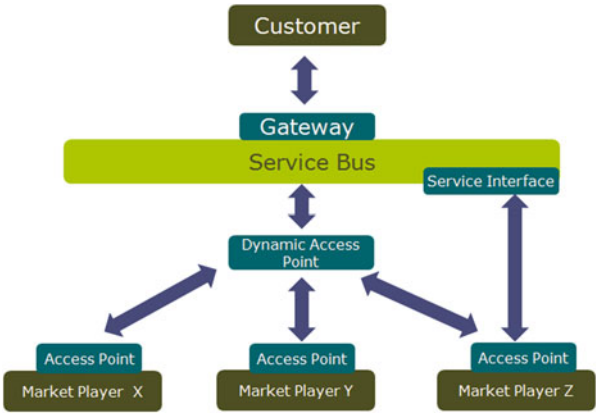

Fig. 4 Open service platform and its components

platform rules. Not only tourism players could benefit from such an approach as it is open to include other areas by cross-domain interfaces (e.g., automotive industry, agriculture, health, education, etc.).

The platform consists of the following components (see also Fig. 4, and for more details Schuster et al. (2013)):

- Service bus: This is an intelligent hub processing outside requests and forwarding them to the appropriate interfaces. It not only has routing functionalities, but also includes business logic and rules. The customer may access services only indirectly through the gateway
- Access point: These are the communication interfaces between market players and service bus. Every market player has its own access point, which includes the market players' data and synchronisation procedures. The service bus handles the data once a request was submitted. The access point owner (service provider or destination organisation) is able to unlock all the data or only parts thereof.
- Dynamic access point: The service bus uses dynamic access points to link different access points to create dynamic packages. The bundling of all possible products happens in real-time in compliance with availability. The dynamic access points are a virtual part of the service bus and are instantiated by the service bus on demand.
- Gateway: This is the interface to the demand side and is visible to the customer. Via the gateway all customer services are available. The core functionality of the gateway is to handle complex search queries. The open service platform offers a gateway with basic functionalities, which can be expanded by the service providers. Any number of gateways (customer applications) can be integrated.
- Service interface: The service interfaces open the platform to the market. Technology partners can connect to the service bus and integrate their external tools and applications via these interfaces. These can be extended by trusted

partners (e.g., IT companies, but also universities or other research & development entities).

As the defined alternatives are conceptual options on a strategic level, no formal evaluation was possible. This could only be done if they would be technically and organisationally implemented. However, as they were iteratively developed and nearly permanently discussed with the board and other experts, one may at least assume their feasibility. One should also note, that their description not only contains technical features, but also cost estimates for both development as well as operation (Schuster et al. 2013).

6 Conclusions

The paper describes strategic e-tourism options for destinations. Although this was done for Austria, it can be assumed that it might also be applicable in other destinations. The design was based on an analysis of the current situation, including national and international examples, review of IT trends as well expert interviews and workshops. The quality and feasibility of the designed alternatives was improved by a permanent feedback with an advisory board.

Overall, the results showed that DMOs and their tourism websites offer good features and services, with the major limitation of not covering the entire tourist life cycle. Not only in Austria the booking market is dominated by few OTAs. In this context, the paper develops a so called "paradoxical spiral"—the more providers spend for OTAs and search engine marketing, the more they become dependent on these platforms.

The developed alternatives are on a strategic level that can only be evaluated if a proof of concept would implemented, which is beyond the scope of the project. Especially the open service platform, following a platform and cooperation innovation strategy, represents a promising answer for destinations. This conclusion also had a positive public response and was even discussed in the Austrian parliament. However, this did not lead yet to concrete steps to implement this solution.

A final note: the probably most important major result of the study was the insight, that the decisive issue would be the development of an innovative ecosystem of research and innovation. Since the speed of development does not decrease, research and innovation are crucial to keep up with it.

Acknowledgements Thanks to the Austrian Federal Ministry of Science, Research and Economy for funding the project etOpt and all the advisory board members as well as interviewed and participating experts for their feedback.

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The Rise of eTourism for Development

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Abstract This paper presents the conceptualization of eTourism For Development (eT4D), an emerging and still underexplored field of research. eT4D can be defined as the use of tourism technologies in developing and emerging contexts to foster socio-economic development. eT4D is a new concept that integrates three distinct disciplines: development studies, tourism studies and information and communication technologies. The paper describes and defines the eT4D field from a theoretical point of view. Additionally the research presents an exploratory case study describing current tourism technology usage in a given developing context that is the one of Rocinha, a slum in Rio de Janeiro. Results confirm the theoretical conceptualization of the domain and the need of investigating the eT4D field also from a practical perspective.

Keywords eTourism 4 development • eToruism • ICT4D

1 Introduction and Problem Statement

Tourism is seen as an economic driving force in many developing countries (Sireyjol 2010) and it is considered as a potential strategic factor for economic growth (Stabler et al. 2009). Nevertheless, there is a lively discussion about the nature of the tourism contribution to social aspects of development. Academic literature acknowledged that tourism has a general positive impact on the development of rural economies (Cánoves et al. 2004). Tourism generates new businesses, improves infrastructures and services, fosters preservation of the natural

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_31

environment/landscapes and helps with economic diversification (Herrero and San Martín 2012; Wang and Pfister 2008). However, tourism has also a controversial effect on natural resources and hosting communities' exploitation (e.g. Deller 2010) by international investors and organizations. Some authors questioned the actual quality of the growth that tourism generates (e.g. Hall 2007) while some others argued that tourism can generate a general exploitation of the working poor by the rich (e.g. Marcouiller 1997; Marcouiller and Green 2000). Therefore academic discussion suggests that there is an on-going debate on the actual contribution of tourism to socio-economic development (Deller 2010), since tourism in developing and emerging countries is often seen as an imperialist and post-colonial phenomenon (Nash 1989; Pastran 2014). Although this can be seen as a paramount issue, two factors are neglected in this analysis.

Firstly, the nature of tourism ecosystem in developing countries, which is populated by a galaxy of (micro) Small and Medium size Enterprises (SMTEs), constituting the "life blood" of travel industry (Thomas et al. 2011). These firms are often seen as promoters of the socio-economic evolution of rural and developing areas (Heeks 2010). This is especially true when SMTEs belong and are operated by members of the local community (e.g. Simpson 2008). A stream of literature, started with the seminal work of Murphy (1985) highlighted the importance of community involvement in tourism to generate and sustain socio-economic development (e.g. Simpson 2008). Community Based Tourism (CBT—Murphy 1985) emphasises the participation at the local level to facilitate (1) infrastructure development, (2) the inclusion of community wishes in tourism planning and development, and (3) to ensure economic returns to the locals (Murphy 1985).

Secondly, the disruptive rise of Information and Communication Technologies (ICTs) and of the internet that redefined the competitive landscape of businesses around the world (Buhalis 2003). The diffusion of ICTs, and especially the internet, is leading the digitalization of the tourism sector (Buhalis 2003), and is also contributing in reaching the Millennium Developments Goals (Heeks and Molla 2009). In fact, ICTs are playing a crucial role both in tourism (with the rise of the so called eTourism—Buhalis 2003) and socio-economic development (with the rise of the so called ICT4D—Unwin 2009).

Moving from the CBT perspective, this paper discusses the pivotal role of tourism technologies, for the development of SMTEs in emerging and developing economies, as a trigger of socio-economic development. It is here argued that an effective use of ICTs by SMTEs in developing contexts can enhance enterprises' visibility and competitiveness and at the same time improve the socio-economic conditions of local communities. This field of research is here summarized with the acronym eT4D (eTourism 4 Development).

In the first part of this paper, the intersection among (1) development studies, (2) tourism studies and (3) ICTs (Fig. 1) is discussed with a theoretical lens. The second part presents an exploratory case study from Rocinha, the largest slum in Brazil. The aim of this paper is to start a reflection about the eT4D field by theoretically exploring the subject and practically validate it. Discussion and conclusion will open the floor for new research in this promising and emerging area of research.

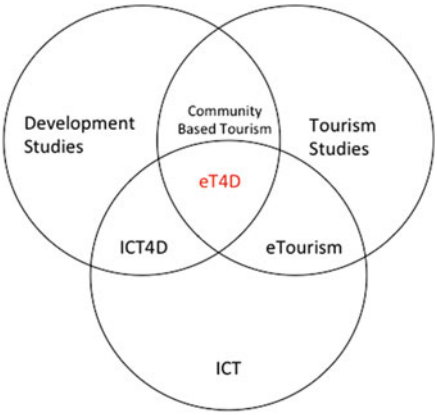

Fig. 1 eT4D conceptualization

2 Mapping the Intersections Among Development, Tourism and ICT

2.1 Tourism Studies and Development Studies

Literature presents an ever-growing corpus of researches about the intersection between development studies and tourism studies (Liburd and Edwards 2010). Academics acknowledge that the imperialistic and post-colonialist (Nash 1989; Pastran 2014) strategy of international tourism players in developing countries is creating a so-called "resort economy" (Akama and Kieti 2007). This is likely to generate an exploitation of the working poor by the rich (VanZyl et al. 2014). Exploitative tourism was historically challenged (Krippendorf 1987) and alternative forms thus arose with a renewed focus on local sustainability and community development. Alternative tourism is an ideologically different form of tourism that is considered preferable to mass, consumer-driven and exploitative travel (Wearing 2001). This is coupled with the rise of alternative markets, which include sustainable tourism, ecotourism, ethical tourism, and volunteer tourism. These are driven by a growing demand for products and services that are more sustainable, pro-poor, and less harmful to local environments and communities (Callanan and Thomas 2005). New tourism products like the ones describe above are classified under the broad umbrella of the so called 'alternative tourism' (Bimonte and Faralla 2012; Brohman 1996). Alternative tourism is often coupled with Community Based Tourism (Murphy 1985; Simpson 2008) that is a bottom up approach to involve community in the creation and execution of tourism products (Sebele 2010). Actually, community participation is often regarded as one of the most essential tools to drive tourism towards a substantial contribution to the local, regional and national development of a country (Lea 2006). When the community fully participates in tourism activities there is sustainability (Woodley 1993), better opportunities for local people to gain benefits from tourism taking place in their locality,

positive local attitudes and the conservation of local resources (Tosun 2006). Participation is emphasised at the local level to facilitate infrastructure development, the inclusion of community wishes in tourism planning and development and to ensure economic returns from the industry (Murphy 1985). Nevertheless, some authors claimed that benefits to the community can be delivered also by tourism initiatives not controlled by the community (e.g. Kontogeorgopoulos 2005).

2.2 Tourism Studies and ICT

Information and communication technologies (ICTs) have revolutionized the structure and organization of the tourism system (Poon 1993; Sheldon 1997). The advent of the internet produced a paradigm shift in the industry thanks to the convergence among informatics, communication, and multimedia (Buhalis 2003). This provided both the demand and the supply sides with new channels through which to empower their communication processes while reducing search and distribution costs (Buhalis and Law 2008). Technology, and especially the internet became a necessity for tourism operators. ICTs do play a crucial role in managing the ever-increasing amount of information needed to effectively run tourism businesses and are essential for marketing (Buhalis 2003) and selling (Werthner and Klein 1999) tourism products. ICTs have changed the operational and strategic practices for organisations on a global level and altered the competitiveness of enterprises and regions around the world (Buhalis and Law 2008). Modern travellers are more and more exigent (Buhalis and Law 2008) and look for personalized experiences. Thanks to the rise of alternative tourism (e.g. Weaver 1995) travellers are reaching peripheral areas of tourism destinations (Scheyvens 2002). However; the access to these peripheral areas is often problematic both physically and electronically (Nash and Martin 2003; Hall and Page 2014). Actually, as outlined by Minghetti and Buhalis (2009) less developed areas are subject to disparity in technological access, skills, and use, and services. This creates a 'digital divide' among developed and less developed areas (Minghetti and Buhalis 2009) resulting in the risk of becoming invisible for a rising share of the market that increasingly relies on the internet for travel search and purchase (Morrison et al. 1999). Within this scenario, tourism firms (both in developed and less developed contexts) are recognizing the importance of technologies in their field and they acknowledge that the management of their holistic online presence is a prerequisite for success (Inversini et al. 2011). Within SMTEs (Lituchy and Rail 2000), especially in developing countries, SMTEs needs to develop their "virtual size" thus marketing and selling their services to the global markets (Spencer et al. 2012).

2.3 Development and ICT

Traditionally, development has been defined in terms of western-style modernization achieved through economic growth (Redclift 1987). However, the failures experienced in achieving this growth questioned this approach (Seers 1969) and numerous theories about the nature of development have been proposed (e.g. Oppermann 1993). One of the most well-known is Sen's Capability Approach (1999), on which is based the working concept of Human Development used by UNDP (United Nation Development Program).

With the advent of ICTs and the internet, development specialists and practitioners started to reflect on how these tools could support socio-economic development processes. Thus, in the recent years (Unwin 2009; Heeks 2010) a new field of research emerged, that is the one of ICT4D (Information and Communication for Development). As this is a recently born domain of research, academics have been working on different development-related domains, such as agriculture, health, education and political participation (Unwin 2009). The underpinning is that access to digital technology can promote social and economic development (Rega et al. 2013). Although, there is a lack of studies focusing on tourism (VanZyl et al. 2014), an interesting set of works for the present study suggest micro-small and medium size enterprises as unit of analysis (Heeks 2010), in order to understand the role of ICT in development (Kleine and Unwin 2009). Within these studies, ICTs are seen to generate benefits related for example to the interaction between customers and suppliers (Donner and Escobari 2010) or to enhance the labour productivity leading to higher salaries (Esselaar et al. 2006).

3 The Missing Piece: eTourism for Development

The above-presented elements come together in the concept of eTourism 4 Development (eT4D). eT4D conceptualizations moves from three different perspectives:

- The Community Base Tourism perspective (Murphy 1985; Simpson 2008; Sebele 2010) where tourism is driven by the local community with a bottom up approach leading to socio-economic development (Lea 2006)
- The disruptive rise of ICTs and the internet in the field of tourism and its the impact on the marketing (Buhalis 2003) and selling power (Law 2009) of the travel and tourism operators
- The increasing importance of technologies within development studies field (ICT4D—Unwin 2009), which are operating as a paradigm shift also at micro and small firm level (Heeks 2010)

Merging these three perspectives, tourism can disrupt the imperialistic and post colonialist tradition in developing countries (Pastran 2014). That is to say that community based touristic firms can accommodate alternative tourism demand

(Bimonte and Faralla 2012) in developing countries. By using the internet they can market and sell their products online without intermediaries (Law 2009). Within this context, and thanks to the use of technologies, there will be direct participation of the local entrepreneurs in the creation of tourism products. The possibilities given to community based firms in developing contexts by technologies can enhance the economic and social status of entrepreneurs and collaborators thus generating socio-economic development helping in enabling the freedoms people enjoy (Sen 1999).

4 Case Study: Rocinha Accommodations Are on the Map

In order to support the theoretical conceptualization of the eT4D field, this paper presents a case based on Rocinha, the largest slum in Brazil, located in Rio de Janeiro, is here presented. This case study builds also upon the body of knowledge about slum tourism (Davis 2006). Slum tourism can be described as slum tourism guided tourist tours through the poorer quarters in the cities of the global south (Rolfes 2010). Slum tourism is seen as 'negative sightseeing or poverty tourism' (Meschkank 2011) Despite this negative image, slum tourism has been able to emerge and establish itself in several cities of the global south (Dyson 2012) and also in Brazilian favelas (Frisch 2012) like Rocinha. Rocinha is built on a steep hillside overlooking Rio de Janeiro. Compared to other slums, Rocinha has a better developed infrastructure and hundreds of businesses such as banks, medicine stores, bus lines, cable television. In November 2011, a security operation was undertaken where hundreds of police and military patrolled the streets of Rocinha to crackdown on rampant criminality. Since then Rocinha has been classified as 'pacified slum' with the government taking control of the neighbourhood. Recently few Rocinha's entrepreneurs started to respond to the growing tourism demand by creating hostels, hotels and a series of small tourism firms. The case of Rocinha become very popular in the months before the Football World Cup 2014 held in Brazil. Several newspapers (e.g. Freeman 2014) around the world reported the growing demand for tourism accommodation in Rio de Janeiro for the world cup.

5 Case Study Methodology

This case study has been designed to explore the importance of ICTs and the internet to promote and commercialize tourism products in a developing context. Additionally the case study has been designed to shade light on the relevance of the above towards the enhancement of the socio-economic development of the community. Therefore two research questions have been formulated:

Table 1 Technology used by each firm involved in the case study

Firm	Website	Social media	IDS
Hostel Rocinha	alberguehostelrocinha.com	Facebook	worldhostel.com booking.com
Hotel Boa Viagem	hotelboaviagem.com	Facebook	Decolar.com Booking.com
Rocinha Original Tour	rocinhaoriginaltour.com.br	Facebook	Not applicable

RQ1: to what extent Small and Medium Tourism Enterprises are enhancing the socio-economic conditions of local communities?
RQ2: what is the importance of tourism technologies in disadvantaged settings?

In order to investigate these two research questions a series of in depth, semi structured interviews (held in June 2014) have been designed and carried on with owners of local tourism firms in Rocinha. The interviews where structured around the following topics: (1) the use and the role of technologies for SMTEs, (2) skills development, (3) clients typologies, (4) reasons to be a touristic entrepreneurs, (5) the relation between Rocinha and tourism. Currently, a series of tourism business exist in Rocinha: three accommodations, one tour operator, plus a series of restaurants/cafes. Due to the explorative nature of this case study, three tourism firms (two accommodation and one tour operator) have been opportunistically selected, in order to support collect evidences of the relevance of the eT4D topic. Table 1 shows the technology used by each firm.

6 Results

Firm 1 Hostel Rocinha: is a facility with 40 beds, offering accommodation and breakfast. A family of Rocinha's entrepreneurs created the hostel in June 2014. The family has a history of 15 years of experience in selling construction materials within Rocinha and decided to enter the tourism sector because one of the two daughters was passionate about tourism, and already studied to become a touristic guide. The enterprise is a family business managed by the parents and the two daughters, plus two other staff members. The hostel uses local businesses to provide services for its clients, e.g. kitchen and bar products are bought locally. The average stay is 2–3 weeks, and at the moment of the interview (June 2014), 20 tourists were hosted in the facility. Clients come from all other the world, the majority from Europe and North America, they are young, between 18 and 30 years old, and discovered the hostel thanks to hostelworld.com, booking.com or facebook.com.

Firm 2 Hotel Boa Viagem: the hotel was funded in January 2013 and has 120 beds, offering a service of bed and breakfast. The hotel employs 12 people from the community and it is not a family business. The owner was already an entrepreneur, owning a bakery in Rocinha he decided to open the hotel because he wanted to

increase his return of investments taking into consideration all the events about to happen in the city: the Olympics and the World Cup. The hotel uses local resources to offer services to its clients. Tourists stay 1 or 2 weeks on average, they come from all over the world and the majority are from 20 to 40 years old, and discovered the hostel thanks to decolar.com or booking.com.

Firm 3 Rocinha Original Tour: is the first tour operator created by someone from Rocinha with the aim of making the local community benefit from the increasing tourism happening in Rocinha. The entrepreneur saw that tourism was growing in Rocinha, but that local people were not part of it and they were not benefitting from it, and he decided to take action. Although the project idea dates 2007, it is at the beginning of its activity, started in March 2014. His wife and himself are working in the business with a web designer and a friend of his taking care of the commercial side o the enterprise. At the moment, he does not have resources to train and employ other people.

6.1 The Impact of Tourism on Rocinha

The choice of developing tourism enterprises represents a challenge for Rocinha's entrepreneurs as Rocinha Original Tour confirms:

> The choice of tourism was a matter of social justice more than driven by personal motivations. [. . .] I saw that the exploitation of external entities [i.e. travel agencies] was not converted in a social return for the slum, and this made me decide [for tourism] (Rocinha Original Tour).

The impact that tourism is having on Rocinha is both economic and social. From an economic perspective, the creation of these small businesses generated employment of new people (e.g. 12 local people in Hotel Boa Viagem). Furthermore, the two accommodations are using products bought locally in order to offer services to their clients (e.g. breakfast and bar products). Finally, tourists spend their money in the slum, buying for example groceries, and therefore contributing to the economic sustainability of its inhabitants. However, the main impacts reported by the entrepreneurs are related to the relation between tourists, the environment and the local community.

> Clients love it [Rocinha], they post in Facebook that they love it because they feel at home. [. . .] In Rocinha tourists love these things, the culture, the place, our welcoming attitude [. . .] and tourists when arrive here feel welcomed by the local people. [. . .] Here is plenty of human warmth. (Hostel Rocinha)

This exchange between the world of the slum and the external world has two main effects: first tourists coming into the slum, living its daily life and meeting its people are helping changing Rocinha reputation as it is confirmed by the Hotel Boa Viagem.

> I think that this bring more respect for the people. People [tourists and the outside world] can know that here do not live neglected and desperate poor people, but people who work, with good living conditions, living as the others [outside the slum], that here there are not only marginalised people. (Hotel Boa Viagem)

Secondly, tourists, who come from all over the world, gives the possibility to Rocinha inhabitants to get to know other cultures, and therefore to open their horizons, even if they do not have the possibility to travel.

> [Tourism] is good for the local economy, but also because you can meet people from other countries. You, without travelling outside the country, are meeting and knowing a bit of each person [coming], of each place in the world, and this is interesting. (Hostel Rocinha)

6.2 Web Presence and Digital Literacy

All the interviewed firms do have a website, a Facebook page, and the two accommodations are also present Internet Distribution Systems. Both the owners had a clear vision about the relevance of technology and especially the internet. They are the privileged means trough which tourists to get to know the hostel is the internet

> This business could not work without internet. There is no way. Clients would not climb the steps and come until here. Without internet, we would have only one or two guests, but not the majority of them. Without internet the conditions to have this place would not exist. (Hostel Rocinha)

> I think there is no way of doing this job without internet. There is no way, how people would know that this hotel exist? It wouldn't be possible. (Hotel Boa Viagem 2)

Rocinha Original Tour owner highlighted that the web presence is a must to be able to exist, and the purpose of using internet is to find tourists and to make them aware of their mission: create a socio-sustainable tourism initiative in Rocinha.

> Our idea is to use this tools for everything, to reach the tourists, and most of all, to pass along our message, which is a different message, it is a local project for a new kind of tourism, with a new logic which involves the inhabitants, so these tools are going to be essential to be able to pass along our values. (Rocinha Original Tour)

According to the Hostel Rocinha owner, Facebook is the media that converts the most, while she does not feel the website is of any help in this matter. Interestingly owner of Rocinha Original Tour also highlighted that other technologies are relevant to get in touch with customers, e.g. mobile phones.

> Beside Facebook, we use a lot the mobile phone, and we want to start using in the future new tools, such as instagram, youtube. (Rocinha Original Tour)

7 Discussion and Conclusions

This research conceptualizes the field of eT4D through an analysis of the existing literature looking at the intersection among tourism studies, development studies and ICTs. Bottom up CBT firms can enhance their presence and their selling opportunities thanks to the use of ICTs and the internet. This enables CBT entrepreneurs to be 'on the map' and to promote their products without intermediaries. Due to the involvement of the community, tourism entrepreneurs have a direct contact with travellers. Thanks to ICTs usage tourism in developing countries can overcame its post-colonialist and exploitative nature fostering local socio-economic development.

Furthermore, the research presented an exploratory case study, which reports an on-going touristic experience in Rocinha (Rio di Janeiro). The case study supported the eT4D conceptualization by presenting the relevance of ICTs for tourism product marketing and distribution in developing contexts. Additionally the case study shows that the use of ICTs is enabling tourism businesses to have a virtual size (Spencer et al. 2012), that is to say to be visible and bookable online. Thanks to technology, CBT firms in Rocinha have the unprecedented possibility to market and commercialize their products without restrictions. Technologies are here seen as fundamental tool for CBT firms success. Successful CBT tourism initiatives foster socio economic development by employing locals, use community resources and rise the reputation of the destination and wide the horizons of locals.

This study contributes to the body of knowledge about community based tourism, eTourism and ICT4D, by shading light on the intersection among these domains. It gives a theoretical lens to approach the ever-growing technology adoption by micro and small tourism firms in developing countries. It connects the technology usage with the possibility of generating socio-economic development in the given communities. Theoretical and practical evidences show the need of researching in this field. Authors suggest that eT4D should be approached in a twofold way: (1) theoretically, by exploring the interplay among development studies, tourism studies and ICT; and (2) practically, by fostering an effective and professional use of ICTs in these contexts (e.g. by teaching entrepreneurs how to get the best out of different technologies).

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Part V
Intelligence Systems: Mobile, Wearable, and Sensor

The Acceptance of NFC Smart Posters in Tourism

Kim Boes, Larissa Borde, and Roman Egger

Abstract With the introduction of permeating devices, NFC is seen as a technique, which facilitates and enhances short-range connections. Smart posters are a new business invention utilising NFC and are perceived to be very user-friendly, as they provide the user with digitalised information without a significant amount of user interaction. Although research has been conducted in the field of NFC development and the technology's benefits and values, relatively little research has been carried out to understand what lies behind travellers' behavioural intention to use NFC smart posters. Thus, this study explores the various factors influencing consumer acceptance of NFC smart posters by applying the Unified Theory of Acceptance and Use of Technology model. The results indicate that not only Perceived Performance Expectancy and Perceived Quality have a strong positive impact on Behavioural Intention to use NFC smart posters, but Social Influence and Perceived Effort Expectancy also have a positive effect on the acceptance of such posters.

Keywords NFC • Smart posters • UTAUT • Tourism • Technology acceptance

1 Introduction

Today people are able to access information rapidly, anytime and anywhere via ubiquitous computer systems (Garrido et al. 2010). Even though many of these systems have not specifically been developed for the tourism industry they still have a significant impact on tourism as many travellers use these services before, during and after their trip (Guttentag 2010). Mobile technologies are considered as one of the most interesting developments affecting the tourism industry and especially NFC has been

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_32

perceived as the next big technological development that can have a significant impact on both tourism businesses as well as tourism research (Buhalis and Law 2008).

In 2013 the worldwide shipment of NFC enabled mobile phones reached 268.4 million, marking a growth of 123 % from 2012 (iSuppli 2013). This rapid proliferation of NFC enabled phones is driven by the increasing number of NFC readers and rising consumer awareness (iSuppli 2013). Various business scenarios are utilising NFC technology and smart posters, "an object in or on which a readable NFC tag is placed" (NFC Forum 2011, p. 4) are one of these possibilities (Garrido et al. 2010; Mayers et al. 2012; Ok et al. 2010).

As Carlsson et al. (2006) explain, it is obvious that mobile services cannot function without mobile technology. Yet, an interesting symbiosis can be detected between these two: "(i) assume that the technology gets accepted, (ii) the acceptance is supported by the availability of services, but (iii) mobile services may not be accepted despite the availability of technology" (Carlsson et al. 2006, p. 2).

Up until now, research has mainly concentrated on the development of new NFC applications (Borrego-Jaraba et al. 2011; Ok et al. 2010) as well as the benefits and values (NFC Forum 2011; O'Neill et al. 2007; Ok et al. 2011; Sandner et al. 2007). However, the acceptance of NFC smart poster in a touristic context has not been researched yet. Therefore, this paper will strive to answer the following research question: "What are the acceptance determinants of NFC smart posters in tourism?"

2 Literature Review

2.1 NFC Technology

Anokwa et al. (2007) explain that with NFC serving as both a tag and a reader, the technology holds a big advantage over RFID, as with NFC enabled devices, users can not only scan the embedded tags onto augmented objects and receive the information right away, they can also transfer the information. Due to the introduction of permeating devices, NFC is seen as an ideal technology to strengthen short-range connections between two devices (Hardy et al. 2010). With the integration of an NFC tag, NFC technology offers an easy and interactive way to provide information to consumers (Garrido et al. 2010) and compared to other technologies, NFC tags have the advantage of a very fast reading time (Hardy et al. 2010). The most important feature of NFC is the uncomplicated way of transferring data between two devices within close proximity (Anokwa et al. 2007). Yet another advantage is the ability to use a mobile device as storage for a link to information as well as functioning as a NFC reader. No extensive knowledge is needed for the usage of the device, as existing RFID structures are compatible with NFC technology. Additionally, NFC could enhance mobility and minimise effort for the user. One of the future scenarios for the implementation of NFC technology could be the integration of NFC tags in ID-cards, passports,

fingerprints and driver licenses as well as playing a role in the secure exchange of critical data (Ok et al. 2010). Nowadays, NFC applications have already been implemented into several business-to-customer environments such as in digital media trials, payments, e-tickets, location identification, conversion of text to voice, and information query (Chen and Chang 2013). Looking for the technical aspect of NFC, there are three different ways to operate this service: passive tag, where card emulation is used, active tag, where a device is writing or reading a NFC tag, and the peer to peer mode, where two devices are actively communicating with one another (Garrido et al. 2010; NFC Forum 2011).

2.2 NFC Smart Posters

As pointed out in the introduction to this paper, NFC technology is quickly being disseminated within the tourism industry. Nowadays, NFC tags are frequently attached to posters in order to exchange data, such as links, or contact details, subsequently turning them into "smart posters". The integration of such NFC tags into smart posters can be done discreetly since the NFC tags are embedded in the object (Hardy et al. 2010). Smart posters are perceived to be very user-friendly as they provide the user with digitalised information without a significant amount of user interaction (Verdult and Kooman 2011). The concept of combining a physical object with digitised information and service access creates various new opportunities for NFC users and service-providers (Mayers et al. 2012). For service-providers, smart posters enable user-interaction, offer the possibility of dynamically updating content, personalise user information and develop statistical reports. Apart from this, smart posters are low in costs compared to other dynamic displays and are fairly easy to create (NFC Forum 2011).

Up until now, research has mainly focused on the development of NFC applications and the advantages for service-providers. Fischer (2009) emphasizes the advantage of applying NFC technology onto advertisement posters, stating the ease of use for the user, who can simply move a mobile device over the tag embedded in the smart poster and will then be automatically directed to the company's website. Sandner et al. (2007) claim that smart posters could increase the effectiveness of mobile marketing as a whole, since the user is actively asking for information. Advertisements that are tailor-made to the current situation of the user might be perceived as valuable and not seen as intrusive. Thus, tailored and location-based advertising could generate revenue. In tourism research, Borrego-Jaraba et al. (2011) tested the effectiveness of smart posters in the centre of Cordoba. The results yielded positive evaluations by the users who predominantly stressed simplicity of using NFC enabled smart posters. Broll et al. (2007) developed a mobile ticketing smart poster. Even though participants experienced some technical difficulties with their mobile devices, they found the possibility of touching the poster with their mobile phone an innovative and enjoyable communication method.

Although NFC smart posters are seen as the main constituent of this technology (Loke 2006) and hold the potential to significantly boost the acceptance and success of the NFC technology, they hold several draw backs as well. Due to the short-range connection, users have less control over the automatically triggered actions that are inevitably associated with NFC technology. Apart from that, NFC was solely developed for the transaction of small files and, therefore an additional technology has to be used for the transaction of larger files (Verdult and Kooman 2011). So far, this paper has focussed on NFC technology and smart posters. The following section will discuss the technology acceptance model utilised for this study.

2.3 Technology Acceptance Models

Since researchers and developers have a strong interest in optimising design methods based on the evaluation and response to new technologies, the importance of researching technology acceptance has been recognised for a long time (Dillon and Morris 1996). The technology acceptance model (TAM), developed by Davids (1989), was one of the first models to explain technology acceptance by suggesting that perceived ease of use (PEOU) and perceived usefulness (PU) are the two most important components in determining the success of information systems. Nowadays, an extensive number of technology acceptance models exist. In an attempt to develop a framework that consolidates several elements of the current models, Venkatesh et al. (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT), which synthesises the similarities of existing theoretical perspectives and delivers a unified approach to investigating user acceptance. Venkatesh et al. (2003) construct the UTAUT with three direct determinants of the intention to use (Performance Expectancy, Effort Expectancy, and Social Influence) and two direct determinants of usage behaviour (Intention to Use and Facilitating Conditions). The model incorporates fluctuating variables accounting for active influences including organisational context (voluntariness), user experience as well as demographic characteristics (age and gender). The complexity of the model, and the fact that it is able to explain 70 % of the variance in user intention, makes it a powerful instrument in predicting future success of a new technology. Even though the UTAUT is the most comprehensive model in information technology adoption theory, the model needs modification and revision to be able to accommodate different research questions (Min et al. 2008; Venkatesh et al. 2003).

3 Methodology

3.1 Proposed Research Design and Hypotheses

This paper aims to investigate the acceptance of NFC smart posters in the tourism context while using the UTAUT model and focuses on the analysis of statistical research in order to draw conclusions or test hypothesis (Veal 1997). Additionally,

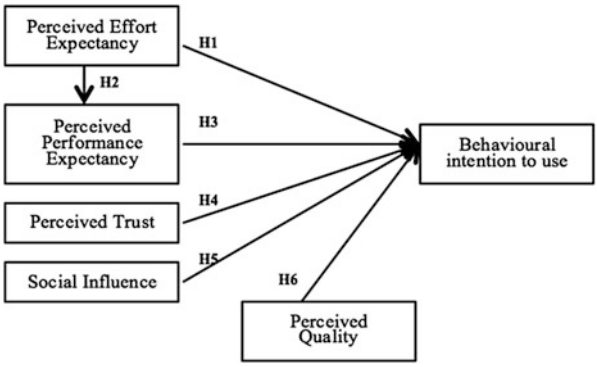

Fig. 1 Proposed UTAUT model

quantitative research focuses on the relationships between variables (Bryman and Bell 2011). As the UTAUT model needs to undergo modification, this research extends the main determinants of UTAUT by adding the following variables: Perceived Trust (PT) and Perceived Quality (PQ). Perceived Trust is added as a determinant since security and privacy issues in combination with the complexity of the interaction process of NFC are factors on which acceptance depends (Curran et al. 2012; Herting and Broll 2008; Mulliner 2009). Perceived Quality is added as both the quality of the information as well as the quality of the system are perceived as factors influencing the usage of technology (Gefen and Devine 2001; Tomitsch et al. 2008). For the scope of this paper information quality and system quality are combined as one determinant factor since previous studies indicated that these two can be loaded under one determinant (Alsaif 2013). The facilitating factors are excluded since the researched NFC technology is available and accessible to all participants within the scope of this study (Oshlyansky et al. 2007). The framework for this study is described in Fig. 1.

Venkatesh et al. (2003) describe Perceived Effort Expectancy according to the constructs; perceived ease of use, ease of use and complexity. PEE is therefore one of the determinants for the acceptance of technologies. Besides, various studies concentrating on the acceptance of mobile technologies concluded that usefulness (PPE) and ease of use (PEE) have a positive effect on the intention to use mobile services (Bader et al. 2012; Chen and Chang 2013). Chen and Chang (2013) also suggest that Perceived Effort Expectancy has a positive effect on Perceived Performance Expectancy. These considerations lead to the following hypotheses:

H1: There is a significant positive relationship between Perceived Effort Expectancy and Behavioural Intention to use NFC smart posters.
H2: There is a significant positive relationship between Perceived Effort Expectancy and Perceived Performance Expectancy.
H3: There is a significant positive relationship between Perceived Performance Expectancy and Behavioural Intention to Use NFC smart posters.

As stated by Chen et al. (2004), the concept of trust amounts to feeling secure about relying on something or someone. Understanding this basic concept, security and privacy issues in combination with the complexity of the interaction processes

are factors on which the future acceptance of NFC technologies will depend (Curran et al. 2012; Herting and Broll 2008; Mulliner 2009). Peng et al. (2011) argue that perceived risk negatively influences the usage of mobile technologies. Consequently, this study suggests a higher degree of trust from users regarding the usage of NFC smart posters leads to a more compelling and stronger intention to use the technology. Thus, the following hypothesis is proposed:

H4: There is a significant positive relationship between Perceived Trust and Behavioural Intention to Use NFC smart posters.

According to Venkatesh et al. (2003), social influence accounts for the probability of the decision to use a certain technology. Social influence is linked to the degree of importance in which an individual decides whether to use a certain technology. Hence, it is argued that individuals will use a technology if they feel this would influence another's perception. Fuchs et al. (2011) conclude from their study that social influence is a driving force behind the usage of mobile technology in tourism. In addition, Chen and Chang (2013) suggest in their paper that the intention to use NFC technologies depends on the degree of influence from people who belong to the social circle of the user. Thus, the following hypothesis is formulated:

H5: There is a significant positive relationship between Social Influence and Behavioural Intention to Use NFC smart posters.

As existing literature shows, satisfaction and loyalty of customers towards a technology is positively influenced by quality content of the information system (Gefen and Devine 2001). The results of Tomitsch et al. (2008) suggest the same relationship, however, focusing more the degree of accessibility, and they claim that user-interface, interaction, experience and acceptance depend on the actual implementation of the technology, i.e. where the interaction takes place. Also Fuchs et al. (2011) depict a strong correlation between hedonic quality and the behavioural intention to use mobile services. Hence, the following hypothesis is proposed:

H6: There is a significant positive relationship between Perceived Quality and Behavioural Intention to use NFC smart posters.

In order to test the validity of the above-described hypotheses, the questions depicted in Table 1 were utilised in the study.

3.2 Data Collection Method

The empirical data was obtained over a course of 6 weeks starting on the 28th of October 2013. During this period, data was collected from international students of the University of Applied Sciences Salzburg. They represent a group of users comparable to tourists, with their intercultural background and can be the predominant users when smart posters are applied in a tourism context. Prior to the

Table 1 Design structure of the questionnaire

Constructs	Statements
Perceived Performance Expectancy (PPE)	PPE1: Using NFC will enhance my stay in Salzburg PPE2: Using NFC will bring convenience to my life PPE3: Using NFC smart posters will increase the quality of my stay PPE4: NFC smart posters are supportive
Perceived Effort Expectancy (PEE)	PEE5: I find NFC easy to use PEE6: I find NCF smart posters easy to use PEE7: My interaction with NFC smart posters is clear and understandable PEE8: Learning to operate with NFC smart posters is easy for me PEE9: It will be easy for me to understand the use of NFC smart posters
Perceived Quality (PQ)	PQ10: I can easily access the relevant knowledge required for NFC mobile phone service PC11: The information given by the NFC smart poster is complete PQ12: The information given by the NFC smart poster is exciting to use PQ13: The information given by the NFC smart poster is fun to use PQ14: There are many practical situations in life, in which a NFC smart poster may be used
Social Influence (SI)	SI15: People around me think that I should use the NFC smart poster SI16: I will discuss the NFC smart poster with my family and friends SI17: I will use the NFC smart poster because I am influenced by my family and friend
Perceived Trust (PT)	PT18: I worry about the impact of using the NFC smart poster PT19: I will feel insecure while using the NFC smart poster PT20: I am afraid that using the NFC smart poster will result in a loss of data
Behavioural Intention (BI)	BI21: I believe I will use the NFC smart poster BI22: I believe that using the NFC smart poster is a good idea BI23: Next time I have access to a NFC smart poster I plan to use it BI24: If the price of an NFC mobile phone is reasonable, I want to buy one

development of the poster, a group of 26 international students were asked about their requests for information when first arriving to Salzburg. Out of this information four main information topics could be extracted including public transport information, general tourism information, vouchers and discounts for tourism activities, and information on events. Before the smart poster was tested the participants received a short introduction on the topic of NFC and were then free to experience the technology and the developed NFC smart poster prototype shown in Fig. 2.

Fig. 2 NFC smart poster prototype

A NFC enabled smartphone was provided if participants were not equipped with a NFC enabled smartphone themselves. Whenever the participant had a NFC enabled smartphone they were encouraged to use this and supported in turning on the NFC technology. The initial research included six constructs as affecting user intention. These constructs were measured with a questionnaire with a 5-point Likert scale (i.e., fully agree $=1$ to fully disagree $=5$). SPSS software was used to analyse and evaluate the data.

4 Results

4.1 Descriptive Statistical Analysis

In total 165 test users participated in the experiment. The sample included more females (65 %) than males (34 %). Due to the focus on international students as test users, the age of participants was between 18 and 37 years and the participants originated from 39 different countries.

4.2 Reliability, Validity and Regression

At the first stage, a reliability test was conducted with SPSS in order to calculate Cronbach's Alpha. These values showed that each factor could be reflected by its

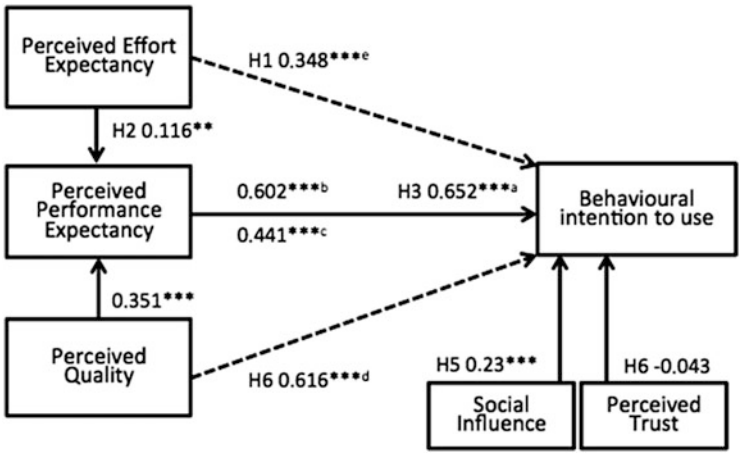

Fig. 3 Test results linear regression test. a: direct correlation between PPE and BI. b: correlation PPE on BI indirectly influenced by PEE. c: correlation PPE on BI indirectly influence by PQ. d: direct correlation between PQ and BI. e: direct correlation between PEE and BI. ***significant at $p < 0.001$ ** significant at $p < 0.01$

own items (Campell and Fiske 1959; Grefen et al. 2000) and all Cronbach's Alphas obtained via the reliability test were higher than 0.7 indicating that the results are reliable.

Secondly, a linear regression analysis was performed including the five independent variables (PEE, PPE, PT, SI, PQ) and the dependent variable (BI). The model accounted for a substantial proportion of the variance (55 %) of BI. In contrast to the original UTAUT model the constructs PPE, PEE and SI could only explain 20 % of the variance in BI (Venkatesh et al. 2003). The linear regression test, with all independent variables included, exposed correlations between the variables. Therefore, separate linear regression tests were carried out. Subsequently, it could be detected that PQ and PPE are together responsible for 50.4 % of the variance of BI and consequently reflect the largest proportion of BI.

A direct positive and strongly significant effect of PPE on BI could be detected. This finding affirms the assumption that an improvement in the usefulness of NFC smart posters affects the intention to use these posters (Bader et al. 2012), thus underpinning Hypothesis 3. Moreover, a direct positive and strongly significant effect of PQ on BI could be found, hence supporting Hypothesis 6. In other words, the intention to use NFC smart posters is positively influenced by the quality of the content (Gefen and Devine 2001) supporting the findings of Fuchs et al. (2011). Besides, a direct positive and significant effect could be detected between PQ and PPE indicating that PQ indirectly impacts the effect of PPE on BI (see Fig. 3).

Additionally, this study showed that PEE has a direct positive significant effect on BI corroborating Hypothesis 1. This implies that an increase the ease of use affects the intention to use NFC smart posters. Moreover, PEE has a positive significant effect on PPE, supporting the results of Chen and Chang (2013),

Bader et al. (2012) and Fuchs et al. (2011); Hypothesis 2 is reaffirmed by these test results. This indicates also that PEE has an indirect impact on the effect of PPE on BI.

Also, the relationship between SI and BI was positive and strongly significant, resulting in support for Hypothesis 5. However, it was not much influenced by the other dependent variables. Thereby, it may be assumed that the behavioural patterns of users are influenced by the way in which tourists believe others will see them when using NFC smart posters (Venkatesh et al. 2003).

Interestingly, the relationship between PT and BI was not significant, thus no support for Hypothesis 4 could be found. In other words, trust does not affect the intention to use NFC smart posters. This challenges in particular, the findings of Chen and Chang (2013) and Curran et al. (2012) who claim that anxiety and trust significantly influence the intention to use mobile services and NFC. However, these results do support the conclusion of Fuchs et al. (2011) and Bader et al. (2012). It might be presumed that people trust their providers and their devices and are therefore not worried about the risks of NFC technology or NFC enabled smart posters.

To put it succinctly, the intention to use NFC smart posters is mainly driven by usefulness and quality. Social influence and effort expectancy only have a moderate impact on the intention to use them.

4.3 Qualitative Feedbacks

Apart for the quantitative analysis, a short qualitative analysis of the respondents was undertaken, where they were able to state their personal opinions about NFC smart posters. Most respondents were positively surprised of the smart poster prototype and how fast they were able to access the embedded information via NFC. Almost all of the respondents equipped with a NFC enabled smart phone were unaware of this and many did not know what NFC was about. Furthermore, a large number of the respondents had an iPhone and were therefore unable to use the smart poster with their own smart phones. They stated that NFC is a great technology; there were obvious limitation given how the iPhone is not equipped with it, which automatically excluded them from accessing NFC technology. Many of them were not willing to buy a NFC equipped phone solely for this technology. In general, all were positively surprised by the possibilities of both NFC technology as well as the NFC enabled smart poster.

5 Conclusion

This study set out to examine the acceptance determinants for NFC smart posters by using the UTAUT model. NFC technology is one of the most promising short-range communication methods currently available, and one that claims to be especially user-friendly when implemented into smart posters (Hardy et al. 2010; Loke 2006).

Even though it is argued that the awareness of NFC is growing (iSuppli 2013), the findings of this study indicate that many participants were still unaware of the existence of this technology. Nonetheless, the participants were genuinely enthusiastic, interested and curious about the NFC smart poster and felt that such posters may enhance their stay in a destination. Because of the symbioses between this assumption and the fact that many people are unaware of NFC and NFC smart posters, one strongly advises service managers to promote the availability, functional performance and value of NFC smart posters. In general, NFC smart posters provide digital information while simultaneously minimising user interaction (Verdult and Kooman 2011). Yet, apart from just simplifying user interaction, it is of utmost importance that the disseminated information is of high quality, since quality content provided via the NFC smart poster will positively influence user satisfaction and loyalty (Gefen and Devine 2001). As such, the evidence from this study may recommend that personalised information ought to be provided, where for example, dinner recommendations are made bearing in mind the tourist's personal preferences. Besides, the findings of this study imply that apart from relevant content, the NFC smart poster should be appealing and enjoyable to use. Service managers are therefore advised to consider the hedonic aspects when developing and implementing a NFC smart poster.

To put it succinctly, NFC smart posters have proven to be suitable and effective means of communication in a touristic context and consequently, it is recommended that these should increasingly be implemented in the tourism industry for information exchange. When utilised for the dissemination of information, NFC smart posters should be easy and fun to use while simultaneously providing the user with quality information.

Finally, a number of important limitations need to be considered. First, this study solely examined the acceptance of one smart poster prototype. Therefore, it is suggested that future research involves a variety of smart posters with different designs. In addition, the sample focused solely on students and thus, it is recommended to further test the proposed UTAUT model by including a broader and bigger sample. In addition, the role of moderating variables such as gender, age and experience should be included, as well as the separation of information quality and system quality.

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Exhibition Attendees' Smart Technology Actual Usage: A Case of Near Field Communications

Heejeong Han, Namho Chung, Chulmo Koo, and Kyoung Jun Lee

Abstract The exhibition industry has been a part of the 'smart tourism' context, using smart information technology. Near field communication (NFC) allows exhibition attendees to acquire information and experience various services, which enhance their experience. However, which factors out of visitors' determinants using NFC are crucial and how these factors affect their actual usage with real data have not been sufficiently investigated. Therefore, current study empirically examined how visitor's self-efficacy and organizer's support for NFC affect actual use through post-confirmation, NFC quality, NFC satisfaction and planned behaviour based on Expectation-Confirmation Model. We collected sample data from 387 exhibition attendees using NFC in the Cosmetic and Beauty Expo, Korea 2013. This study found that self-efficacy and organizational support affected their confirmation, which had effect on NFC actual use via NFC quality, NFC satisfaction and planned behaviour. Based on these results, this study presented theoretical and practical implications.

Keywords Attendee • Near Field Communication (NFC) • Expectation-Confirmation Model (ECM) • Exhibition • Smart tourism

1 Introduction

Smart tourism using information technology is boundlessly active in tourism context. More specifically, exhibition industry started introducing and utilizing NFC (Near Field Communication) to amplify smart exhibition experience among visitors. NFC is "a combination of contact-less identification and interconnection technologies that enables wireless short-range communication between mobile

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_33

devices, consumer electronics, PCs and smart objects" (López-de-Ipiña et al. 2007). For example, exhibition attendees touched smart tags in exhibition places and objects with their NFC-enabled smartphones and then acquired information or experienced services contained NFC tags. Davis (1989) revealed that system use was theoretically proved by perceived usefulness and perceived ease of use. Because we believe that there exists a positive relationship between use and performance. Actual usage among visitors is very crucial in the context of a new information technology such as NFC and is deeply related to the vitality of the new technology. Thus, it is important to examine exhibition attendees' NFC actual usage and its determinants in the context of exhibition.

This continuous and actual use of new technology is explained with the Expectation-confirmation model (ECM) developed by Bhattacherjee (2001). This model explained to understand user's continuous acceptance of information system using the framework—confirmation (evaluation), post-expectation (user's beliefs), satisfaction, and continuance intention (Bhattacherjee 2001). If users have high performance level with information system, they will form positive satisfaction and belief, which forms continuance intention to use it. In addition, internal and external factors inspire visitors to adopt a new technology such as NFC (Ajzen 2002; Kim and Kankanhalli 2009). Among the internal and external factors, self-efficacy and organizational support have been considered in technology acceptance studies (e.g., Chen et al. 2010; Igbaria et al. 1996; Kim and Kankanhalli 2009). Self-efficacy means how well a user can handle the technology and has been regarded as an important factor related to information technology (e.g., Chen et al. 2010; Kim and Kankanhalli 2009). The visitors with high self-efficacy have sufficient confidence of using the technology and tend to do better in recognizing the performance of unfamiliar information system such as NFC. In addition, the use of an unfamiliar technology to users requires learning and guidance to better understand its utilization (Kim and Kankanhalli 2009). If the visitors can become more familiar of the use of NFC with such guidance and learning provided by organizations (i.e., exhibition organizer or NFC developer), the function and utilization of NFC can be learned.

However, previous studies on NFC have focused only on technical understanding development and behavioural intention (e.g., Chen and Chang 2013; Egger 2013; López-de-Ipiña et al. 2007; Luarn and Juo 2010). In the context of lacking actual cases and studies of applying NFC in exhibition sector, the study on the integrated understanding of visitors' internal and external factors and confirmation of NFC, as well as the study on the identification of its actual use is insufficient.

In this light, this study tries to integrate self-efficacy, organizational support, planned behaviour and NFC actual use, and understands visitor's actual NFC usage in exhibition experience based on ECM. The current study follows two specific objectives: (1) identify the critical internal and external factors influencing on NFC user's actual use in the context of exhibition; (2) examine how those factors influence visitor's perceived confirmation, NFC quality, NFC satisfaction, planned behaviour and NFC actual use.

2 Theoretical Background

Expectation-confirmation theory (ECT) by Oliver (1980) is applied to understand consumer' subsequent behaviour in the various contexts (Bhattacherjee 2001; Chen et al. 2010; Hossain and Quaddus 2012). According to this theory, consumers formed expectation of a particular product or service and then perceived performance when they use it. They confirmed own original expectations (or expectation before using it) and built their satisfaction or dissatisfaction influencing on their intention to reuse it. Finally, consumers formed their intention to repurchase services or products through the series of process. In other words, ECT is described as the process: expectation, confirmation, satisfaction, and continuance use intention. ECT suggests that satisfaction is a primary determinant of consumer subsequent behaviour such as repurchase or continuous use (Oliver 1999). Satisfaction refers to "a psychological or affective state related to and resulting from a cognitive appraisal of the expectation—performance discrepancy (confirmation)" by Bhattacherjee (2001, p. 354). If a consumer has lower expectation and/or higher performance level, he or she will form positive satisfaction and continuance intention toward particular goods or service (Bhattacherjee 2001). Bhattacherjee (2001) applied ECT to the situation of using information system and suggested that ECM. This model combined with Technology Acceptance Model and ECT. This ECM focused on post-acceptance variables and post expectation replaced pre-consumptions expectation because ECT ignored consumer's expectation changes after using information system and confirmation. The satisfaction construct also already embodied pre-acceptance variables. In addition, ECM insisted that perceived belief such as perceive usefulness was considered as the post-expectation because its definition is consistent with one of expectation in ECT. In sum, Bhattacherjee (2001) suggested the framework of ECM in Fig. 1 and empirically confirmed.

ECM is subject to understand individual's intention whether to continuously use information technology or information system or to stop use it (Chen et al. 2013). In other words, ECM explains actual usage of information technology. In addition, this model has been widely used in technology acceptance research (e.g., Chen et al. 2010, 2013) and particularly, applied to tourism area (e.g., Casaló et al. 2010; Li and Liu 2014). ECM has been proven in several studies and, in particular, ECM explained post-adoption behaviour of information technology in the context of e-service (Lee and Kwon 2011). When people use the state-of-the-art technology, they will form a cognitive appraisal (i.e., confirmation) through their usage and will perceive NFC by the post-expectation, which will form satisfaction about it. These

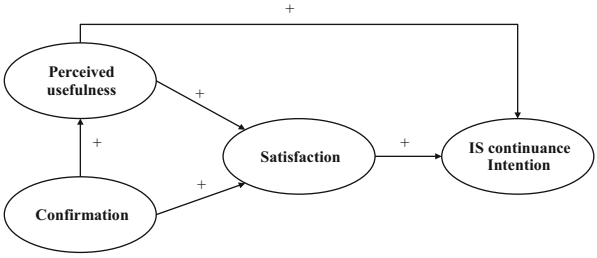

Fig. 1 ECM framework

satisfaction and post-expectation will boost planed behaviour using NFC, which will lead to actual usage such as NFC touch frequency and usage time. Thus, this study chose ECM as the theoretical frame to explain visitor's post adoption of NFC in the exhibition context.

In addition, internal and external factors are considered as factors influencing on NFC user's expectation. When using the cutting-edge technology such as NFC, many studies are boosting the confidence of being able to use the new technology as an internal factor (i.e., self-efficacy) (e.g., Chen et al. 2010; Kim and Kankanhalli 2009). In addition, since new technologies are unfamiliar to the users, an organizational help that assist the understanding of new technology is identified as an external factor in the previous studies (Igbaria et al. 1996; Kim and Kankanhalli 2009). Therefore, this study tries to understand these processes to promote actual NFC usage based on the ECM.

3 Research Model and Hypotheses

Based on the ECM, a research model was proposed in Fig. 2 with evaluation phase, post-expectation phase, and continuous experience phase.

3.1 Self-efficacy, Organizational Support and Confirmation

NFC is the cutting-edge technology in the context of exhibition, and needs visitors to have a high level of confidence in using it. This propensity is self-efficacy, a user's confidence in own ability to accept the new situation or new technology (Bandura 1995; Kim and Kankanhalli 2009). In addition, self-efficacy is considered as an internal factor in adopting information technology (Ajzen 2002; Kim and Kankanhalli 2009) and some researchers pay attention to the link between self-efficacy and confirmation (performance) (e.g., Chen et al. 2010). Chen et al. (2010) insisted that consumers with high self-efficacy have more confidence and their confidence cause that perceived performance go beyond pre-expectation. Therefore, self-efficacy and organizational support stimulate intertwinedly for exhibition attendees to adopt a new technology such as NFC.

H_1: Self-efficacy has a positive effect on confirmation.

The current study considered organizational support as an external factor related to using NFC. According to the definition of Kim and Kankanhalli (2009), organizational support is defined as the perceived help served by the exhibition to make visitors easily adopt NFC in an exhibition. In the context of adopting a new technology, learning and guidance are needed (Igbaria et al. 1996; Kim and Kankanhalli 2009). Lee et al. (2010) insisted that organizational support to users improved their performance in the context of enterprise resource planning implementation. Additionally, Tzeng (2011) found out the organizational support's

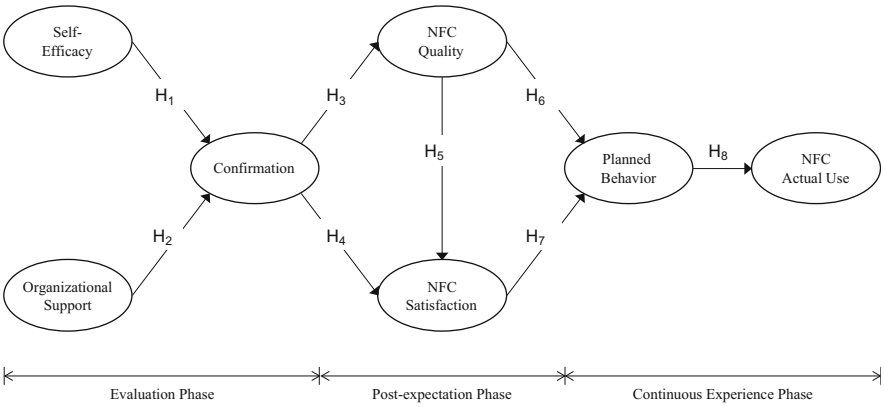

Fig. 2 Research model

influence on positive perception toward information system. As organizational support increases, the level of confirmation may increase. Therefore, the following hypotheses are proposed:

H_2: Organizational support has a positive effect on confirmation.

3.2 Confirmation, NFC Quality, NFC Satisfaction and Planned Behaviour

The ECM supposes that a user's confirmation affect a user's beliefs and satisfaction to use information system, which affects the acceptance of the system (Bhattacherjee 2001). That is, visitors highly evaluate service quality and satisfy by using NFC in an exhibition because they are already confirmed that NFC exceeds their pre-expectation. In addition, service quality will enhance users' satisfaction related to information technology (Subramanian et al. 2014; Yang et al. 2005). By applying ECM in the current study, we suppose that visitors with a high level of confirmation are more likely to perceive service quality and satisfaction toward NFC because they already acknowledge the NFC performance. In additions, Yang et al. (2005) found a significant effect of service quality on satisfaction in the context of web portal. There was evidence of a relationship between service quality and satisfaction in other studies (e.g., Lee and Chung 2009; Lee and Wu 2011; Subramanian et al. 2014). Therefore, the following hypotheses are proposed:

H_3: Confirmation has a positive effect on NFC quality.
H_4: Confirmation has a positive effect on NFC satisfaction.
H_5: NFC quality has a positive effect on NFC satisfaction.

According to ECM, user's satisfaction with experience and perceived NFC quality are important factors in the context of information technology usage

(Bhattacherjee 2001; Chen et al. 2013; Lee and Chung 2009). Accordingly, satisfaction toward information technology has been considered as a measure of information system success (Au et al. 2008; Chen et al. 2013; Lee and Chung 2009) and as a determinant of intention or using an information system (Bhattacherjee 2001; Chen et al. 2013; Li and Liu 2014; Tojib, and Tsarenko 2012). This study identified planned behaviour as the degree that NFC enhances visitors' action as previously arranged. If visitors with higher level or NFC satisfaction or service quality, they will put their plan into practice using NFC in the exhibition. Hence, this work proposes the following hypothesis:

H_6: NFC quality has a positive effect on planned behaviour.
H_7: NFC satisfaction has a positive effect on planned behaviour.

3.3 Planned Behaviour and NFC Actual Use

Continuous and actual use of information system have been dealt with critical factors among industry and academia (Li and Liu 2014). In this study, NFC actual use adapted from Davis (1989)'s system use is defined as the actual record using NFC among visitors (i.e., total frequency of NFC touch, NFC use time) and means continuous use of NFC. In addition, planned action is a starting point for rational action and human do rational actions according to planned action (Muñoz and Encinar 2014). Human action is also derived from feelings and emotions and however this study focuses on visitor's actions resulting from cognitive deliberation. While using NFC at the exhibition sites, exhibition attendees try to continuously use it if NFC is enough for their planned behaviour. Therefore, if visitors using NFC look around and visit the exhibition booths and experience services as planned, they can enhance forming actual use with longer usage time and more NFC touches on smart tags in the exhibition. Hence, this work proposes the following hypotheses:

H_8: Planned behaviour has a positive effect on NFC actual use.

4 Research Methodology

4.1 Instrument Development

The current study used instruments from prior studies modified to fit the context of NFC except for actual use construct. We modelled the higher-order construct, actual use, as the function of two formative dimensions; touch frequency and usage time. The touch frequency and usage time of NFC were derived from a real log file. NFC use time was calculated by the gap time between initial touch and final time. The rest items were measured on a seven-point Likert scale with strongly

disagree (1) and strongly agree (7). Self-efficacy and organizational support items were adapted from Kim and Kankanhalli (2009). Confirmation and satisfaction were adapted from Bhattacherjee (2001). The measure used to assess NFC quality, was drawn from Lee and Chung (2009). The two items of planned behaviour were self-developed taking into account relevant characteristics of exhibition attendees by four tourism and information technology professionals.

4.2 Data Collection

To achieve research goal, the on-site survey was conducted of people who attended the Cosmetic and Beauty Expo, Korea 2013 and used NFC. Various NFC tags and their management system were developed for this expo and about 1.000 NFC tags were installed in exhibition hall. NFC tags which be placed within the exhibition were issued and registered through the tag management system. The visitors will receive their unique ID, when the NFC tags are touched by using their smartphones. Any applications do not need to be installed in the smartphone in order to use it. These NFC tags enable visitors to automatically access various and multiple language services. These services include: 'Hot place' that recommend the most popular exhibition hall, 'Local guide' that recommend the surrounding attractions, discount coupons for productions, service that offers the exchange of business cards and sharing of profile using the smartphones, catalogue service that offers downloading of exhibition information catalogues, and an exhibition map (see Fig. 3). With these various services, visitors enhance their experience in the exhibitions. Several trained staffs who are skilled with using NFC and majored in tourism served as field researchers to collect sample from May 17 to 21, 2013. Each staff handed out a flyer about introduction and usage of NFC at the entrance of the exhibition. After several hours, they conducted the self-administered questionnaire at the exit. Total 614 respondents participated this survey and 227 questionnaires were eliminated because of inconsistent responses and questionnaires without visitor's ID. Finally, 387 questionnaires were coded for analysis.

The respondent gender ratio was male 144 (37.2 %) to female 243 (62.8 %). The 30–39-year-old age group had the largest proportion at 38.2 % (n = 148), followed by those 40–49 years (n = 111, 28.7 %) and those aged 20–29 years (n = 97, 25.1 %). Most respondents (n = 305, 78.8 %) had 2-year college degrees or higher. The typical respondent's monthly income level was 1,800 USD to 2,600 USD, with 119 respondents in this category (30.7 %), followed by a monthly income of 900 USD to 1,700 USD (n = 88, 22.7 %). Data analysis and Results

To test presented research model including formative and reflective constructs, the collected data were analyzed with structural equation modeling (SEM) using PLS-Graph Version 3.0 (Chin 1998). According to Anderson and Gerbing (1988), two stages were preceded for data analysis as follows: (1) confirmatory factor analysis (CFA) was used to test reliability and construct validity for all measurement scales except for the construct of actual use; and (2) the structural model testing were examined for model evaluations and hypotheses testing.

Fig. 3 Snapshot of NFC use

4.3 Measurement Model

The actual use construct was modelled as a second-order formative construct included usage time and touch frequency. The adequacy of the measurement model was checked by convergent validity and discriminant validity. Convergent validity of scale items was confirmed using three other criteria (Bagozzi and Yi 1988; Hair et al. 2010). First, the standardized path loading of each item should be statistically significant and greater than 0.6. Second, the composite reliability and the Cronbach's α for each construct had to exceed 0.7. Third, the average variance extracted (AVE) for each construct had to exceed 0.5. As shown in Table 1, the standardized path loadings were all significant and greater than 0.6. In addition, the CR and Cronbach's α for all constructs exceeded 0.7. The AVE for each construct was greater than 0.5. Therefore, convergent validity for the constructs was confirmed.

The discriminant validity of the measurement model was checked by using Fornell and Larcker (1981)'s recommendation. The square root of the AVE for each construct is greater than the correlations between that construct and other constructs (Fornell and Larcker 1981). As shown in Table 2, the square root of the AVE for each construct exceeded the correlations between that construct and the other constructs. Therefore, discriminant validity was established.

4.4 Structural Model

A booth strapping technique was used to examine explanatory power and path significance for our research model (see Fig. 4). A bootstrapping sample of size 500 was used in the PLS analyses.

H_1 and H_2 address the structural relationships among self-efficacy (H_1), organizational support (H_2), and visitor's perception of confirmation. The effects of self-efficacy were statistically significant contributors to confirmation use ($\beta = 0.350$, $p < 0.001$). The path between organizational support and confirmation was positive

Table 1 Descriptive statistics of constructs

Constructs	Variables	Standardized loadings	C.R.[a]	AVE [b]	α
Self-efficacy	Based on my own knowledge, skills and abilities, using NFC would be easy for me	0.908	0.942	0.845	0.908
	I am able to use NFC without the help of others	0.944			
	I am able to change to use NFC reasonably well on my own	0.905			
Organization support	The Expo provides me guidance on how to use NFC	0.922	0.952	0.869	0.924
	The Expo provides the necessary help and resources to enable me to use NFC	0.950			
	I am given the necessary support and assistance to use NFC by the Expo	0.924			
Confirmation	My experience with using NFC was better than what I expected	0.915	0.950	0.865	0.921
	The service level provided by NFC was better than what I expected	0.940			
	Overall, most of my expectations from using NFC were confirmed	0.935			
NFC quality	NFC is easy to access	0.906	0.957	0.816	0.943
	NFC is reliable	0.922			
	The connection speed to NFC is fast	0.904			
	The screen configuration in NFC is simple and easy to see	0.913			
	The MTIS provides me with helpful information of the exhibition	0.870			
NFC satisfaction	I felt very satisfied about my overall experience of NFC use	0.938	0.964	0.869	0.950
	I felt very pleased about my overall experience of NFC use	0.944			
	I felt very contented about my overall experience of NFC use	0.936			
	I felt absolutely delighted about my overall experience of NFC use	0.911			
Planned behavior	I adopt information as initially planned in this exhibition	0.927	0.921	0.854	0.829
	I could watch this exhibition according to the schedule	0.921			
NFC actual use	Total frequency of NFC touch	0.677	0.794	0.665	–
	NFC Usage time	0.933			

[a]Composite reliability
[b]Average variance extracted

Table 2 Correlations among constructs

Construct		Mean	S.D.	Correlation of constructs					
				(1)	(2)	(3)	(4)	(5)	(6)
(1)	Self-efficacy	5.028	1.087	***0.919***					
(2)	Organization support	4.891	1.207	0.612**	***0.932***				
(3)	Confirmation	5.099	1.084	0.526**	0.505**	***0.930***			
(4)	NFC quality	5.157	1.020	0.533**	0.407**	0.597**	***0.903***		
(5)	NFC satisfaction	5.024	1.070	0.534**	0.466**	0.831**	0.580**	***0.932***	
(6)	Planned behaviour	4.380	1.097	0.359**	0.223**	0.357**	0.484**	0.345**	***0.924***
NFC	Touch frequency	25.73	10.178	–					
Actual use	Usage time	2:09:21	1:21:11	–					

Note. The diagonal elements in boldface in the "correlation of constructs" matrix are the square root of the average variance extracted (AVE). **$p < 0.01$

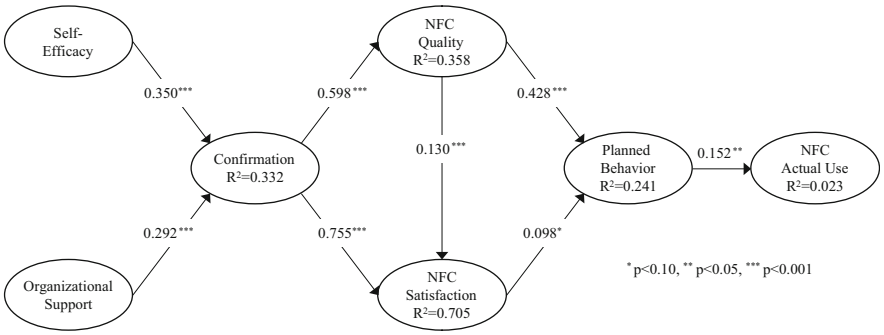

Fig. 4 Results of SEM analysis

and significant ($\beta = 0.292$, $p < 0.001$). The percentage of explained variance for confirmation was 33.2 %.

H_3, H_4, and H_5 addressed the structural relationships among confirmation, NFC quality, and NFC satisfaction. The path between confirmation and NFC quality was positive and significant (H_3; $\beta = 0.598$, $p < 0.001$, which explained 35.8 % of the NFC. NFC satisfaction was influenced by confirmation (H_4; $\beta = 0.755$, $p < 0.001$) and NFC quality (H_5; $\beta = 0.130$, $p < 0.001$). In addition, confirmation and NFC quality explained 70.5 % of the variance in NFC satisfaction. Therefore, H_3, H_4, and H_5 were supported.

Finally, H_6, H_7, and H_8 the structural relationships among NFC quality, NFC satisfaction, planned behavior and NFC actual use. Planned behavior is predicted by NFC quality (H_6; $\beta = 0.428$, $p < 0.001$) and NFC satisfaction (H_7; $\beta = 0.098$, $p < 0.10$), explaining 24.1 % of the variance. The path between planned behavior and NFC actual use is positive and significant ($\beta = 0.152$, $p < 0.05$), supporting H_8. For actual use ($R^2 = 0.023$), the variance is explained by planned behavior.

5 Conclusion

The post-adoption behaviour such as actual and continuous use has been importantly considered because it is directly linked with benefits from organizational investment, vitality and advance in technology (Bhattacherjee 2001; Li and Liu 2014). In line with this, the main objective of the current study was to understand visitor's actual NFC use with the theory of ECM. All hypotheses were supported by the data. This study found out self-efficacy and organizational support for NFC affected their confirmation, which had the effect on NFC actual use via NFC quality, NFC satisfaction, and planned behaviour.

Our findings bear both theoretical and practical implications. From the theoretical implications, we examined out research model based on the ECM theory using real NFC data that presented visitors' use time and touch frequencies. The NFC is

newly applied to the context of exhibition as one of the cutting-edge technologies. Therefore we focused on NFC technical aspect and behavioural usage (e.g., Chen and Chang 2013; López-de-Ipiña et al. 2007; Luarn and Juo 2010). In addition, there are only few studies in the exhibition context. Our theoretical attempt is the start of a promising era, smart MICE (Meetings, Incentives, Conventions, Exhibitions) conversing with tourism for tourism industry.

From the practical implications, self-efficacy and organizational support are important factors forming confirmation of using NFC. Thus, in order to increase the usage of the state-of-the-art technology such as NFC, destination marketing organizations (DMOs), tourism applications developers, tourism marketers, and its associated organizations should build experience centres or booths or attempt promotions and assistances to enhance the understanding of new technology in tourism industry. In addition, a visitor's confirmation strongly affected both service quality and satisfaction. Based on the result that NFC quality also had stronger effect on planned behaviour than NFC satisfaction, it needs to focus on the overall NFC quality management. NFC developers and exhibition organizers try to meet visitor's needs related to NFC and they need to ask for feedback from the visitors using NFC.

This study has a few limitations and it should be explained in the future research. The first limitation is that we used the data in one exhibition, which limits generalization. Thus, more research should be conducted about NFC in the tourism context. The second limitation is that other factors influencing on NFC' actual use are considered such as technical factors, social influence, affective factors and visitor's personality. Further study should be applied to various factors in the future.

Acknowledgements This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2013S1A3A2043345).

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Google Glass Augmented Reality: Generic Learning Outcomes for Art Galleries

M. Claudia Leue, Timothy Jung, and Dario tom Dieck

Abstract Art galleries are increasingly asked to provide evidence of their efforts towards facilitating visitors' learning experience. Augmented reality (AR) and wearable computing has the potential to create a realistic learning environment. Using Google Glass allows art gallery visitors to receive augmented information while looking at paintings. The Generic Learning Outcomes (GLO) framework was specifically designed to investigate visitors' learning experience in museums and art galleries however, research on art galleries visitors' learning experience through wearable computing and AR applications is scarce. This study aims to assess how Google Glass enhances visitors' learning outcomes within the art gallery environment. Twenty-two visitors participated in a test of the Google Glass Museum Zoom application. Visitors were interviewed and the data were analysed using thematic analysis and revealed that Google Glass helps visitors to see connections and enhance the knowledge and understanding of paintings.

Keywords Google glass • Wearable computing • Augmented reality • Art gallery • Generic learning outcomes

1 Introduction

Increasingly, art galleries and museums are asked to provide evidence of their efforts towards facilitating visitors' learning experience (Hooper-Greenhill et al. 2003). Augmented Reality (AR), which overlays information into the real environment, has the potential to create a realistic learning environment through the projection of enjoyable and interesting content in front of art objects (Chang et al. 2014). Traditionally more utilised on smart-phones, the launching of Google Glass will allow art gallery visitors to receive augmented information while looking at paintings. The use of Google Glass and other wearables enables art gallery visitors to have a unique experience. Leue et al. (2014) conducted an exploratory

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_34

research and confirmed that art gallery visitors have an enhanced experience while using the device to explore paintings however, called for research to examine the cultural learning experience. The Generic Learning Outcomes (GLO) framework was specifically designed to investigate visitors' learning experience in museum, archives and libraries as well as art galleries (Hooper-Greenhill et al. 2003). However, research on art galleries visitors' learning experience through wearable computing and AR applications is scarce. In addition, the trend of Google Glass only started recently and therefore only limited research that incorporates these new devices exists (Rhodes and Allen 2014). Therefore, the aim of the study is to assess how Google Glass enhances visitors' learning outcomes within the art gallery environment. This research will contribute to a gap in the literature by investigating the opportunities of using a novel and innovative technology to enhance the learning outcomes within art galleries. Therefore, this study aims to assess whether Google Glass can enhance the knowledge and understanding, skills, attitude and values, enjoyment, inspiration and creativity as well as activity, behaviour and progression of visitors at Manchester Art Gallery.

2 Literature Review

2.1 Augmented Reality and Wearable Computing

AR is the concept of superimposing or adding digital information over the real world environment (Lucero et al. 2013; Mann 2013). Although AR can be performed on mobile devices such as smartphones and tablets, better-suited devices are those that enable the wearer to experience the AR in a more immersive and intuitive setting removing the need for a device to be held in front of the user (Mann 2013). Therefore, wearables, in particular head mounted displays (HMD), are considered to be superior choices for the use of AR (Rhodes and Allen 2014). Wearable computing in the technical sense refers to any device that can perform computation within the device that is worn (Rhodes and Allen 2014). In the context of consumer goods this refers to anything from activity trackers, smart watches, sensor bands or similar devices that either perform some form or computation on the actual device, but the term wearable is also used for any digital technological gadget that can be worn. Therefore, there are numerous levels of sophistication of computational devices that can be worn and are therefore called wearables with varying degrees of flexibility. For example, sensor band generally fulfil only one purpose, to collect data from the sensors that are embedded within it, therefore only collecting this information without the ability to be used for anything else. In contrast, there are more flexible devices that resemble more general purpose such as smartphones. These are essentially mini wearable computers and therefore provide a higher degree of flexibility (Hoellerer and Feiner 2004). For the present study, Google Glass, a wearable HMD which incorporates many elements one would find in a smartphone therefore making it relatively flexible, was used. Although other devices are in development and some commercially available, Google Glass is the first device to incorporate significant amount of components into a relatively small, lightweight and unobtrusive device (Kahn 2013).

2.2 *Learning Experience in Art Galleries*

According to Packer and Ballantyne (2002), there is an increased awareness of art galleries and museums as facilitators of public lifelong learning. Since the 1990s, the European Union had a strong emphasis on creating an information society with a wide access to culture and education for its citizens (Brophy and Butters 2007). According to Brophy and Butters (2007, p. 4), this entails "emphasising the needs of people for services which are engaging, interactive, localised and easy-to-use". However, measuring this kind of informal learning is difficult and problematic as visitors have different purposes for visiting art galleries and "not necessarily seeing their experience as learning" (Amosford 2007, p. 128). Therefore, there is no simple way to determine and examine learning experiences. Nevertheless, there are a number of research frameworks, which aimed to evaluate the learning experience within public organisations. According to Falk and Storksdieck (2005), originally there were two schools of thought with regard to learning frameworks within museums and art galleries. For instance, Schauble et al. (1997) discussed a socio-cultural learning framework that focuses more on the learning process than solely its outcomes. They emphasised that the learning process involves the interplay between visitors and the mediators (e.g. provided signs or tools) (Schauble et al. (1997)). On the other site, Falk and Dierking (2000) proposed the Contextual Model of Learning with a key focus on the "interactions between an individual's (hypothetical) personal, sociocultural, and physical contexts over time" (Falk and Storksdieck 2005, p. 745). However, in order to provide a holistic framework that is easily understood and implemented by organisations, Hooper-Greenhill et al. (2003) developed a framework to measure the effectiveness of the learning environment within UK museums, libraries and archives councils. This Generic Learning Outcomes (GLO) framework aimed to simplify the identification of the learning experience through the introduction of simple measures (e.g. How much did you enjoy your visit to our museum today?), which are dependent on the subjective opinion of visitors. The GLO is built based on the idea that learning is an active process where visitors engage in their experience in order to make sense of the world. Hooper-Greenhill et al. (2003) furthermore believed that learning includes the development and enhancement of skills, knowledge and understanding as well as values and idea and ultimately should lead to change and further development. Based on this, Hooper-Greenhill et al. (2003) developed and formulated the GLO (see Fig. 1) framework which proposed that learning has different outcomes including (1) Knowledge and understanding; (2) Skills; (3) Attitude and values; (4) Enjoyment, inspiration and creativity as well as (5) Activity, behaviour and progression.

Monaco and Moussouri (2009, p. 318) defined generic learning outcomes as "the perceived benefits visitors ... have from a museum visit ... These benefits may include changes in knowledge or skills and so on but, more often than not, they are much more subtle. They may be about seeing something in a different light, making new links, or discovering that museums can be fun places". Due to the relevance of

Fig. 1 Generic learning outcomes (Hooper-Greenhill et al. 2003)

the GLO for the UK art gallery context and its easiness to measure and apply outcomes it is considered an appropriate framework to assess how Google Glass enhances visitors' learning outcomes.

2.3 Manchester Art Gallery and Museum Zoom Application

Chang et al. (2014, p. 186) acknowledged, "AR not only promotes participation and motivation, but also creates a realistic and novel learning environment via the combination of the real and the virtual". The implementation of AR further enhances the learning outcomes as it enables to learn in a rich sensory context which makes learning and the gathering of information more enjoyable (Wojciechowski and Cellary 2013). In addition, the novelty factor of using AR within the learning environment was assessed to positively influence the attitude (Wojciechowski and Cellary 2013). The initiative to utilise Google Glass as a learning tool for visitors at Manchester Art Gallery, an important cultural heritage attraction for local residents and tourists, started in 2014 as a cooperation between Manchester Metropolitan University, Manchester Art Gallery and 33 Labs. This project evolved out of a previous limited smartphone based trial in Dublin, whereby MMU carried out AR feasibility testing and user interaction research in collaboration with the Dublin City Council and the Dublin institute of Technology. Being among the first in Europe to test Google Glass in an Art Gallery environment the second test of the Museum Zoom application in June 2014 aimed to explore visitor's learning outcomes when using Google Glass within the art gallery

environment. The possibility to develop, test and iterate on the application through the close collaboration with the Manchester Art Gallery and developers at 33 Labs means that requirement changes, content, functionality and user interaction amendments can be carried out throughout the project. Preliminary results indicate that the potential of personalised information delivery and interactive learning opportunities could significantly increase the visitor experience, and drive more people to visit art galleries, museums or exhibitions while simultaneously increasing dwelling time within these venues.

3 Methods

The aim of the study is to assess how Google Glass enhances visitors' learning outcomes within the art gallery environment. The Museum Zoom application was tested in two stages. The first stage aimed to assess user requirements while the second stage focused on the learning experience. In comparison to the first stage testing, the second testing focused on the functionality of the application and it has been extended to allow for a broader testing with multiple paintings to be incorporated. The application was designed for visitors to be in control of the learning experience by enabling the user to choose a painting of choice (from within a selected group of eight paintings—due to development constraints) and explore the information associated with the particular painting. From there, the user was in control of whether he wanted to follow recommendations for other paintings based on three categories, same medium, same artist or same theme. For the purpose of this test, those three categories were chosen for demonstration purposes, but the categories could be expanded to virtually anything information is available for. Apart from letting the user control the type of paintings that were explained, the application provided functionality for reading aloud additional information about the painting and artist through the built in bone conducting speaker. In addition, visitors could share the presented information regarding the viewed painting with a social network of their choice; navigate to the next selected painting through the provision of a location card as well as image recognition to match the painting being viewed at initially with the correct information cards. Google Glass does not allow the creation of a full AR experience due to the design of the device being in front of only one eye, however it allows that content is overlaid on objects in the format of small cards. In order to evaluate visitors' learning outcomes, a qualitative interview approach was employed. Twenty-two participants were recruited via Manchester Art Gallery's Twitter, Facebook and webpage and were each allocated a time slot on the 16th and 17th of June. The profile of participants can be found in Table 1.

Before starting the experiment, functionalities such as voice command, swiping, taking pictures and sharing functions were explained and demonstrated by the researcher and projected to a smartphone screen for the participant to follow. Afterwards, participants were asked to try Google Glass to get familiar with the

Table 1 Participants' profile

	Gender	Age	Education	Innovativeness
P1	Male	20–29	Undergraduate	Moderate
P2	Male	30–39	Postgraduate	Moderate
P3	Male	40–49	Postgraduate	High
P4	Male	50–59	High school	High
P5	Male	30–39	High school	High
P6	Female	30–39	Professional degree	High
P7	Female	20–29	Undergraduate	Moderate
P8	Female	30–39	Postgraduate	High
P9	Female	30–39	Postgraduate	Moderate
P10	Male	30–39	Postgraduate	Low
P11	Male	30–39	Undergraduate	Moderate
P12	Female	30–39	Undergraduate	Moderate
P13	Female	30–39	Undergraduate	High
P14	Female	20–29	Postgraduate	Moderate
P15	Male	20–29	Undergraduate	Moderate
P16	Male	20–29	Postgraduate	High
P17	Female	20–29	Undergraduate	Moderate
P18	Male	20–29	Undergraduate	High
P19	Male	30–39	Undergraduate	High
P20	Male	50–59	Postgraduate	Moderate
P21	Female	20–29	Undergraduate	Moderate
P22	Male	20–29	High school	Low

device for about 10 min After this, participants experienced the Museum Zoom application for 30 min focusing on three paintings within the art gallery before taking part in a 15–25 min interview. The test was limited to three paintings due to time constraints. The interviews were semi-structured and based on previous research (http://www.inspiringlearningforall.gov.uk) and asked questions from the five GLO (Increase in knowledge and understanding; increase in skills; change in attitudes or values; evidence of enjoyment, inspiration and creativity; as well as evidence of activity, behaviour, progression) categories. Questions included "What have you learned in the art gallery using Google Glass today?" (knowledge and understanding) or "What value do you see in experiencing paintings using Google Glass?" (attitudes and value). Two to four questions were asked in each category. In addition, two warm-up and wrap-up questions were asked. The obtained data were analysed using thematic analysis to identify key themes in each category of the GLO framework. Boyatzis (1998) supported the use of thematic analysis to form themes prior to the analysis while sub-themes are able to emerge during the process of analysing the data. The present study identified themes according to the GLO thus, thematic analysis was perceived to be most suitable.

4 Findings

4.1 Knowledge and Understanding

The interviews revealed that the majority of participants were able to improve their knowledge and understanding of the art because of Google Glass and the Museum Zoom application which provided participants with additional information on the painting, artist as well as similar paintings. P1 acknowledged "just using the Google Glass it makes the journey a lot easier and more seamless rather than just wondering around every single room" and P18 confirmed "it was a lot easier to digest the information". P7 strengthened that particularly the audio made it easier to remember information. Furthermore, P2 pointed out that he had a better understanding as he was able to reference back to what he looked at previously. The importance of engagement for the creation of knowledge and understanding is another theme that emerged throughout the interviews (P3, P4). For instance, P3 felt more responsive because of the thematic approach of viewing art. In general, participants felt the idea to look at art based on similar themes to be a novel and refreshing approach. This was confirmed by P4 who felt more engaged with the art because of using Google Glass. Overall, during the interview process when being asked for specific details of the viewed paintings, a large number of participants had specific knowledge about artist, name of the painting, further information as well as the connection with another painting (P1, P3, P5, P6, P7, P10, P11, P14, P15, P20). In fact, P7 stated "I normally would not remember these kind of specifics. I think that Google Glass probably... made me more aware of these connections". The same was confirmed by P13 "I was actually looking closer at the paintings and looking at them in more detail". Although not so detailed, other participants were able to remember the paintings, order of paintings and that there were certain connection between the paintings (P4, P8, P16, P17, P19, P21). P4 pointed out "I was more focused on working the device...by the last painting I was probably more engaged with the art. I remember the specific with the Trafalgar square lions". The problem with the novelty factor was also raised by P4 and P8 who stated that they could not remember anything specific about the paintings as they were struggling with the functions of the device and application. Finally, P9 argued "I was not in the mood of learning I was just looking at the technology and maybe the opportunities it can have" and a similar statement was also made by P22.

4.2 Skills

In terms of new skills, participants had problems to identify how exactly Google Glass changed their behaviour. Two participants (P6, P15) identified 'appreciation' as a new skill they have learned by using Google Glass in the art gallery. P6 and P15 supported that the application provided more information so they were able to

appreciate the painting more. P1 stated "I would not say that it changes how I learn but it makes it easier and a bit more interactive" and P7 even referred to it as "intimate experience". The idea of a more personalised and intimate experience was also picked up by P18 who concluded that this personalisation adds value to the art gallery visit and learning experience. Nevertheless, P2 commented "I found it a bit disengaged, well not disengaged but perhaps it doesn't provide the potential of engagement". On the contrary, P5 acknowledged, "I would normally look at the images and walk away but now I am asking myself different questions". The enhanced paying of attention is another theme that was picked up by a number of participants (P4, P13, P16, P18). P13 furthermore added "it made me look at the art in a different way and look at the way it is constructed and the subjects in it rather than the painting as a whole" and also P14 confirmed that she paid more attention to using Google Glass. In addition, P4 strengthened that he can get as much information as possible without being overloaded. P16 pointed out a skill he has learnt during the test by thinking about "which themes [he] might be interested". P18 stated "I think if I didn't have the Google Glasses, I would have looked at the picture and left but I got a more rounded understanding of the picture and the context". Therefore, overall, it can be seen from the responses that participants got a more personalised and engaged experiences which enhanced their skill to learn about the paintings. In fact, only P3 and P4 simply stated that they believed to have learned no new skill during the test.

4.3 Attitudes and Values

In terms of general attitude towards and the value of Google Glass as an enhancer of learning within the art gallery, the participants supported themes regarding advantage, usefulness and benefit of Google Glass (P1, P2, P3, P6, P8, P12, P13, P17). P1, for instance, assessed that looking at painting with the information provided by Museum Zoom stimulated his mind and P2 and P3 confirmed that they were much more engaged with the painting. In addition, P5 found it more interesting to look at the paintings with Google Glass as it brought the paintings and information to life. According to P14 the "value for me is . . . that [Google Glass] is able to direct your journey through the gallery much more specifically and I think there is a lot to be said for being able to create your own experience rather than what an audio guide tells you what to do step by step". Therewith, P14 strengthened the importance to control your own art gallery visit journey. In addition, P6 and P8 confirmed that they have an overall positive attitude and see the potential value of using Google Glass as it enables to learn more. Three participants (P12, P13 and P17) elaborated on the theme of 'adding value' as the value of an interactive and educational experience through Google Glass was identified by P12 and P13. Also P17 confirmed "it made you kind of appreciate [the paintings] more and look at them more rather than just going around and glance at each". Finally, P13 stated "I kind of

appreciated the paintings more and it makes me ... want to come back here and have a look".

4.4 Enjoyment, Inspiration and Creativity

Within the theme of enjoyment, inspiration and creativity, 'seamless experience' was identified as a sub-theme throughout a number of interviews (P1, P2, P15, P20). Interestingly, one might believe that enjoyment is key when it comes to the usage of Google Glass however, participants were more surprised and inspired by the seamless access of information (P20). P1 for instance acknowledged that the biggest inspiration and enjoyment of using Google Glass within the art gallery is that this "seamless experience" hinders her from getting bored, which is normally his case in art galleries. Further, P2 pointed out that "I was inspired by the fact that you can actually look at art in an interestingly technological informed way". P15 stated that "I was most inspired by the connections between the paintings... and the way the pictures were brought together [as] it brought different parts of the gallery together". The only disappointments were related to the sub-themes of limited amount of content (P1, P5, P7, P8, P14, P16, P21) as well as Google Glass hardware and software limitations. P16 pointed out that "the functions work but it needs more content... I would like to look at art from the same period and art that is created with certain materials... how someone has used material and how someone else has used the material in a completely different way". In terms of hardware limitations, participants were disturbed by the low volume of the sound (P9), small size of prism, and difficulty of adjustment of the prism (P4). In addition, P6 was rather annoyed that "the technology was not as slick as expected" and also P11 and P12 confirmed that they were annoyed by the speed of using it. P10 identified the sub-theme of isolation as a negative aspect of using Google Glass within the art gallery. P10 clearly stated that he felt isolated and was "disappointed by maybe just how intrusive they can be and basically the distance that created and [he] was lost wearing them ... [and] didn't like being cocooned by it". In addition, P13 stated that she was disappointed because of the fact that she could not use it very well as she is short-sighted and had to take the glass off.

4.5 Activity Behaviour and Progression

The final set of questions asked participants whether they changed their behaviour or are likely to change their behaviour within art galleries as a result of using Google Glass. Overall, a large number of participant confirmed that the activity of using Google Glass will change their future behaviour (P2, P5, P12, P13, P16). P16 confirmed that "It just makes me very perceptive to new ways of viewing art". P2 added that it forces visitors to engage more and that "in the future I will focus more

on things and try to find ways to personalise my experience". Also P5 stated "I will ask myself more questions at what I am looking at" and P12 and P13 assessed that it will fundamentally change the way they view art in public spaces. According to P13 "it will change the way I will be looking at the painting. I think I will look at the way paintings are constructed and look at the way subjects have been depicted more" and P12 pointed out that "it makes me think more about what else is around and how pictures are linked together". Nevertheless, P9, P14, P15 and P19 revealed that using Google Glass has not changed their behaviour during the test or their future intentions, for now. P15 strengthened that when Google Glass will be publicly available and fully functioning it will change these kinds of experiences. In addition, P8 pointed out that Google Glass is an ideal tool to create an art gallery experience for international tourists due to the opportunities to easily adapt languages through Google. Furthermore, P20 stated to have been "more reflective" while using Google Glass and that "it deepens the experience. . . that information could all be looked up later, but you would not, so you know it actually deepens your experience and use of time as it is instant". Interestingly, P6 had a relatively negative attitude towards the usage of Google Glass as she "felt more intrusive to the enjoyment of others" due to talking to the device. Amosford (2007) identified measuring informal learning is difficult as visitors have different purposes for visiting art galleries and not necessarily intend a learning experience which was supported by P6 who mentioned "I just like looking at art" and also P11 confirmed "I just go to look at some art . . .I mean it is good to learn". P9 and P22 were two participants who clearly stated that they did not come with the intention to look at art in detail but to try out Google Glass hence, it was difficult to evaluate their overall learning experience.

5 Discussion and Conclusion

This study aimed to identify whether Google Glass can enhance the knowledge and understanding, skills, attitude and values, enjoyment, inspiration and creativity as well as activity, behaviour and progression of visitors at Manchester Art Gallery. Previously, the GLO was applied to the learning experience of children and adults within museums, galleries and libraries (Amosford 2007; Hooper-Greenhill et al. 2003) however, there is a notable gap in the literature with regards to the potential of wearable computing as an enabler of learning within galleries and museums (Leue et al. 2014). Therefore, this study contributes to the gap in the literature by investigating art gallery visitors' learning outcomes from using a new and innovative technology—Google Glass. Monaco and Moussouri (2009, p. 318) identified that learning entails that visitors see "something in a different light, making new links" and that was exactly what Google Glass helped to achieve within the test at Manchester Art Gallery. A large number of participants confirmed that they normally look at art individually without making any connections; however the availability of Google Glass helped to see new links and to look deeper. This is considered one of the prominent learning outcomes of using Google Glass

within the art gallery. In addition, as far back as 2002, Sparacino identified the potential of wearable technologies to enhance and personalise the museum experience. Some participants confirmed that the biggest advantage of using Google Glass, as opposed to no technology or audio guides, is the ability to be in control of your own journey (Leue et al. 2014). Participants do not have to go on pre-curated tour but are enabled to follow paintings based on the interest in specific themes (i.e. time period, artist or in the case of the tested Museum Zoom application the theme of anatomically correct painted animals). Although latest audio guides follow a similar approach of allowing visitors to freely select a desired route based on personal preference (Huang et al. 2011), participants within the present study perceived Google Glass to be a more personal and convenient device due to the hand-free approach. In addition, Google Glass can be an important tool for tourism as it allows international tourists to experience destinations in their own language. In terms of learning opportunities, the present study suggested that all the information could be gathered after the art gallery visit or by researching using smartphones. However, the majority of visitors would not do that and therefore Google Glass was considered as an optimal tool to get instant information and that encourages visitors to see connections and dig deeper and thus, enhance the learning experience and outcomes. Previous scholars included interaction as key element of adult and life-long learning (Falk and Dierking 2000; Schauble et al. 1997). There has been a big part of interactivity within the Museum Zoom application, allowing the visitor to influence the journey, talk to the device, share content and take pictures and it was found that one of the biggest values of the experience was actively engaging in the art gallery experience. This concurs with research by Brophy and Butters (2007) who found that interactivity, engagement and ease of use are crucial elements of learning. Overall, Google Glass can therefore be considered a good device to facilitate the learning experience as its functionalities allow the provision of interactive content; while being relatively small, lightweight and unobtrusive (Kahn 2013). However, it also has to be noted that two participants felt Google Glass to be intrusive making them feel isolated from their environment and thus, had a negative effect on their experience. Monaco and Moussouri (2009) suggested that learning outcomes may entail changes in knowledge or skills however, may also be more subtle. Talking to participants it was found that using Google Glass and looking at paintings in a different way enhanced the appreciation of art which supports Monaco and Moussouri (2009) findings that learning includes more than solely the increase of knowledge. Using new and innovative devices seems to change the viewpoint which may change future visit activity and behaviour.

5.1 Theoretical and Practical Implications

Theoretically, this study applied the GLO framework to a new and unexamined field of Google Glass wearable as an enhancement of the learning experience within

an art gallery. This study is an extension of the GLO framework in the wearable learning in the art gallery context. Previous research looked at the mobile learning context within museums and art galleries (Lonsdale et al. 2005), however due to the novelty factor of Google Glass, research focusing on these cutting-edge devices is scarce. Therefore, this research can be seen as a foundation for future research in wearable learning in museums and art galleries. It provides academia with the understanding of how innovative technologies are perceived by art gallery visitors. Practically, this study has shown the enormous opportunities wearable devices offer for the cultural heritage sector to enhance user experience and learning outcomes. The study identified the positive overall attitude to use Google Glass as an enhancer of the art gallery learning and visiting experience. Therefore, it could be considered as a starting point for art galleries to consider implementing wearable technologies. Despite the problems viewing the content due to being short sighted, this is no real limitation for Google Glass as such, as they are working on prescription lenses for the devices. Nevertheless, this needs to be considered by museum and art galleries that plan to provide Google Glass to their customers. In addition, the positive aspect of Google Glass is, similar to audio guides, that not all visitors have to use it. Thus, visitors who benefit from an enhanced learning experience and are curious to try it out can do so without interrupting fellow visitors' experiences. Therefore, art galleries are encouraged to offer its visitors this unique experience in order to enhance life-long learning, attract new markets and provide more personalized and interactive experiences.

5.2 Limitations and Future Research

There are a number of limitations within the present study. Due to the sampling technique, recruiting participants via social media and the website, there is not equal distribution among age groups, with the group below 20 and above 60 years of age not even being represented. In addition, 59 % of participants were male. Nevertheless, Wood and Hoeffler (2013) suggested that the stereotyping of genders with regards to innovative technologies (men are more tech savvy than women) is accurate. Considering the voluntary participation and the selection of participant through social media; the majority of males within the sample accurately reflects patterns from other studies. Nevertheless, this affects the possibility to project findings to a wider target market and future research should incorporate a wider spectrum of participants. Furthermore, the test was performed in a controlled environment where participants were told which paintings to look at and where to go next. This might have influenced the learning experience. However, due to the limitations in content provided in the Museum Zoom application, participants only had the options of experiencing certain paintings. Another limitation is that participants could have been segmented into technology adoption classes based on their perceived degree of innovativeness as the general attitude and behaviour with respect to technology could have an impact on the outcome of the Google Glass

experience. This could be addressed by future research. In addition, future research should include control groups in order to better understand the potential of Google Glass and wearables to enhance the learning outcomes. Not having identified learning outcomes from a group that used a different technology (e.g. audio guide) makes it difficult to measure how and why the learning was enhanced. Therefore, the present study can only provide subjective findings regarding learning outcomes. On the other hand, a testing of the application in a lab setting might provide valuable insight into dwelling times and actual usage behaviour. In addition, Google Glass provides further opportunities for urban cultural heritage destinations and future research could test Google Glass applications outdoor environment. Furthermore, the present study used local art gallery visitors as sample, however as discussed Google Glass could be an ideal technology to enhance tourism experience and also tourists' learning experience and thus, future research should investigate the potential of Google Glass to enhance the experience in tourism destinations.

Acknowledgements This research has been supported by Knowledge Exchange Innovation Fund, funded by Manchester Metropolitan University (M-80024.8.6). Authors would like to give thanks to Manchester Art Gallery and 33 Labs for their co-operation for this project.

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Examining the Cultural Differences in Acceptance of Mobile Augmented Reality: Comparison of South Korea and Ireland

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Abstract Augmented Reality (AR) is one of the emerging technologies used in cultural heritage tourism sites around the world. However, the process of having behavioural intention to use AR can be varied in different culture. Thus, this study selected two different countries, South Korea and Ireland, having high smartphone penetration rates, but with very different cultural profiles, and investigated the impact of cultural difference on acceptance of AR application (app) in cultural heritage tourism sites. Further, this study focused on the aesthetic and hedonic characteristics of AR apps from the perspective of hedonic information system. The results showed that aesthetics of AR have the strongest influence on perceived enjoyment. Also, as expected, South Korea, having high power distance, collectivism, and high uncertainty avoidance culture, displayed stronger dependence on social influence and hedonic characteristics of AR. Based on these findings, we present theoretical and practical implications.

Keywords Cultural difference • Mobile augmented reality (AR) • Acceptance • Cross-cultural analysis • South Korea • Ireland

1 Introduction

Augmented reality (AR) provides its users with virtual 3D images or information that superimposed on the real-world view captured from the camera of device (Bujak et al. 2013; Kounavis et al. 2012). Smartphone meets all of the requirements

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_35

posed by AR because it has camera of capturing the real-world view and capability of rendering and displaying 3D graphics or video (Henrysson and Ollila 2004). Thus, with explosive growth of penetration rates of smartphone, app-based AR has been more accessible to wider users. Especially, cultural heritage tourism is one of the most important areas served by mobile AR app (Portalés et al. 2009) which provides digitally restored artifacts, thereby prevent degradation of cultural heritage sites aggravated by frequent access by tourists and let them perceive fun and usefulness (Haugstvedt and Krogstie 2012). Recently, a considerable number of heritage institutions and tourism organizations around the world, such as the Deoksugung & Gyeongbokgung Palace in Seoul, An Post Museum in Dublin, the Louvre Museum in Paris and the British Museum in London, have developed and provided with their mobile AR apps. However, even though various AR apps are widely produced, provided, and used, cultural difference may influence on the AR acceptance (Harris et al. 2005). Several prior research papers demonstrate that the process having behavioural intention to use information systems (IS) varies in different cultures (e.g. western and eastern) (Harris et al. 2005; Kim et al. 2011; Srite and Karahanna 2006). Cho and Cheon (2005) selected the United States, the United Kingdom, Japan, and Korea, because these countries are the greatest advertising revenues in western and eastern cultures respectively, but they have very different cultural profiles. In this vein, this study selected South Korea and Ireland, having high level of smartphone penetration and interest in AR app, but with noticeably different cultural profiles. In addition, this study focused on the aesthetics and enjoyment of AR app from the perspective of hedonic information system. The aim of this paper is to assess the impact of aesthetics and perceived attributes including enjoyment on behavioural intention to use AR in cultural heritage tourism sites, and to investigate the influence of cultural difference between South Korea and Ireland on these causal sequences.

2 Theoretical Background

2.1 Aesthetic and Hedonic Features of Augmented Reality

AR is a visual techniques that superimposes digitized virtual information on top of the real-world view as captured by the camera of computer, smartphone or other devices (Kounavis et al. 2012), which, thus, appear to the its users that virtual and real objects coexisted in the same space (Azuma 1997) and thereby it enhances not only real world but also users' cognitive capability toward the surroundings in real time (Bujak et al. 2013) (Fig. 1).

In other words, AR has a feature of immersing its users in virtually enhanced real world (Di Serio et al. 2013). Immersion is defined as "becoming physically or virtually a part of the experience itself" (Pine and Gilmore 1998, p. 31) and the features of aesthetics, one of the four realms of experience (entertainment, education, aesthetics, and escapism) proposed by Pine and Gilmore (1998). Aesthetic experience, defined as "indulged in environments" (Oh et al. 2007, p. 121), features passive participation and immersion of the consumers. The tourists who use AR app

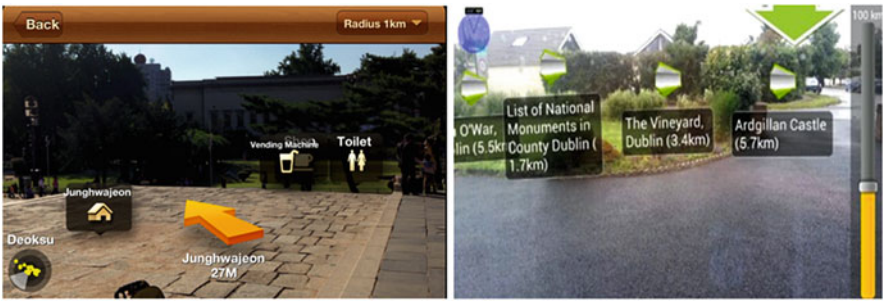

Fig. 1 Snapshots of AR (*Left*: Deoksugung in my hand, *Right*: Dublin AR)

in tourism sites passively participates in activities and does not directly affect or influence the performance while immersed in tourism sites. Thus, we placed emphasis on aesthetic features of AR with experience economy (Pine and Gilmore 1998). Moreover, aesthetics has a particular significance in app-based AR because smartphone has physical limitations such as smaller display with lower resolution than traditional devices such as desktop computer (Sadeh 2002), therefore, it is important to design the mobile app by taking into account the mobile space in order to deliver the information accurately and clearly (Lee and Chung 2009).

Further, this study focused on hedonic feature as well as utilitarian feature of AR with motivational theory proposed by Deci (1975), which posits that user acceptance of a product or service can be explained by extrinsic and intrinsic motivations. In the context of IT usage, the extrinsic motivation concerns about the drive of utilitarian purpose of IS usage such as expecting reward or benefits and analyzing function rationally (Deci and Ryan 1987), whereas the intrinsic motivation relates to the drive of hedonic purpose of IS usage such as expecting pleasure or satisfaction from the interaction with the system itself (Van der Heijden 2004). Perceived usefulness (PU) and perceived ease of use (PEOU) focused on extrinsic motivation whereas perceived enjoyment (PENJ) focused on intrinsic motivation (Ayeh et al. 2013; Van der Heijden 2004). These three beliefs are principal constructs in TAM to predict users' attitude and behavioural intention (Davis 1989; Kim et al. 2009; Van der Heijden 2004). Thus, in this study, we tried to investigate both extrinsic and intrinsic motivation influencing the behavioural intention to use AR in cultural heritage tourism sites.

2.2 Cultural Difference

Cultural difference can be a barrier to technology transfer (Lee 2013), and the process of IS acceptance can be influenced by culture (Harris et al. 2005). Especially, app-based AR are influenced easily and strongly by culture-level phenomena because it features interaction, and operate as part of network, thus, a cross-cultural approach about IT acceptance is needed (Di Serio et al. 2013; Harris et al. 2005).

Table 1 Cultural dimensions and mobile phone penetration in selected countries

Definition[a]		Korea	Ireland
Smartphone penetration	–	73.0 %[b] (Rank 2)	57.0 %[b] (Rank 11)
Masculinity/femininity	Degree to which gender inequalities are espoused by an individual. (e.g. masculinity emphasizes work goal, femininity emphasizes personal goals)	39[c] (F)	68[c] (M)
Power distance	Degree to which large differentials of power and inequality are accepted as normal by the individual.	60[c] (H)	28[c] (L)
Individualism/collectivism	Degree to which the individual emphasizes his/her own needs as opposed to the group needs and prefer to act as an individual rather than as a member of a group.	18[c] (C)	70[c] (I)
Uncertainty avoidance	The level of risk accepted by the individual which can be gleaned by his/her emphasis own rule obedience, ritual behavior and labor mobility.	85[c] (H)	35[c] (L)

[a]Cited from Lee et al. (2013)
[b]Richter (2013)
[c]Hofstede (2000)

In this vein, this study drew upon the measures of cultural dimensions of Hofstede (1980) and examined the influence of cultural difference on AR acceptance between two countries. Hofstede (1980) proposed the four cultural dimensions on which countries are comparable: masculinity/femininity; power distance; individualism/collectivism; and uncertainty avoidance. The definition of each dimensions are shown on Table 1. As shown in the Table 1, both South Korea and the Ireland have high smartphone penetration rates in the world at 73.0 % (rank 2) and 57.0 % (rank 11) respectively (Statistica 2013). Furthermore, both countries have actively launched AR apps in cultural heritage sites.

3 Hypotheses Development

In order to investigate the cultural difference between Ireland and Korea in the context of the process to having behavioural intention to use AR in cultural heritage tourism sites, we proposed the following conceptual model based on the extant literature as shown in Fig 2. In this section, we present the hypotheses development for the relationship among the constructs.

3.1 Aesthetics and Beliefs

Aesthetic experience, defined as "indulged in environment," features passive participation and immersion of the consumers (Pine and Gilmore 1998; Oh et al. 2007). AR provides its users aesthetic experience, in which they passively participate and immerse themselves in virtually enhanced environment (Di Serio et al. 2013). The

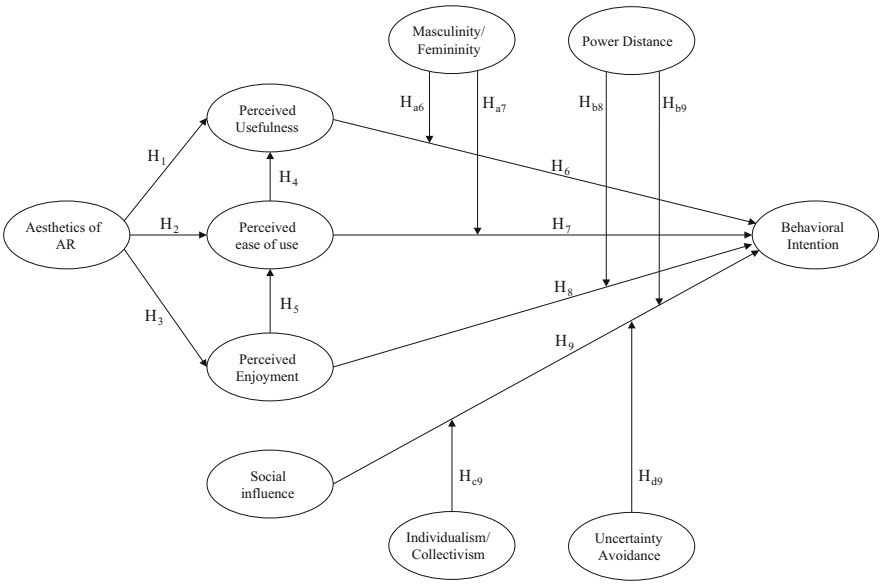

Fig. 2 Proposed model

aesthetics means the beauty that can be expressed through the elements such as color, photographs, font style, and layout. Even though the size and resolution of smartphone has been bigger and higher, there are still limitations of providing or receiving some information. However, these physical limitations can be overcome by the beauty of the IS (Sarker and Wells 2003). As aesthetics has a strong halo effect (Al Sokkar and Law 2013), which is defined as a tendency through which initial outstanding impression or characteristics of something affect overall judgments even after contradictory evidence is exposed (Rosenzweig 2009). In this vein, initial impressions derived from the aesthetic aspects can induce users to judge the usefulness or joyfulness of the product. Also, a well-designed AR app helps delivering information accurately and clearly. Empirically, aesthetics of IS (e.g. mobile commerce website) have been demonstrated that it has an effect on formulating or inducing positive beliefs such as PU, PEOU, and PENJ (Li and Yeh 2010). Therefore we postulated that aesthetics of AR affect cognitive and affective beliefs of AR app, thus, the following hypotheses are proposed:

H_1: Aesthetics of AR has a positive impact on PU of AR.
H_2: Aesthetics of AR has a positive impact on PEOU of AR.
H_3: Aesthetics of AR has a positive impact on PENJ of AR.

3.2 Relationships among Perceived Usefulness, Perceived Ease of Use and Perceived Enjoyment

According to TAM (Davis 1989; Davis et al. 1992), PU, PEOU and PENJ are three principal constructs to predict users' behavioural intention. Also, PEOU has been verified in a number of previous studies to significantly and positively affect the PU

(Davis 1989; Haugstvedt and Krogstie 2012; Kim et al. 2009; Van der Heijden 2004). Haugstvedt and Krogstie (2012) investigated the relationship between the beliefs and behavioural intention to use mobile AR in the context of cultural heritage. The results showed that PEOU significantly influences on PU, PENJ and behavioural intention. However, on the contrary to this, Solomon (2009) postulated that in experience hierarchy, individuals act on the basis of their emotional reactions, thus, affective factors such as PENJ induces cognitive factors such as PEOU. Ayeh et al (2013) demonstrated that PENJ significantly influenced on cognitive beliefs (i.e., PU and PEOU), attitude and intention to use user-generated media for travel planning. Therefore, this study suggested that PEOU influence on PENJ.

H_4: PEOU of AR has a positive impact on PU of AR.
H_5: PENJ of AR has a positive impact on PEOU of AR.

3.3 Influencing Factors of Behavioural Intention to Use AR

According to motivational theory (Deci 1975), behavioural intention to use IS can be explained with extrinsic and intrinsic motivations. As stated above, this study focused on both utilitarian and hedonic feature of AR within motivational theory.

First, this study adopted three beliefs of TAM: PU, PEOU and PENJ. For PU and PEOU focus on extrinsic motivation whereas PENJ focuses on intrinsic motivation (Ayeh et al. 2013; Van der Heijden 2004), and these three beliefs are principal constructs for predicting users' attitude and behavioural intention. Social influence (SI), defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al. 2003, p. 451), is also a direct determinant of behavioural intention. According to Venkatesh et al. (2003), SI tends to appear to be important only in the early stage of individual experience with IS in mandatory settings. Even though AR apps investigated for this study are spontaneously used by its users, as AR is cutting-edge technology and has feature of interaction, this study added SI as an independent construct to investigate the influence of SI on behavioural intention to use AR. Thus, the following hypotheses are proposed:

H_6: PU of AR has a positive impact on intention to use AR.
H_7: PEOU of AR has a positive impact on intention to use AR.
H_8: PENJ of AR has a positive impact on intention to use AR.
H_9: SI has a positive impact on intention to use AR.

3.4 Cultural Differences in South Korea and Ireland's Intention to Use AR

3.4.1 Masculinity/Femininity

Countries can be distinguished by the psychological gender which the societies espouse: masculinity and femininity (Hofstede 1984). Masculinity culture has values reflecting emphasis on work goals, assertiveness, and material success, whereas femininity culture has values focusing on quality of life goals, nurturing and modesty (Hofstede 1998). Thus, instrumental values such as PU are highly regarded masculine value, while PEOU focuses on creation of a pleasant and less frustrating work environment (Venkatesh et al. 2003; Venkatesh and Morris 2000). PU is related to improvement of job performance. In masculinity culture, focusing on work goals and success, PU are expected to receive more attentions. In contrast, in femininity culture, individuals tend to put the bigger emphasis on availability of technology support staff (Venkatesh and Morris 2000). South Korea has a strong femininity culture while Ireland has strong masculinity culture (see Table 1). Therefore, it can be assumed that the Irish tend to focus on usefulness of AR whereas South Koreans tend to focus on PEOU of AR. Thus, the following hypothesis are proposed:

H_{a6}: The relationship between PU and behavioural intention to use AR will be stronger in Ireland's masculinity culture than in South Korea's femininity culture.

H_{a7}: The relationship between PEOU and behavioural intention to use AR will be stronger in South Korea's femininity culture than in Ireland's masculinity culture.

3.4.2 Power Distance

Power distance is defined as the degree to which power and inequality are accepted as normal by the individuals of the society (Hofstede 1984). In higher power distance culture, individuals tend to take it for granted that their superiors have more power and accept the status quo. According to Harris et al. (2005), this can be translated that individuals are more relaxed and fun-loving than ones in lower power distance culture, which, in turn, may induce a great demand for hedonic services. The results of the Harris et al. (2005)'s research showed that the respondents of Hong Kong (higher power distance) tend to display more positive attitude to hedonic service than the respondents of UK (lower power distance). SI is also an important factor in higher power distance cultures because it is related to compliance (Kelman 1958). In other words, individuals from higher power distance culture, are more concerned about complying with the opinion or rules of superiors and group to gain favorable reaction from the other and avoid punishment

(Hofstede 1984; Srite and Karahanna 2006). Thus, the following hypothesis are proposed:

H_{b8}: The relationship between PENJ and behavioural intention to use AR will be stronger in South Korea's higher power distance culture than in Ireland's lower power distance culture.

H_{b9}: The relationship between SI and behavioural intention to use AR will be stronger in South Korea's higher power distance culture than in Ireland's lower power distance culture.

3.4.3 Individualism/Collectivism and Uncertainty Avoidance

People from individual culture tend to be motivated by personal preference or needs, whereas people from collectivist culture are more likely to lean toward a socially appropriate manner (Triandis 1995). Therefore, people from collectivist culture are more likely to conform to and depend on others in group (Hui and Triandis 1986), while peoples from individualist culture are more likely to behave according to their own attitude (Quintal et al. 2010). Indeed, word-of-mouth communication will be stronger in collectivist culture than in individualist culture (Harris et al. 2005). Thus, it can be assumed that the power of SI can be stronger in collectivist culture. In this vein, in the context of AR usage, people in collectivist culture are more likely to decide to use AR in cultural heritage tourism sites according to SI. Meanwhile, lack of information may induce people to be nervous and perceive risk (Vitell et al. 1993). Thus, in the context of usage of newly developed IS such as AR, informational and normative influence is absolutely critical. According to some previous research papers (e.g. Evaristo and Karahanna 1998; Srite and Karahanna 2006), informational and normative influence from others in group reduce uncertainty about whether usage of IS is appropriate. In this vein, it can be assumed that SI will have stronger effect on AR usage in collectivist cultures than individualist cultures. Thus, the following hypothesis are proposed:

H_{c9}: The relationship between SI and behavioural intention to use AR will be stronger in South Korea's collectivist culture than in Ireland's individualist culture.

H_{d9}: The relationship between SI and behavioural intention to use AR will be stronger in South Korea's higher uncertainty avoidance culture than in Ireland's lower uncertainty avoidance culture.

4 Research Method

4.1 Data Collection

The surveys were conducted at Deoksugung palace in South Korea and An Post Museum in Ireland. Deoksugung palace, one of the royal palaces in Korea, launched a mobile app called 'Deoksugung, in my hands', which contains 1,634 items of including pictures, videos and 3D images related to the palace and nearby points-of-interest through AR. In Ireland, 'Dublin AR' app, which contains text, pictures and video, was developed for An Post Museum, one of historic buildings in the Dublin's independence trail. The project was initiated by Manchester Metropolitan University, Dublin Institute of Technology and the Dublin City Council to create awareness and enhance the tourist experience in the context of historical heritage in Dublin (Han et al. 2013). Considering that most visitors are not aware of the apps, we provided the manual to let visitors familiarize with the app before conducting survey so that they can evaluate the app more accurately. Then, the randomly selected visitors used AR apps in Deoksugung palace and An Post Museum for about 30 min and participated in the survey. All respondents received a gift certificates worth KRW5,000 (about USD 5) as a reward for participation. A total number of 145 questionnaires were collected in Deoksugung Palace and 119 questionnaires were collected in An Post Museum. Most of respondents of Deoksugung Place are female (94, 64.8 %), about half of respondents are between 20 and 29 (46.2 %) or students (60.0 %). In An Post Museum, 136 questionnaires were collected at first, however, 17 questionnaires were eliminated due to missing data. Most of the respondents of An Post Museum are female (98, 82.4 %), age below 29 (92.4 %) and students (89.9 %). Although the respondents of these surveys are young and high-educated, only 48 (33.1 %) and 11 (9.1 %) respondents of Korea and Ireland had ever used AR respectively.

4.2 Measures

Measurement items were adopted from previous literature (e.g. Oh et al. 2007; Van der Heijden 2004). All items were measured on a seven-point likert scale with strongly disagree (1) and strongly agree (7). This procedure yield 24 measurement items which are summarized by each construct: aesthetics (five items), PU (four items), PEOU (four items), PENJ (four items), SI (four items) and intention to use AR (three items). Same questionnaire used both in South Korean and Ireland but a survey questionnaire was translated from English into Korean by individuals who were proficient in both languages when collect data at Deoksugung Palace in South Korea. Then, researchers who are fluent in English and Korean with academic specializations in the area under study compared the translated version with the

original version. No material discrepancies were found. These processes in the pretest stage showed that all those questions were valid and reliable.

5 Analysis and Results

In order to test the proposed research model and compare the two countries, Korea and Ireland, we used a partial least squares (PLS) regression analysis, using PLS-Graph Version 3.0. PLS regression analysis has several advantages including small sample size, and few assumptions about measurement scale and normal distribution (Ahuja and Thatcher 2005). Using PLS-Graph, the measurement model and structural model were estimated.

5.1 Measurement Model

In this study, exploratory factor analysis results in eight factors with eigenvalues greater than one. The results did not indicate that the single-factor structure accounts for most of the variance, suggesting that common method bias is not a concern in the data. To validate our measurement model, we undertook validity assessments of content, convergent, and discriminant validity. First, the content validity of our survey was established from the existing literature, and our measures were constructed by adopting constructs validated by other researchers. Second, convergent validity was established by examining composite reliability (CR), Cronbach's alpha, and the average variance extracted (AVE) (Bhattacherjee and Sanford 2006). Cronbach's alpha (greater than 0.5), CR (greater than 0.7) and AVE (greater than 0.5) of the survey from Korea and Ireland indicated that all of the constructs used in our research model satisfied the requirements. Thus, the results established that the items demonstrated convergent validity. Finally, the discriminant validity of the measurement model was checked by comparing the square root of the AVE for each construct with the correlations between that construct and other constructs. The results showed that the square root of the AVE for each construct exceeded the correlations between that construct and other construct. Thus, the discriminant validity of the instrument was established (Chung et al. 2014).

5.2 Structural Model

Structural equation modelling, for testing the validity of the proposed model, was conducted twice for Korea and Ireland respectively to assess how hypothesized relationships vary according to cultural difference. The size of the bootstrapping

Table 2 Standardized structural estimates and tests of the hypotheses

H	Path			Deoksugung palace (Korea)		An post museum (Ireland)		Result
				Estimates	t-value	Estimates	t-value	
H_1	EST	→	PU	0.404	4.713	0.264	2.675	Accepted
H_2	EST	→	PEOU	0.235	2.363	0.179	2.034	Accepted
H_3	EST	→	PENJ	0.658	10.839	0.680	12.219	Accepted
H_4	PEOU	→	PU	0.364	3.908	0.464	5.158	Accepted
H_5	PENJ	→	PEOU	0.477	4.790	0.583	7.247	Accepted
H_6	PU	→	BI	0.235	2.226	0.123	0.978	Rejected
H_7	PEOU	→	BI	0.105	1.233	0.401	3.765	Rejected
H_8	PENJ	→	BI	0.336	3.355	0.235	2.096	Accepted
H_9	SI	→	BI	0.223	2.824	0.149	2.310	Accepted
R^2	PU			0.457 (45.7 %)		0.427 (42.7 %)		
	PEOU			0.430 (43.0 %)		0.515 (51.5 %)		
	PENJ			0.433 (43.3 %)		0.463 (46.3 %)		
	BI			0.564 (56.4 %)		0.592 (59.2 %)		

EST Aesthetics, *PU* Perceived usefulness, *PEOU* Perceived ease of use, *PENJ* Perceived enjoyment, *BI* Intention to use AR, *SI* Social influence

sample that was used in the PLS analyses was 500. Table 2 shows the results of the hypothesis tests of Korea and Ireland respectively.

The Hypothesis 1, 2, and 3 considered the impact of aesthetics of AR on perceived attributes. In both countries, aesthetics of AR had strongest influence on PENJ. The relationship between PU and behavioural intention to use AR was not stronger in Ireland's masculinity culture than in South Korea's femininity culture. The path of the Korea was significant ($\beta = 0.235$, $t = 2.226$, $p < 0.05$), whereas the path of the Ireland was not significant ($\beta = 0.123$, $t = 0.978$, n.s.), thus not supporting Hypothesis a6. Also, the relationship between PEOU and behavioural intention to use AR was not stronger in South Korea's femininity culture than in Ireland's masculinity culture. The path of the South Korea was not significant ($\beta = 0.105$, $t = 1.233$, n.s.), while the path of the Ireland was significant ($\beta = 0.401$, $t = 3.765$, $p < 0.001$), thus not supporting Hypothesis a7. However, as expected, the relationship between PENJ and behavioural intention to use AR was stronger in South Korea's higher power distance culture than in Ireland's lower power distance culture. The path from PENJ to behavioural intention to use AR was significant in both countries, but larger for South Korea ($\beta = .336$, $t = 3.355$, $p < 0.001$), than Ireland ($\beta = 0.235$, $t = 2.096$, $p < 0.05$), thus supporting the Hypothesis b8. The path from SI to behavioural intention to use AR was significant in both countries, but larger for South Korea ($\beta = 0.223$, $t = 2.824$, $p < 0.01$), than Ireland ($\beta = 0.149$, $t = 2.310$, $p < 0.05$). This result is supporting the Hypothesis b9, c9 and d9.

6 Discussion, Implications and Limitations

This study provides theoretical and practical implications. One of the theoretical implications is the roles of aesthetics, which was found that the strongest attribute of PENJ in both countries. This result demonstrated that aesthetic features of IS can induce hedonic perception. The findings of the present study is remarkably meaningful because most of studies that investigated the process from perceived attributes of AR to attitudes or behavioural intention to use, have focused on only the utilitarian component of AR such as PU and PEOU (e.g. Vlahakis et al. 2001) or functional quality of AR. In terms of the application of cultural difference, only a small number of research papers have applied structural equation model (SEM) (e.g. Srite and Karahanna 2006). However, by drawing upon SEM, this study empirically tested the impact of cultural difference on the causal sequence toward behavioural intention to use AR. The results showed that there is no relationship between the impact of utilitarian components of AR and masculinity/femininity culture while the impact of hedonic component and SI on behavioural intention to use AR was stronger in higher power distance, collectivism, uncertainty avoidance, and power distance culture of South Korea. These results are partly consistent with several previous research papers (e.g. Harris et al. 2005; Srite and Karahanna 2006; Venkatesh and Morris 2000). Destination marketing managers and AR developers in the cultural heritage tourism sites around the world can refer to this study in design and operation of actual operations of the AR app. In eastern and western cultures, aesthetics of AR is crucial component for formulating positive perception about AR, in turn, which induces behavioural intention to use AR. Usability, PENJ, and SI should be considered as crucial component of AR in higher power distance, uncertainty avoidance and collectivist cultures, whereas PEOU of AR and manual should be focused in lower power distance, uncertainty avoidance and individualist cultures. The present study has some limitations. First, as AR apps have not yet been commercialized enough to be known to many tourists, the manual about the way to use AR apps had to be produced and provided for respondents before conducting survey. Thus, only young and highly educated people who are willing to accept AR apps could participate in this survey, which make it hard to say the subjects of this study are representativeness of each culture. Second, this study investigated two different AR apps in each country: “Deoksugung, in my hand” in South Korea and “Dublin AR” in Ireland. Thus, it is possible that the aesthetic and functional differences between these two AR apps were reflected in this result. Therefore, future studies should assess the respondents who use same app, but from different cultural area for investigating the impact of cultural difference on behavioural intention to use IS more accurately.

Acknowledgement This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2013S1A3A2043345).

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Investigating User's Information Needs and Attitudes Towards Proactivity in Mobile Tourist Guides

Adem Sabic and Markus Zanker

Abstract In recent years mobile devices became the way of choice for consuming digital content. One of the areas in which this monumental shift has a great impact that creates a lot of opportunities and challenges is tourism. Proactive computing comes with the promise of providing a more engaging user experience. However, due to many practical challenges in areas of first choice, such as mobile tourist guides, proactivity does not yet create a noticeable impact. This motivates our explorative study that focuses on users' information needs during different stages of travel and their attitudes related to different aspects of proactive systems such as privacy concerns, trust or their willingness-to-pay for such services. Analysis indicates some interesting and significant relations between these aforementioned concepts that reflect the users' perspectives on proactive systems.

Keywords Mobile tourist guide • Information needs • Proactivity • Proactive behaviour • User feedback • Psychometric scale • Proactive attitude • Self-efficacy • Intrusiveness • Willingness-to-pay

1 Introduction

Over the past few years, mobile devices became users' preferred choice for consuming information, outpacing other devices in terms of availability or convenience of usage. Obviously the tourism area is significantly affected by this trend in the technological environment. Today's mobile devices are powerful, well connected and ambient-aware, however travel brands still deliver subpar mobile experiences (The Traveler report 2013). Great mobile user experiences depend on various factors, such as visual elements, feedback or the interaction paradigm. One of the most common problems with today's interfaces lies with the interaction paradigm, as almost all of the system functionality is dependent on explicitly provided data and actions by the user. This, "shout when you need something" or

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_36

"pull" approach is established as de-facto standard, partly because of too much risk to bother the user with irrelevant information (Ricci 2010) or the fear to be perceived as disturbing (Ricci et al. 2011). Information which is delivered and visualized without having been explicitly requested may be disruptive and therefore cause user frustration (Gavalas et al. 2014 Systems should use these recent developments, in order to anticipate what and when something is of importance to users, and act upon it without much disturbance. Kwon (2006) defines *proactiveness* as the "ability to act on the user's behalf in anticipation of future goals or problems without the user's requests, where a proactive system can trigger itself by capturing a priori what the users want with better service quality". In order to know when to act, it is necessary to understand the situational context. There are many definitions of context, usually defined differently by research discipline. One of the most cited definitions for context is "any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves" (Dey et al. 2001). Understanding context is a serious challenge, both from the technical, user experience and the intrusiveness point of view. According to Gretzel (2011), "creating these systems requires a profound understanding of the psychology of tourists, of the social structures within which tourism is experienced, of tourists' relationship with and their use of technology, of the structure of the tourism industry or the language of tourism".

The autonomy to act is an important part of proactive systems and therefore their success is largely tied to user acceptance and their attitudes towards such proactive systems. However, most proactive systems today have only the status of pilot systems, mock-ups and conceptual prototypes and therefore even technology-affine user populations lack practical experience with such systems. Consequently, a traditional technology acceptance study design that relates users' attitudes to proactive system's perception and usage is not yet possible. Therefore, this paper presents an explorative empirical survey that tries to identify relationships between factors that will most probably impact the perception and adoption of proactive systems in the tourism domain.

More concretely, we were for instance looking at the relationships between information needs, attitudes towards making personal data available to a system, the willingness to pay for proactive systems and the characteristics of a user's personality. This work is conducted in the scope of the O-STAR project, were personalized route planning systems are researched. A proactivity feature, for instance, in case of larger deviations from schedule or changing environmental conditions turned out to be an important requirement and was mentioned by several stakeholders. In the next section we outline related work and background literature and Sect. 3 provides a detailed description of the study design. Finally, Sect. 4 presents our findings for future hypothesis development and Sect. 5 concludes this paper.

2 Background

2.1 Information Needs (IN) and Mobile Tourist Guides

"Mobile information services show great potential both as an on-site information source for customers and as a communication and distribution channel for tourism providers" (Fuchs et al. 2011). However, it is hard to exactly specify how to restrict the information needs (IN) these mobile IS should support. There are numerous definitions available yet many are tied to specific scopes: forms of expression, reason of existence, forms of delivery etc. One definition takes less rigid stance (Church et al. 2014), stating the following: "an information need is any information that is required for a task, or to satisfy the curiosity of the mind, regardless of whether the need is satisfied or not." (Dearman et al. 2008). Rather than investigating IN in general, most novel body of work in exploring IN has been targeted to specific domains.

Contextual factors seem to significantly influence satisfaction of information needs. Höpken et al. (2010) give a survey on the different notions of context within the scope of mobile information systems in the tourism domain. Sohn et al. (2008) reported results of a two-week diary study investigating the IN of users on the go. They found that users employ various tactics to satisfy IN where possible. Many (42 %) are "postponed or unaddressed because of attentional costs and contextual factors". Wang et al. (2014) found that "smartphone use in travel is not only driven by the individual's cognitive beliefs and situational facilitators, but also situated within a number of contextual factors", or in other words "tourists' motivations to complete certain tasks (e.g. finding a restaurant) appear to be defined from different travel context". In further studies Lamsfus et al. (2014) proposed a conceptual framework that describes the structure and fundamental properties of context related tourism research and the design of mobile systems. Church and Smyth (2009) presented results of a diary study with over 200 entries. The results indicated informational intent (42 %) and geographical factors (31 %) as the strongest intents behind users' mobile IN. Chen and Qi (2010) reported results of another study investigating IN of leisure travellers. The results indicated the influence of different context factors (e.g., location, time, activity) on travellers' IN. They also reported usefulness of location-awareness for mobile services when travellers are in sightseeing, transportation or accommodation. Previous work indicates strong interest of users for finding information when they are on the go. Tourism is one of the areas where a considerable need for mobile intelligent systems is present that could help to enrich the user experience. According to Gretzel (2011), these systems "promise to supply tourism consumers and service providers with more relevant information, greater decision-support, greater mobility, and, ultimately, more enjoyable tourism experiences". Mobile tourist guides are a prime example of this group, and researchers and travel service providers focused their work in recent years to this exciting area.

2.2 *Proactive Computing*

Researchers have called for a more proactive approach for years expecting to enrich and ease mobile experiences "by providing the right information, at the right time, and in the right form for the current context" (Sohn et al. 2008), yet the related research in the domain of tourism is not very widespread. Most of the existing body of work is focused at the area of personal assistants (in writing, learning, reminding such as the Google Now project). In this section few of the more novel research projects are presented, related to the wider area of the tourism domain. Woerndl et al. (2011) presented a model for proactivity in mobile CARS and evaluated its implementation in the scenario of a gas station RS. Results showed correlation between output of the prototyped model and the assessment of users for the timing to generate recommendations. Lerchenmueller and Woerndl (2012) analysed user's activity (movement) from GPS logs in order to determine when to generate a recommendation and developed a proactivity model that analyses the current situation. Their proposed algorithm showed "good performance on the collected dataset and it was easy to implement as an online algorithm on an Android smartphone". On the other side one of the potential problem areas was to distinguish between activities with similar feature values (e.g. distinguishing between "driving" in a traffic jam from "walking"). Gallego et al. (2013) studied the impact of proactivity in the user experience of a context-aware restaurant RS for Android smartphones. Their research included development of a proactivity model for RS that provided recommendations based on specific contextual information (such as, for instance, current time or distance to the available points of interest) with two variations of the user interface. Their findings showed that users preferred the widget-based user interface because they considered it to be less annoying than the notification-based user interface. Gil and Pelechano (2012) presented a "method for adapting interaction obtrusiveness automatically based on user's reaction" (exploited feedback during different time intervals) in order to minimize disturbance of mobile notifications. Exploiting user feedback has also positive effects on other aspects of mobile service.

3 Empirical Study

The goal of this study is to contribute to hypothesis development for studies on researching the technology acceptance and adoption of proactive mobile information systems in the tourism domain. Therefore, we first discuss the factors we observed:

Information need (IN): We measured the need for information in the context of travel by the number of different categories of travel related information that is typically retrieved by the respondents in the pre-trip phase: *What type of information do you check before going on a trip*? Respondents could select

multiple choices from the categories *route information*, *route services (e.g. gas stations)*, *traffic information*, *weather* and *points of interest*.

Tolerance Towards Interruptions (TTI): We wanted to know, which mobile phone related events are more disruptive while traveling/commuting (Likert scale 1–5) for events such as phone calls, text messaging or system updates.

Openness to share personal data (OP): Obviously a proactive system needs to exploit and process personal user information in order to know when it would be appropriate to actively make a proposition to the user. We asked: *Would you approve that a system analyses the following categories of information in order to provide more intelligent proactive help?* (Likert scale 1–5) for six different categories of information such as *location*, *calendar data* or *personal contacts*.

Trust (TR): Proactive systems can only learn over time and will make mistakes. A learning and adaptive system will not be able to present the user the right information at the right time and in the most appropriate way from the very first moment. Therefore, users would need to continue using such a system, even if it makes mistakes. Route navigation systems are one of the few (partly) proactive systems that are already in widespread use. Therefore, we asked: *Do you continue using a route navigation system, even if it makes errors?* (Likert scale 1–5)

Willingness to provide feedback (PF): Without user feedback a system would not be able to improve its learned models and its predictive accuracy. So we asked respondents about their willingness to provide reviews on apps to rate recommendations.

Willingness to pay (WTP): The success of applications does not only depend on their technical maturity but also on their economic sustainability. Therefore, we questioned respondents what lump sum payment as well as what monthly subscription rate they would be willing to pay at most for such a mobile information system that would present them utile travel-related information at the right time in the right form.

In addition to the aforementioned factors, that might have an influence on the adoption of proactive systems, we were also interested to see if personality traits such as self-efficacy and proactive attitude would play a role. According to the "similarity-attraction hypothesis" of Nass et al. (1995) people will prefer to interact with others—in their work computers are attributed human personalities—who are similar in personality. Therefore, we measure participants' proactive attitude according to the scale of Schmitz and Schwarzer (1999). **Proactive Attitude (PA)** "is a personality characteristic, which has implications for motivation and action. It is a belief in the rich potential of changes that can be made to improve oneself and one's environment. This includes various facets such as resourcefulness, responsibility, values, and vision" (Table 1).

Furthermore, we were interested in knowing how good users are at coping with stressful situations and if that capacity is correlated to our other researched factors. In particular as proactive information systems might represent additional stressors for their users if they are acting too intrusive. The **General Self-Efficacy Scale**

Table 1 Proactive attitude scale items from (Schmitz and Schwarzer 1999)

I spend time identifying long-range goals for myself
I feel in charge of making things happen
I feel responsible for my own life (reversed question)
I feel driven by my personal values
I am driven by a sense of purpose (reversed question)
I am able to choose my own actions
I focus my efforts on things that I can control
There are abundant opportunities that await me (reversed question)

Table 2 General self-efficacy scale items

I can always manage to solve difficult problems if I try hard enough
If someone opposes me, I can find the ways and means to get what I want
I am certain that I can accomplish my goals
I am confident that I could deal efficiently with unexpected events
Thanks to my resourcefulness, I can handle unforeseen situations
I can solve most problems if I invest the necessary effort
I can remain calm when facing difficulties because I can rely on my coping abilities
When I am confronted with a problem, I can find several solutions
If I am in trouble, I can think of a good solution
I can handle whatever comes my way

(GSE) was created to assess a general sense of perceived self-efficacy with the aim in mind to predict coping with daily hassles as well as adaptation after experiencing all kinds of stressful life events (Schwarzer and Jerusalem 1995). The scale consists of ten questions as depicted in Table 2.

3.1 Procedure and Sample

An offline paper survey was conducted in May 2014 among randomly selected students with different study backgrounds of Alpen-Adria Universität in Klagenfurt, Austria. A total of 65 individuals completed the survey in German language, aged from 20 to 47 years ($M = 25.23$, $SD = 5.131$). Most of the participants were females (52.31 %), with highest education level: high-school (50.77 %), bachelors (40.00 %) and master degrees (6.15 %), with 95.31 % of participants using smartphones and 35.94 % tablets.

4 Results

4.1 Information Needs and Trip Phase

Looking at IN, most of participants look for several categories of information in the pre-trip (M = 2.6308, SD = 0.99325) and on-trip phase (M = 2.8769, SD = 1.06811).

Figure 1 indicates plausible differences between the categories of information in the different trip phases. Not very astoundingly users are mostly preoccupied with finding information about possible routes and tourist attractions in the before-trip phase and mostly check for weather, traffic, and route services information on-trip.

When analysing what type of device (PC, Laptop or Smartphone) is used it turns out that participants use on average more than one device for finding information in pre- and on-trip phases, where obviously mobile devices dominate the latter phase. Looking at the types of delivery mechanisms user prefer for receiving information while traveling, most participants choose the notification-based methods (alerts, warnings etc.) with 68.42 ahead of voice-based (22.81 %) and widget/UI-based (21.05 %) methods (don't add to 100 % due to multiple-choices).

4.2 Factors Influencing the Adoption of Proactive Systems

One important factor for success of proactive systems is knowing what mobile device related events have a high priority in the eyes of users. In this study, participants' highest priorities are depicted in Fig. 2.

Another important factor is **trust** in proactive system's autonomy to act on user's behalf in order to deliver accurate results and take appropriate actions. Today one widespread type of application that comes close to a truly proactive system is a route navigation system. Participants were asked about their level of trust and they

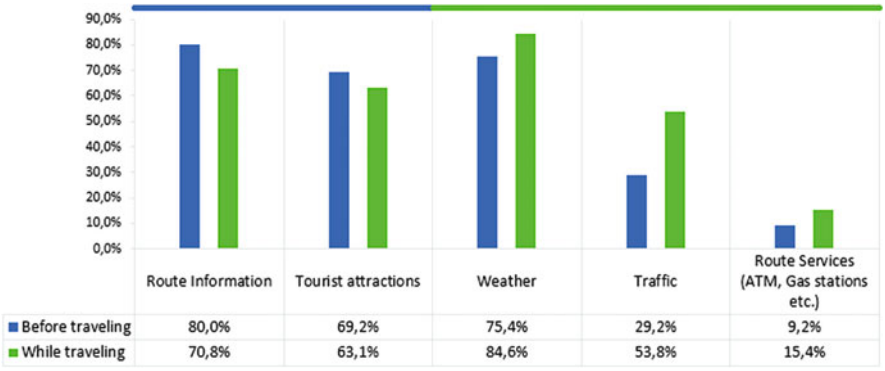

Fig. 1 Information needs before and during travel

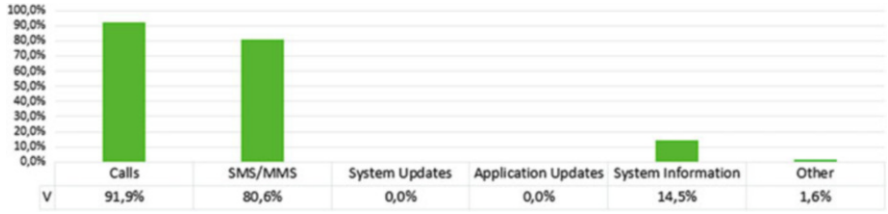

Fig. 2 Categories of events on users' scale of priorities

Fig. 3 Openness to share private data with the system (OP)

showed high trust ($M = 2.00$, $SD = 0.87$) for these types of systems. Another important factor is **intrusiveness** of proactive system, to act in the background without disturbing users in an inappropriate way. Participants were asked about the level of disturbance caused by different categories of events while traveling/commuting. Application updates (new versions, content, news, video etc.) were considered most disturbing (3.60), ahead of system updates (3.55), system information (little battery, Wi-Fi networks available, etc.) with an average rating of 2.79, calls (2.42) and SMS/MMS as least disturbing with an average rating of 2.06. To know what and when something is relevant to users, it is necessary to have access to many types of information for better modelling and training learning strategies. Having access to information usually comes with **security and privacy** concerns. When asked, participants showed high interest in having the possibility to see and approve all information that the system analyses. Looking closer to openness to share certain categories of information (OP), participants show (on scale from 1 to 5) medium openness with the notable deviation of the personal contacts category that constitutes in the eyes of participants the least sharable category of information (compare to Fig. 3).

Another important factor is the **economic perspective** of proactive systems. Participants indicated a medium interest ($M = 3.00$, $SD = 1.000$) in paying for these services and generally preferred ad-supported versions ($M = 2.14$, $SD = 1.139$) of such a system. However, when asked about the maximum amount they would pay for this type of system we got the following averaged answers: 9.63 EUR per install and 2.13 EUR for monthly subscription.

4.3 Willingness to Provide Feedback

For personalization systems that rely on user feedback (e.g. ratings etc.) in order to adapt user interface and content such as recommender systems a high quantity and good quality of feedback is needed. In this study participants shared their views on several important aspects w.r.t. the provisioning of feedback to mobile information systems. First, most users are not willing to tie provided feedback with their identity (42 %; $M = 3.23$; $SD = 0.99$). Mostly they don't rate applications very often (53.8 %; $M = 3.43$; $SD = 0.79$) or want to be reminded to rate/provide feedback for applications on their phone (73.8 %; $M = 3.71$; $SD = 0.63$). Their most preferred user interface method for feedback elicitation was *binary* (yes/no) with 50 %, ahead of *star-based* and *text-based* feedback types.

4.4 Effects of Personality Characteristics on Participants' Needs and Attitudes

In order to capture and analyse effects of participants' personality characteristics on information needs and attitudes towards proactive systems, two well-known types of psychometric scales have been employed. The Self-Efficacy Scale ($\alpha = 0.783$) assesses a person's belief that personal actions constitute a main influence on successful outcomes. As we already mentioned Proactive Attitude ($\alpha = 0.713$) relates to the "similarity-attraction hypothesis" of Nass et al. (1995). Findings show that participants who have a stronger belief in their self-efficacy, check for more categories of information in the before and on-trip phases. Trust in proactive systems (via relying on existing systems for route planning question variable) correlates negatively ($p \leq 0.01$) with the Self-Efficacy Score. For all of the categories of data that can be analysed by the system, we did find significant negative correlations (mostly at the $p < 0.01$ level) between openness to allow a system to analyse category data and participant's Self-Efficacy Score. Analysis further shows that participants who are more open to be reminded to review apps tend to have a higher tendency towards a Proactive Attitude ($p < 0.01$).

4.5 Relationships Among Factors Influencing the Adoption of Proactive Systems

In order to make first steps towards hypothesis construction and mode development to explain the adoption of proactive systems in tourism we explored models from the economic and the privacy perspective:

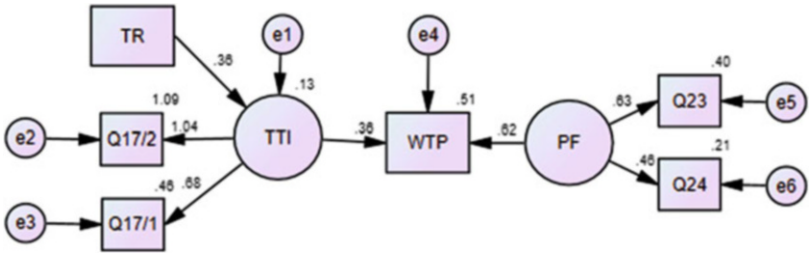

Fig. 4 Structural equation model of economic perspective of proactive systems (Standardized Solution; N = 65)

Table 3 Unstandardized, standardized, and significance levels for developed model in Fig. 4 (N = 65)

Parameter estimate	Unstandardized	Standardized	p
TR > TTI	0.520	0.365	***
TTI > WTP	0.296	0.356	0.008
PF > WTP	1.012	0.619	0.028

4.5.1 Economic Perspective

This model includes the following factors: TTI, PF, TR and WTP. Since TTI is a latent variable composed of variables from a single question in the survey, items were tested for internal consistency ($\alpha = 0.822$, see Fig. 4).

Results of SEM technique using Maximum Likelihood Estimation (MLE), show that the overall model $\chi 2$ is 9.823 with 8 degrees of freedom (df) and relative $\chi 2$ value of 1.228, which is significantly below the recommended 2.5 threshold. The associated p-value (0.278) is non-significant (i.e. suggesting that the proposed model is consistent with the observed data). In addition to $\chi 2$ test, other most-commonly used fit indexes also show values that fulfil the respected thresholds. RMSEA (i.e., 0.06) is below the 0.08 cut-off point, with standardized RMR (i.e., 0.077) and CFI (i.e., 0.976) in the acceptable range, indicating a reasonably good fit of the proposed model (Table 3).

Findings show a significant effect of tolerance to interruption (TTI) and attitude towards providing feedback (PF) on the willingness to pay (WTP) for proactive systems. This might be explained by users who invest more effort into a system by giving feedback in order to make it more useful are also willing to pay more for such a type of service. The relationship between TTI and WTP is a negative one. So, the less tolerance for interruptions by specific event categories users showed, the more they are willing to pay for a proactive system. I.e. the more they suffer from being disturbed by mobile devices the more likely they are willing to pay for proactive systems that promise a relief.

4.5.2 Privacy/Security Concerns

The model explaining privacy and security concerns of users include the following factors: Information need (IN); Openness to allow system to exploit data (OP) (composite of five questions tested for internal consistency: $\alpha = 0.903$); GSE; and Technology Use (TU), i.e. the availability of different technical devices to the participant (see Fig. 5). Results of SEM technique using MLE, show that the overall model χ^2 is 14.953 with 14 degrees of freedom (df), and relative χ^2 value of 1.068, is significantly below the recommended 2.5 threshold. The associated p-value (0.381) is non-significant. In addition to χ^2 test, other most-commonly used fit indexes also show values that fulfil the respected thresholds. RMSEA (i.e., 0.033) is significantly below the 0.08 cut-off point, with standardized RMR (i.e., 0.083) and CFI (i.e., 0.995) in the acceptable range, indicating a reasonably good fit of the proposed model (Table 4).

Results show medium-significant and negative effect of IN on OP. The less diverse users' information needs (IN) are before travel, the more the user is willing to allow the system to exploit personal data in order to provide more personalized proactive services. The perceived GSE and TU have a significant and positive affect on diversity of users' IN. This may be explained that users who are less relying on external help such as (mobile) tourist guides are in need of having more diverse information to fulfil certain tasks. Relation between TU and IN is a bit of self-explanatory, since more access to more types of devices (e.g. smartphones, route navigation systems etc.), usually exposes users to more diverse information (e.g. apps, functionality etc.).

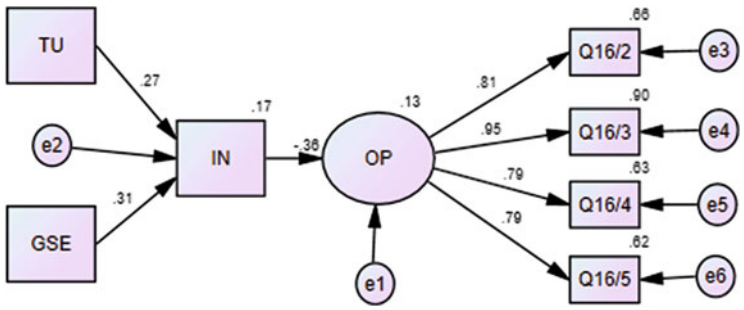

Fig. 5 Structural equation model of information needs and attitudes towards proactive systems (Standardized Solution; N = 65)

Table 4 Unstandardized, standardized, and significance levels for developed model in Fig. 5 (N = 65)

Parameter estimate	Unstandardized	Standardized	p
GSE > IN	0.086	0.315	0.006
TU > IN	0.492	0.265	0.022
IN > OP	−0.399	−0.359	0.003

5 Conclusions and Outlook

This explorative study researched different factors that should influence the adoption of proactive mobile information systems in tourism. Concretely, we were able to contribute to hypothesis and model development by identifying partial models that (partly) explained the willingness-to-pay and users privacy and security concerns. The economic perspective seems to be highly influenced by users' TTI from certain types of events (which is influenced by users' trust) and attitude towards PF. The lower the satisfaction with current solutions the brighter the economic perspective of proactive system will be. In order to precisely quantify this perspective (economic model) it is necessary to find a proper strategy for measuring these concepts in a field study. The second part is related to IN and users' openness to allow system to exploit data for the purposes of providing better services. Personal belief of GSE and TU seem to influence the IN and users' openness to share their personal data. Therefore for practical system development the sensitivity towards privacy concerns of users has to be high and an appropriate strategy for asking users to share their personal data is required. This paper also raises important questions and provides an example on how to model various factors related to proactive mobile information systems in tourism with SEM. Authors' future work will include a more encompassing study that includes practical system experience for participants in order to be able to include questions on perceptions of a proactive systems utility and actual adoption rates.

Acknowledgements Authors acknowledge the financial support from the European Union (EU), the European Regional Development Fund (ERDF), the Austrian Federal Government and the State of Carinthia in the Interreg IV Italien-Österreich programme (project acronym O-STAR).

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Mobile Technologies Effects on Travel Behaviours and Experiences: A Preliminary Analysis

Roberta Minazzi and Aurelio G. Mauri

Abstract The increased opportunity for tourists to be connected to the Internet during the trip, the development of social media, as well as advances in mobile technologies have profoundly affected travel experiences and behaviours. Travel stages (pre-trip, during-trip and post-trip) can overlap with a repositioning of some activities from the pre-trip and post-trip stages to the during-trip step. Therefore, the consumption of travel services becomes particularly important to be managed by travel operators, considering also the rapid progress of mobile tracking technologies. The present study explores the impacts of mobile technologies on travel experience with the purpose of understanding the most appropriate ways to interact with tourists. A qualitative research methodology was adopted to investigate how young adults employ mobile technologies in their travel experiences. The results of this pilot study will be the basis for identifying research questions to be tested in a subsequent research step.

Keywords Mobility • Mobile devices • Travel behaviour • Travel experience

1 Introduction

People are nowadays increasingly connected to the Internet for a longer amount of time, employing an extensive range of technologies and devices: computers, tablets, smartphones, smartTVs, gaming platforms and emerging/wearable devices (Nielsen 2012; comScore 2013; PhocusWright 2013). The widespread connectivity and the proliferation of mobile devices, along with a more intense use of social media, have profoundly affected customers' habits, behaviours and decisions.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_37

ICTs developments have strongly impacted many different sectors, especially the services industries with particular intensity in tourism and travel businesses. The development of mobile technologies affects in different ways the travel overall experience and behaviour (Parra-Lòpez et al. 2012; Xiang et al. 2014; comScore 2013). A first consequence particularly observed and studied is the impact of new technologies on the planning and purchasing process of tourism services. This is connected to the deep structural evolution of the distribution channels, with intense processes of disintermediation and reintermediation (Toh et al. 2011; Mauri 2014). A second type of effect regards the consumption step of the travel behaviour process (during-trip step). Mobile devices can mediate and modify the travel experience. Especially smartphones have been identified as an effective device able to mediate the travel experience, even by changing behaviours and emotional states (Wang et al. 2012). It is important to underline that now people can create context-related information (Buhalis and Foerste 2013) that can have two kinds of effects: (1) influence the behaviour of other tourists who are at the destination in that moment or who will visit or searching for information about the destination (i.e., reviews and photos posted on travel review websites) and (2) increase real-time sharing of the travel experience with other people linked through social media (Qualman 2012; Litvin et al. 2008). In this way it is possible to share experiences and emotions stimulating also feedbacks (likes, pins) able, in turn, to enhance emotions and engagement.

In light of these trends, this study explores mobile technologies impacts on travel experience with the purpose of understanding the most appropriate ways to communicate and interact with tourists. Then, the objective of this pilot study is to identify research questions and hypotheses to be tested in a subsequent research step. The paper can be divided into three parts. The first part provides a literature review of mobile technologies impacts and opportunities for travel operators. The second part describes the research methodology used in the present analysis. Finally, the third part shows and discusses the findings, identifies managerial implications and designs possible future research paths, as long as the limitations of the study.

2 Theoretical Framework

The influence of the Internet on travellers has been studied over the years by various authors (Buhalis and O'Connor 2005; Neuhofer et al. 2013; Xiang et al. 2014). Recent academic research has analysed the evolution from Web 1.0 to Web 2.0 pointing out the strong role of social media and the intense impacts of user-generated content (UGC) on travellers' consumer behaviours (Buhalis and Law 2008) especially with reference to information searching, holiday planning and purchase decisions (Gretzel and Yoo 2008; Litvin, et al. 2008; O'Connor 2008; Sidali, et al. 2009; Vermeulen and Seegers 2009). However, few studies have been conducted with a specific focus on mobility impacts on travellers' experience and behaviours (Tussyadiah and Fesenmaier 2009; Wang et al. 2012). Next paragraphs

present a literature review of main studies about mobile devices and applications impacts on travel experience.

2.1 Mobile and Travel Experience

The travel experience can be defined as "an individual's subjective evaluation and undergoing (i.e. affective, cognitive, and behavioural) of events related to his/her tourist activities that begins before (i.e. planning and preparation), during (i.e. at the destination) and after the trip (i.e. recollection)" (Tung and Ritchie 2011). The tourism experience encompasses different time stages and affects expectations, behaviours and perceptions. In particular, expectations and perceptions are dynamic because they continue to change due to the interactions activated during the service consumption (Fournier and Mick 1999; Seth et al. 2005). The tourist builds his or her personal experience combining subjectively the various components of the travel experience provided by different operators (Uriely 2005) during the whole travel process. All the aforementioned effects are being strongly amplified by the widespread of mobile devices and applications. The travel experience may be also seen as a result of a co-creation process where various actors cooperate to value creation (Prahalad and Ramaswamy 2004). Furthermore, with the development of new technologies this is no more only a result of the co-creation between the company and the consumer but it is increasingly affected by the relationships among consumers (Grönroos 2008). The synergy among connectivity, use of mobile devices (during travel mobility) and social media is boosting this second aspect.

Some authors in the past conceptualized the tourist experience as something separated from everyday life (Cohen 1979; Uriely 2005). Over time, the development of new media and technologies has changed this relation (Neuhofer et al. 2013). Social media and mobile devices allow sharing UGC and operate as virtual "media of transportation" acting on imagination of tourists (Tussyadiah and Fesenmaier 2009). The advancements of ICTs have increased the role of new kinds of technology-based mediators generally connected to the Internet and to mobile devices: smartphones, digital cameras and new wearable devices like Google glasses and Apple watch.

UGC can affect all the steps of the travel process; in the planning phase (i.e., a video can stimulate the traveller's imagination about a destination), during the trip (i.e., searching for interesting activities to do/services to purchase at the destination or for sharing experiences), and then after the comeback, alone or with others, in the phase of recollection of the experience. Photos and videos have been demonstrated to be mediators of travel experiences able to "generate a mental pleasure through imagination that bring to life people's dreams and fantasies of visiting" a certain destination giving then also the opportunity to re-experiencing the past (Tussyadiah and Fesenmaier 2009). Wang et al. (2012) underline the importance of smartphones as mediators of travel experience. In particular, these devices may provide functionalities that can enrich the tourism experience in all the steps of the travel process. But the during-trip stage is generally the most influenced by location-

based services (find restaurants, download Apps about the destination as a tourist guide, etc.) and entertainment services (share photos, videos, etc.) provided by mobile devices.

2.2 *Web 2.0 and Social Media Influence on Travellers' Planning Process*

Social media have an impact on travellers in all the steps of their behaviour process (Schindler and Bickart 2005; Christou and Nella 2012), before, during and after holidays. However, different extent and diverse objectives are pursued (Fotis et al. 2012). Integrating two established approaches on the topic (the decision-making studies and travel planning theory) we have obtained a comprehensive view of the entire process being able to identify and analyse the following stages (Minazzi 2014): need recognition, information search, evaluation of alternatives and booking/purchase as a part of the pre-trip phase (anticipatory), the consumption as part of the during-trip stage (experiential) and post consumption as part of post-trip (reflective). In the pre-trip stage new ideas (i.e., where to go) can be stimulated by social media (i.e., Facebook, Twitter, travel blogs) affecting travel plans (White 2010; Fotis et al. 2012). Moreover, UGC and eWOM on social networks can influence the transformation process of a need in a specific desire. Social media play a key role especially in the step of information search. Research confirms how UGC is considered particularly important during the step of travel planning (Gretzel 2007; Anderson 2012; Xiang et al. 2014) as a source of information for travellers (Pan et al. 2007). For example, online comments, photos and videos of other travellers can help selecting information and making decisions. Moreover, in the case of a new destination, never visited before by the customer or by his/her friends, sharing activities of UGC could also decrease the perception of risk and positively influence the decision-making process. Generally, travellers look for information about accommodation and transportation (comScore 2013) and other experiential travel products (attractions, restaurants) (Fotis et al. 2012; Xiang et al. 2014). In this stage customers reviews about travel operators (accommodation, restaurants, destinations) are rich sources of information that help travellers to a certain group of alternatives, narrowing down choices. Technology has increased the amount of alternatives and gives travellers the opportunity to compare them more easily by means of transactional or non-transactional travel websites. Non-transactional websites can have generally two goals: reviewing and trip planning, and comparing the offers of different OTAs, airlines, hotels, etc. (meta-search).

After the travel choice, tourists could change their mind. This occurs especially in the case of non-binding decisions (i.e., a free cancellation booking). In these cases, any unexpected situations or cognitive dissonance could influence travel planning. According to a study of Fotis et al. (2012), a large majority of travellers investigated made some sort of changes to the original travel plan after having

consulted online UGC. Travellers could decide to search for information to reassure themselves about the decision undertaken, comparing the services chosen with other alternatives through customer reviews, ranking, ratings, etc. Otherwise, they can change the reservation adding or removing some services and activities (i.e., excursions, attractions, etc.).

During the trip, travellers generally continue to search for information about: weather/climate, restaurants/reviews, and activities to do. They generally use social media and multiple (especially mobile) devices and applications (Expedia, comScore 2013). In this way they can reduce the perception of risk (Schroeder and Pennington-Gray 2014) and enrich their experience taking real-time decisions thanks to mobile tracking and location based mobile applications (i.e., Foursquare). But this step is particularly affected by the combination of connectivity, social media and mobile technologies that allows people to create context-related information (Buhalis and Foerste 2013) and to share it real-time (Litvin et al. 2008). Social media and short messages service (SMS) allow people to share text, photos and videos. Social networks (i.e., Facebook) and content communities (i.e., Pinterest, Instagram, Youtube) are particularly suitable for these activities. Travel experiences increase the amount and the variety of content that are published on social media and therefore their use by travellers and other connected people. Posts are becoming a sort of "new postcard". Travellers can share also posting online reviews on travel review websites, such as TripAdvisor, giving scores, publishing photos and describing the experience.

In the post-trip stage travellers generally go on sharing their experience by means of social media. They can share context-related content about the holiday, chat online with friends about the experience, or post an online review on travel review websites. This last action could be a sort of award for the company, or a way for complaining.

Mobile connection availability affects travellers' behaviours moving some of the activities from the pre-trip and the post-trip stages to the during-trip phase (Xiang et al. 2014). This happens especially in the case of high experience customers or already known destinations (i.e. research of attractions, restaurants, maps, etc.) (Jun et al. 2007). Thanks to Mobile phone tracking (obtained employing both radio signals and Global Positioning Systems (GPS) technologies), tourists can make easily real-time decisions about various services directly at the destination: travellers can manage unexpected situations and complete travel activities more efficiently and effectively (Wang et al. 2012). On the basis of the literature review this study attempts to focus mainly on the specific impacts of mobile technologies to the overall travel experience considering various stages of the consumer behaviour process.

3 Research Methodology

For the purpose of the study a qualitative research methodology was considered appropriate. A focus group methodology was used to obtain in-depth information about how young adults employ mobile technologies in their travel experience and behaviour. Data were collected by means of two focus groups of young adults aged 18–37, called also Millennials, who are generally more dynamic in online travel and experienced in tourism decision making. Participants were asked to discuss in detail their experience concerning the use of mobile technologies during the travel behaviour in the pre-trip, during-trip and post-trip steps. Focus groups methodology was chosen because generally suitable in order to investigate beliefs and emotions about a specific issue. This qualitative research method seems to be adequate for the purpose of the study because it is advocated as a means of identifying an appropriate domain of content for the development of more structured survey instruments (Fowler 1993). The focus group is an economical way of gathering in-depth information (Agar and McDonald 1995; Milman 1993) on dynamics of attitudes and opinions in the context of interaction that occurs between participants.

The two different focus groups were composed of 10 participants and were selected according to the age: from 18 to 27 (FG1) and from 28 to 37 (FG2). A number from 1 to 10 was assigned to each participant for each group (FG1-1, 2, n; FG2-1, 2, n) in order to simplify data processing and analysis. People with a certain expertise of mobile technology were identified, equally balanced from the point of view of gender (5 men and 5 women). To assess the use of mobile technologies we verified, prior to the analysis, that all participants were familiar with modern mobile devices. For each focus group a trained moderator co-ordinated the interactions trying to generate primarily qualitative data. The discussion was conducted in Italian language. Citations reported in the results section have been translated in English by the authors. Written notes was taken to record the data in order to avoid the possible embarrassment that could be generated by tape recording. A semi-structured script was used to ensure consistency in the questioning route across the groups and to help participants thinking about their experience with modern mobile technologies. The study was conducted during summer 2014 and followed two steps: the first step consisted in the script processing through a literature review and a comprehensive analysis of statistical data and trends about mobile technologies adoption and usage. After that, the second step, dealt with the selection of the focus groups and the practical implementation. Finally, data were analysed in order to identify possible research questions and hypotheses to be tested in a subsequent step of the study.

4 Results and Discussion

4.1 A Multi-device Traveller?

Both focus groups resulted to be composed by "multi-device" consumers (consumers who use more than one device during the day for different kind of activities). However, we can find some differences between the two focus groups. Participants of focus group 1 (FG1), composed by people aged 18–27, use more than one device during the day but they share the use of some of them with other persons within the family. In this case, a very frequent behaviour is to use the smartphone in mobility and use other devices in the evenings at home. A large majority of the participants utter that the smartphone is their private mobile device while the other ones (tablet, laptop) are often shared with the brother/sister or with parents:

FG1 (2): Maybe in the evenings I use the tablet but it is generally used by my Mom for recipes.

FG1 (10): I would like to use it (tablet) more often but it is the one of my mother. Then, I use my smartphone[1] *or the laptop.*

Participants of FG2, composed by people aged 28–37, use more than one device at the same time during the day more frequently in mobility than FG1. They bring laptops and tablets with them during the day, generally due to their working activities.

FG2 (1): My laptop is always with me! I've bought a small one for this reason.

FG2 (6): I love using my tablet to read books or magazines when I'm on the train.

When they go back home in the evenings some of them can be shared with other members of the family. In the case of FG2 part of respondents differentiates between the one "of the house" and "my personal" mobile device. For example, sometimes tablets and laptops are bought to substitute a desktop computer, perceived as less appealing than more modern devices.

FG1 (10): We bought a laptop to substitute the old computer that goes very slow. In this way we can use that in each part of the house. But I prefer the tablet, we have one. It is smaller and touch-screen as my smartphone.

During the travel experience participants of FG1 prefer to use only their smartphones. They bring with them also the laptop in the case of a business or a study stay. Participants of FG2 are more likely to travel also with a tablet or a laptop. In the case of a couple, a family or a group of friends all members will bring with them their own smartphone, that is perceived as a very private device, and will bring in common other devices (tablets, laptops).

[1] Generally the brand of the device was used.

FG1 (9): It depends on the type of travel. For example this summer I went to London with a friend and we decided to bring with us only my tablet. My friend brought also her laptop.

4.2 Mobile and the Pre-trip Step

Concerning the use of mobile technologies in the pre-trip step, the comments of the two focus groups appear to be very similar. Mobile devices are generally used to search for information about a destination or travel services. Participants of both groups indicate this search activity as the most frequent. However, in practice, this search is converted in different actions. Participants of FG1 search mainly information on Facebook that is the most used source of information. They hear from the experience of their friends, consulting their user-generated content (photos, video). Sometimes friends are also source of inspiration. Moreover, they visit social media pages of travel services and destinations. Only two participants indicate travel review websites (i.e. TripAdvisor, Yelp) as a source of information and only one has opened an account on Tripadvisor. On the contrary, respondents of FG2 consider these applications as important sources of information, as well as main transactional websites such as Booking, Expedia, etc. However, both the groups show a low perception of trust about travel reviews posted on travel review websites.

FG1 (2): I prefer to hear my friends' experience on Facebook. They publish a lot of photos and videos that I trust more than other stuff.

Another activity for which travellers employ mobile devices and applications is the evaluation of alternatives. They both download specific mobile applications and access Internet browsers by means of mobile devices. Google has been indicated as the most used Internet search engine. Main applications and websites used to evaluate alternatives are transactional websites such as Booking and Expedia, and non-transactional websites such as meta-search websites (i.e., Skyscanner Trivago) and, especially for FG2, travel review websites (i.e., Tripadvisor). Meta-search websites are mainly used in the case of unknown destination or to find the lowest price (fare/rate). Sometimes, especially very experienced participants use more than one meta-search (for each type of service) and then check or integrate the information on the website of the single company.

FG1 (4): Generally, I consult the website of the airline or of the hotel. Other websites offer me too many solutions where I have to create a new account to verify the real price.

Concerning purchasing activity, participants of FG1, after having searched for information on mobile devices, prefer to proceed to the purchase by means of a laptop. Generally, the reasons given were connected to: the preference to have a wireless connection, considered more stable and sure, the better opportunity to read

all the information about the purchase, probably due to the age and, therefore, to a lower level of experience in travel purchases than FG2. In fact, participants of FG2 are more likely to buy through mobile devices; sometimes they have their credit cards information already recorded in the applications and the password saved so that they can access the account more easily.

FG1 (3): I rarely purchase travel products through mobile devices. I prefer to use my laptop at home so that I can read also possible strange clauses written in very small characters.

FG2 (7): On my smartphone I have all my password already saved. I purchase trains and flights tickets sometimes also hotel stays. I also book tickets for cinemas, exhibitions, etc.

4.3 Mobile and the During-Trip Step

Concerning the during-trip step, recording and sharing are definitely the most cited activities. Participants of both groups create content, especially visual content such as photos and videos, as a reminder of the trip, but also in order to share them with friends by means of social media. WhatsApp was the most cited mobile application, along with Facebook and Instagram. Some participants of FG1 report almost all the moments of the holiday (they are always connected if possible). However, the general orientation is to identify emotional and special moments and to share them with their network.

FG1 (4): Me and my friends record all the activities on Facebook. I chat with them about what I'm doing and I share photos and videos. When I find something strange or funny I catch it by means of Instagram and it is immediately on Facebook.

FG2 (2): During the holiday I love to capture my beautiful moments in order to keep them alive after the comeback and to show them to my friends and family.

During the trip participants also search for information, especially about what to do at the destination. They look for restaurants, compare rankings and ratings (rarely the reviews), they check which are possible attractions and activities nearby, as long as maps. Participants to FG1 prefer to search on Facebook and on Google while those belonging to FG2 indicate also specific applications such as Foursquare, Around me, or Tripadvisor (especially for restaurants), generally more used to find places rather than to post actively reviews.

FG1 (4): I use my smartphone to find maps, pubs, beaches and other things to do.

FG1 (9): When searching for a restaurant on TripAdvisor I give a look at the number of comments and at the ratings, filtering according to the budget. I find boring reading all the feedbacks.

4.4 Mobile and the Post-trip Step

After the comeback, participants utter they share their travel experience, but in different ways according to the kind of sharing activity undertaken during the trip. Participants particularly active during the trip are more likely to create albums of most beautiful photos or to publish creative elaboration of what collected during the trip. For example, a video that put together the most nicest or funny moments experienced during the trip can be posted on Facebook. In these cases, the sharing activity has already been done real-time during the journey, therefore to be "appealing" the new post has to give something more. On the contrary, participants less "addicted" to sharing activity during the trip, or simply who had no opportunities to share due to an unstable internet connection, publish their experience in the post-trip step.

FG1 (4): When I come back I collect all the photos and videos of my holiday. Then, I decide the most amazing and funny ones and I create different albums. I have a great applications to create videos with music. . .it is time consuming but at the end it is very satisfactory.

We found in both groups a low propensity to publish reviews on travel review websites after having evaluated the overall experience. This can be connected to the thought, previously cited, that online reviews can be fake. The low level of trust in collecting information could influence the interest in writing a review for others. Also the reply to questionnaires sent by transactional websites is rarely considered. A minority of participants reported cases of high dissatisfaction or high satisfaction when they decided to write a review.

FG1 (4): Yes, I remember one time I decided to reply to a questionnaire. I was very angry about the way I was treated by the staff. They were rude. Anyway, I had already strongly discouraged all my friends of my network not going in that hotel. I hope they will follow my recommendation.

5 Discussion and Managerial Implications

Results of the focus groups' analysis confirm that travellers are frequently "multiple device" users but they show different behaviours. Smartphone is considered the most important mobile device. It is private and unlikely shared with other people. On the contrary, other mobile devices are sometimes shared, especially in the case of a family. In particular, laptops and tablets are substituting more traditional IT devices (desktop computers) because they are easy to be used in mobility (also at home) by different people in different locations. Furthermore, they are more appealing because they are increasingly characterized by a technology similar to smartphones (i.e., they are touchscreen). We notice a particular role of the brand that was generally cited by participants referring to their smartphones. The groups,

equally composed by people using IOS or Android, demonstrated a particular loyalty towards their brands. Concerning the travel experience, depending on the type of trip, tourists will bring with them a different mix of devices. The smartphone is for sure the mobile device most used. The analysis of the way people employ mobile devices during the three steps of the travel process reveals that in the pre-trip step people mainly search for information while, during the trip, they continue to search real-time information and, in addition, they record context-related information for sharing. This result confirms previously literature about social media influence on consumer behaviour also specifically for mobile technologies (Cox et al. 2009; Fotis et al. 2012; Munar and Jacobsen 2014; Xiang et al. 2014). Our findings are different from those of Murphy et al. (2010) who found that the majority of young travellers interviewed usually share UGC about the trip on social media (Facebook) in the post-trip stage. Anyway, we found a certain "advanced" sharing activity in the post-trip stage but more similar to the creation of travel diaries to be posted on social media. Results confirm electronic word-of-mouth (eWOM) biased information identified by literature. Online feedbacks are posted by extremely satisfied or extremely dissatisfied customers (Anderson 1998; Litvin et al. 2008). The majority of participants to the study show a low level of trust towards online reviews due to the possibility of a deliberate manipulation. This confirms the studies of a great corpus of literature on eWOM credibility (among others Cheung et al. 2009; Mauri and Minazzi 2013). Finally, we notice in our study a progressive move of some travel decisions from the pre-trip and the post-trip stages to the during-trip phase confirming the studies of Jun et al. (2007), Xiang et al. (2014), and Munar and Jacobsen (2014).

Coming to managerial implications, the increasing trend to delay some kinds of travel decisions/purchases to the during-trip stage (especially for the "activities to do" at the destination), thanks to the development of mobile technologies, could be both an opportunity and a threat for travel and hospitality companies. Plans developed in the pre-trip stage could then change during the travel experience (Stewart and Vogt 1999; Jun et al. 2007). Therefore, on the one hand, travel companies could try to convince customers purchasing the services since the pre-trip stage by means of partnerships with other travel operators. For example, some airlines or meta-search websites, before concluding the purchase process, give tourists the chance to book other services such as accommodation, car rental, etc. In this way, they could try to optimize sales already in the pre-trip step, reducing the risk to lose customers during the process due to the competition of other local operators. On the other hand, the propensity to move some of the information search activities in the during-trip step could be a great opportunity for local companies that do not participate to large partnerships or sell services through OTAs. Small hotels, restaurants, etc. able to develop an appropriate technology in order to intercept customers at the destinations could have good results (i.e., iBeacon). Some travel companies, especially hotels, consider travel review websites as a threat due to feedbacks' manipulation. However, these could be also an additional instrument to monitor customer satisfaction. In this study we notice a low propensity of participants to consult online reviews. This can be a risk

for travel companies because respondents prefer to give their opinions and find information by means of social media like Facebook. This kind of eWOM is even more beyond the control of the company than online reviews because it can be hardly monitored by companies. Therefore, it becomes more and more important to actively operate on social media interacting and engaging with customers. This allows travel companies also to check the customer satisfaction level with interesting opportunities of real-time service recovery. The interaction with customers in this stage on social media, if properly managed, can be an opportunity to make a client loyal developing a long-term relationship. Moreover, as resulted from the study, travellers want to share their emotions and most beautiful moments. Therefore, the ability of the company to organize and provide memorable services, according to the needs of different target markets, could really contribute to increase sharing of context-related content (eWOM) and, in turn, improve customer satisfaction.

6 Conclusions

The development of mobile technologies affects the distribution of activities among various stages of the travel behaviour. Thanks also to the increased opportunity for tourists to be connected to the Internet during the journey, we notice that the travel stages (pre-trip, during-trip and post-trip) can overlap with a repositioning of some activities from the pre-trip and post-trip stages to the during-trip step. The consumption of travel services becomes particularly important to be managed considering mobile tracking technologies that are developing very fast. Location-based features have now become a prerogative of many applications of different travel services that allow companies to personalise their offer, their marketing activities, and communicate directly to the customers. The ability to exploit the opportunities offered by mobile technologies, understanding "mobile travellers" behaviour, could be a crucial factor to improve competitiveness of travel companies.

The present paper is based on an explanatory study and presents some limitations that could be tested in the future research. First, focus groups research methodology does not permit the framing of predictions or generalizations that extend beyond the context but may provide important means of theoretical generalization. Based on the findings from these focus groups, we are developing a survey aimed at empirically testing the research questions suggested by the study. Second, the study was focused on the experience of focus groups of Italian young adults. New paths of research could extend the analysis examining different cultures, ages, and nationalities. Are Millennials "global costumers" or is it possible to find some differences across cultures? Going on with the analysis, especially developing a quantitative research framework, more variables could be considered. It could be interesting for the future to understand the impact of wearable devices

that are developing now. Other possible interesting topics for future research could be: the role of mobile devices brands, the ways to interact with travellers during the trip by means of proximity technologies, and the different roles of various mobile devices (smartphones, tablets, laptops).

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Transportation Mode Annotation of Tourist GPS Trajectories Under Environmental Constraints

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Abstract Tourist transportation usage analysis provides basic information for tourism policy making. With the technical advances of tracking devices, GPS-equipped smartphones sense the movement of tourists and generate extensive volumes of movement data detailing tourist trajectories. Many researchers study semantic annotation using machine learning. However, it is necessary for machine learning to label the data for training; this requirement is costly. It would be useful for GPS semantic annotation if labelling the substantial amounts of GPS data could be avoided. In this research, we propose a new, simple GPS semantic annotation method using environmental constraints without machine learning. We call this method Segment Expansion with Environmental Constraints (SEEC) and assume a tourist behaviour model in which tourists move by foot and public transportation in touristic destinations that include numerous locations of interest. SEEC inferred the transportation modes of the GPS trajectory data at a 90.4 % accuracy level in the experiment.

Keywords GPS • Semantic annotation • Big data analytics • Environmental constraint

1 Introduction

Tourist transportation usage analysis provides basic information for tourism policy making, destination marketing strategy, and transportation policy making. There are various methods for measuring tourist transportation usage. Traditional questionnaires, face-to-face interviews, and traffic analysis are frequently employed (Pearce 2005). With the technical advances of tracking devices, GPS-equipped smartphones sense the movement of tourists and generate extensive volumes of movement data detailing tourist trajectories. Researchers can measure tourist

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_38

movement in an objective manner using this GPS trajectory data. However, GPS trajectory data lacks semantic richness because it includes only coordinates (longitude and latitude) and time. For enhanced tourist transportation analysis, the quality of semantic richness can be improved by including the transportation modes. This is called semantic annotation for GPS trajectory (Guc et al. 2008) and provides superior information for tourist transportation analysis.

Significant research has been undertaken into the study of semantic annotation using machine learning (Bolbol et al. 2012; Yan et al. 2011, 2013; Stenneth et al. 2011; Zheng et al. 2010; Liao et al. 2007). However, machine learning has limitations for GPS semantic annotation. It is necessary for machine learning to label the data for training; this requirement is costly. Furthermore, the labelling cost for GPS trajectory data is greater than other data because temporal-spatial information must also be considered. It would be beneficial for GPS semantic annotation if labelling the substantial amounts of GPS data could be avoided.

As an alternative method to machine learning, we propose methods that utilize the moving constraints of human transportation in physical space. We call these constrictions environmental constraints. The environmental constraints physically or legally restrict human movement in areas using transportation modes and can be labeled as attributes of the area. The environmental constraints can be categorised into two classes. The first class is a route constraint. Certain transportation modes move along specific routes and the users can only embark/disembark at specific locations. Typical examples are trains and route buses (not sightseeing buses). Trains and buses run on predefined routes only with regular stops in train stations and bus stops. The second class is an entry constraint. Other transportation modes are not permitted to enter certain areas although they can move freely and the users can embark/disembark without restriction. For instance, taxis cannot enter pedestrian zones and pedestrians cannot enter railway tracks, streets, or motorways. Combining the environmental constraints and tourist unique movement information such as speed, transportation modes can be inferred with high accuracy. The environmental constrains can be acquired with relative ease from commercial map companies or public map services.

In this research, we propose a new GPS semantic annotation method using environmental constraints without machine learning. As the scope of the research, we assume a tourist behaviour model in which tourists move by foot and public transportation in touristic destinations that include numerous locations of interest, such as Paris and Kyoto. In the experiments, we use the GPS trajectory data of school trip students and their tour escorts around Kyoto City. The transportation modes that students and escorts can use are train, bus, taxi, and foot. Bicycle mode is not included. The GPS measurement interval is 1 s. Because GPS trajectory data include some error of measurement, the data are filtered before the inference process. The proposed method is evaluated on accuracy of mode inference by comparison with correct data labeled by a human.

This paper is organised as follows. In Sect. 2, related work is introduced. In Sect. 3, the proposed method is described. The experiment is described in Sect. 4. In Sect. 5, we discuss the results. We conclude the paper and discuss future plans in Sect. 6.

2 Related Work

Significant research has been undertaken into the study of GPS semantic annotation. Yan et al. (2011) proposed a general model including a computing platform from GPS raw data to semantic trajectory. Their model infers only walk and automobile modes. However, others have focused on transportation mode inference. Bolbol et al. (2012) categorise inference approaches into machine-learning and procedural approaches. In the following subsections, related works are introduced by these groupings.

2.1 Machine-Learning approach

Machine-learning approaches infer the transportation modes based on learning from existing GPS trajectories. Some studies propose the employment of Decision Trees (Zheng et al. 2010), Bayesian Networks (Stenneth et al. 2011), and hierarchical Conditional Random Fields (Liao et al. 2007). Recently, several studies have attempted to implement mode inference using Support Vector Machines (SVM) (Bolbol et al. 2012; Reddy et al. 2010). However, machine-learning approaches have limitations for GPS semantic annotation. Machine-learning approaches must label a volume of training data. For GPS trajectory data, the labelling cost is higher than other data because temporal-spatial information must be considered. Although many studies use speed as an important feature for transportation mode inference, it has an obvious limitation. Speed is used for mode inference of each observation point and consecutive points that we call segments. In case of mode inference for each observation point, we are unable to distinguish some modes using speed only. For example, a car can run at slow speed or stop for relatively long periods because of traffic congestion or passenger embarkation/disembarkation and we cannot distinguish the difference between a stopping/slow speed car and walking pedestrians using speed only. For segment mode inference, we can use speed features on multiple points.

2.2 Procedural Approach

Procedural approaches infer the transportation modes based on logical assumptions or rules. Stopher et al. and other researchers assume typical tourist travel patterns and the logic assumptions of human activities such as work and sleep (Stopher et al. 2008; Liao et al. 2007). Hemminki proposes acceleration as a mode classifier (Hemminki et al. 2013). In summary, there has been minimal research into the procedural approach to GPS semantic annotation.

3 Semantic Annotation Using Environmental Constraints

In this section, we describe the proposed GPS trajectory annotation method called Segment expansion with environmental constraints (SEEC). SEEC infers tourist transportation modes in two stages using environmental constraints and tourist activity characteristics as described in Fig. 1. In the first stage, highly possible transportation modes $m_i\,(i :: \text{positive integer})$ against consecutive points of GPS trajectory data $p_j\,(j :: \text{positive integer})$ are inferred by the environmental constraints and speed $sp_j\,(j : : \text{positive integer})$ Speed sp_j is calculated in the preprocessing stage before the inference process. We call consecutive points a segment. Segments are determined by the inferred modes with a length defined as the difference of time between the first point and the last point. In this first stage, the segments $s_k\,(k ::$ positive integer) are fragmented and not necessarily successive. In the second stage, the segments are expanded. The number of segments in the GPS trajectory decreases as a consequence of the expansion. The details of each process are described in Sects. 3.1–3.3.

The environmental constraints are described in Fig. 2. The environmental constraints, bus route, train route, and pedestrian area, are applied to the model. The environmental constraints are powerful tools for transportation mode

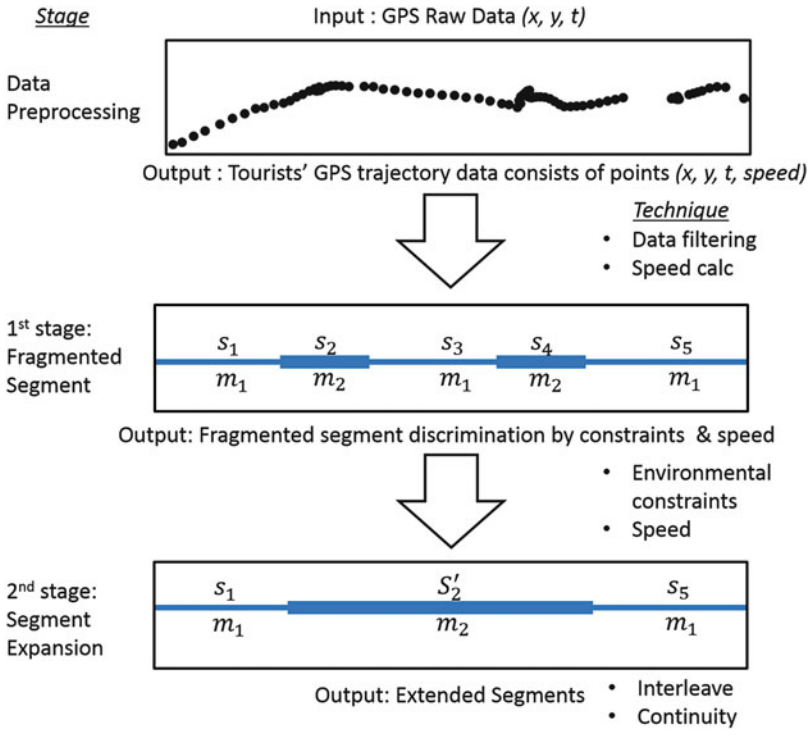

Fig. 1 Overview of SEEC

Fig. 2 Environmental constraints described on Kyoto City map

inference. "Bus" and "train" modes can be inferred with high accuracy using route constraints because buses and trains run along specific routes. However, using route constraints, the system also infers the trajectories of tourists who move by other transportation modes in the bus or train routes as "bus" or "train" modes. Thus, the rate of false-positives, which means that the system infers incorrectly as belonging to the class, increases. The rate of false-negatives, which means that the system fails to infer as belonging to the correct mode when it should have, is relatively low. Thus, when using environmental constraints, decreasing the rate of false-positives is a challenge. SEEC solves the false-positive issue using strong assumptions on tourist activity as follows. The first assumption is that tourists do not change the transportation mode in a short period. This is called the **continuity assumption**. The second assumption is that tourists do not change from train to automobile (bus or taxi) or automobile to train directly. A "walk" mode or other transportation mode must be interleaved. This is called as **interleave assumption**. These assumptions are obtained from the observation of tourist activities.

3.1 Data Preprocessing

GPS trajectory data includes outliers caused by propagation error. Therefore, before the inference process, outliers are filtered to remove abnormally calculated tourist speeds. Tourist speed is calculated from distance *Dist* and elapse time between two consecutive GPS observation points (x_p, x_q). $Dist\,(x_p, x_q)$ is calculated using Hubeny's distance formula described in Eq. (1). Speed sp_p is defined as the quotient of $Dist\,(x_p, x_q)$ and the difference of time between two consecutive points (x_p, x_q).

The tourist GPS trajectory data from the output of the preprocessing consists of coordinates, time, and speed. Similar to the proposed approach, some former researches compress the trajectory data to support low deviation (Parent et al. 2013; Potamias et al. 2006).

$$Dist(x_p, x_q) = \sqrt{(M \times dP)^2 + (N \times \cos(P) \times dR)^2},\ p \in T,\ q \in T,\ p \neq q \quad (1)$$

P: Average latitude between two consecutive GPS observation points;
dP: Latitude difference between two consecutive GPS observation points;
dR: Longitude difference between two consecutive GPS observation points;
M: Meridian radius of curvature;
N: Prime vertical radius of curvature;
T: Set of all GPS observations;
p,q: Consecutive GPS observations.

3.2 Inference-Fragmented Segments Using Environmental Constraints and Spesed

In the first stage of the mode inference, SEEC infers the modes from the GPS trajectory data using the environmental constraints and tourist speed. The flowchart of the process is presented in Fig. 3. Environmental constraints using route information are effective for inference of transportation modes that move on limited routes. Of all the transportation modes in the research, bus and train are the ones with restricted routes. For instance, all "train" mode movements are included in the trajectories that move on the train routes, therefore, the true-positive rate of inference is 100 %, in theory. In practice, the true-positive rate does not attain 100 % owing to the GPS outliers. Conversely, numerous false-positives occur and therefore we must employ other constraints to decrease the false-positive rate. SEEC confines the subject to environmental constraints and decreases the false-positives by inferring the transportation modes using tourist speed. SEEC also employs other techniques corresponding to specific situations to improve the inference rate. For example, taxis and buses travel motorways at a similar speed. Thus, it is difficult to distinguish them using speed only. To address this issue, SEEC applies the difference of deceleration density between taxis and buses. Though buses regularly stop at bus stops, taxis usually stop when traffic lights turn red and customers embark and disembark. Therefore, the density of deceleration of taxis during the movement tends to be higher than that of buses. SEEC uses this tendency to improve inference.

SEEC applies the following constraints given as spatial information illustrated in Fig. 2: train route, bus route, and pedestrian route.

Train Route Based on the characteristics of a train, if the GPS point is located in the train route and the speed is higher than a certain threshold sp_r, SEEC infers

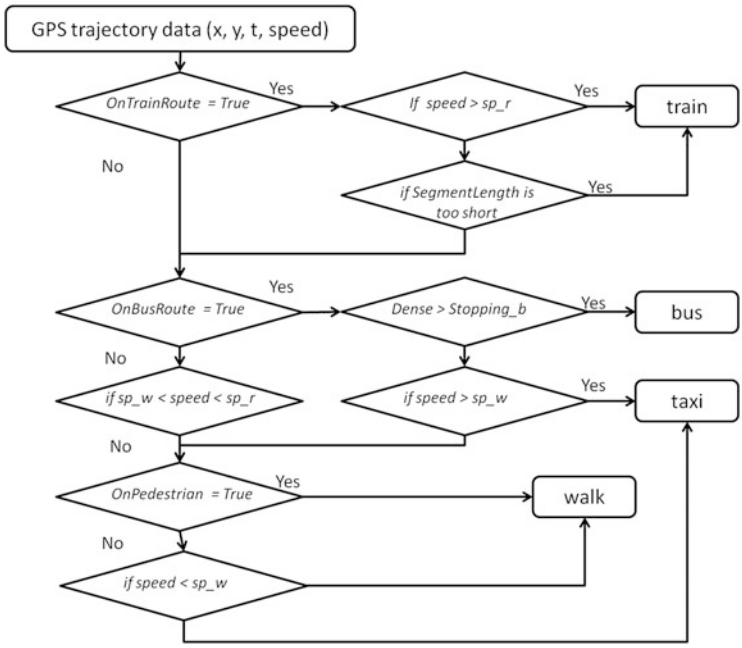

Fig. 3 Flowchart of inference-fragmented segments

the point as "train" mode, as illustrated in Fig. 4. In Fig. 4, the light blue belt indicates a train route (40 m buffering). Green diamond points within the belt are inferred as "train" mode. However, tourists sometimes cross the train routes at the level crossing. When the interval of the consecutive points (*SegmentLength* in Fig. 3) is short, SEEC infers the mode of the segment based on the modes of the previous or next segments. SEEC does not use speed for inferring the "train" mode because trains change speed when they stop and start at train stations.

Bus Route In a manner similar to the train, if a GPS point is located in the bus route, SEEC infers the point as "bus" mode. However, because buses and taxis use the same streets and motorways, many false-positive inferences occur. Buses stop regularly at the bus stops; therefore, the average number of stops in a segment is usually lower than that of taxis. SEEC uses the difference of the density of stops in a segment *dense* and distinguishes between "bus" and "taxi" mode if *dense* is less than a threshold *stopping _b*. Further, if the average speed during the segment is less than a walking threshold *sp _w*, SEEC infers the segment as "walk" mode. If tourists run along a route where a bus does not run, at the walking threshold sp _*w*, SEEC infers the segment as "taxi" mode. Inference using bus route constraints is described in Fig. 5. The grey belt is a bus route (20 m buffering). The blue triangle points indicate that "bus" modes are inferred by the route constraints. Yellow star-shape points are inferred as "taxi" mode because the segment is located outside the bus route.

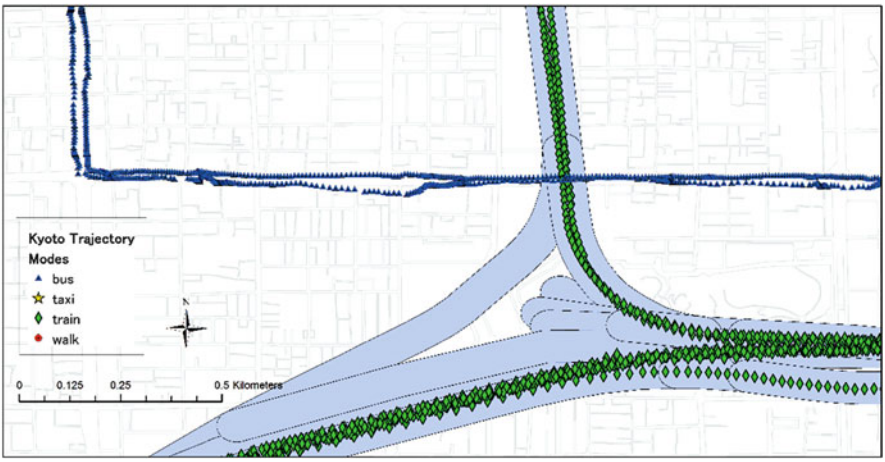

Fig. 4 Inference using train route constraints near Kyoto station

Fig. 5 Inference using bus route constraints in central Kyoto

Pedestrian Area GPS trajectory data in vehicle-free areas are inferred as "walk" mode.

Inference by Speed The modes for the GPS trajectory data that is not inferred using the environmental constraints is inferred using the speed *sp* as described in Fig. 3.

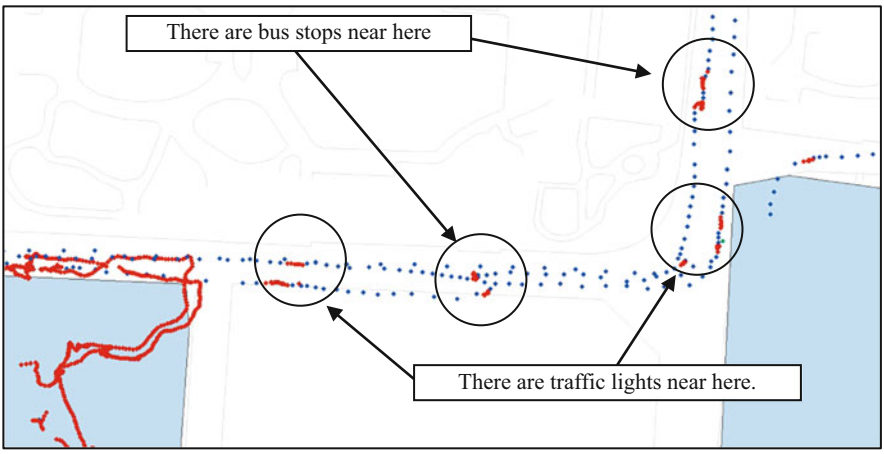

Fig. 6 Roughly labeled segment by speed in Central Kyoto

3.3 Segments Expansion

Interleave Assumption Tourists do not change train to automobile (bus or taxi) or automobile to train directly. "Walk" mode and other modes are interleaved. In the case of successive segments of these modes, the shorter-interval segment is merged into the longer-interval segments. The mode of the longer segment is applied.

Continuity Assumption Tourists typically do not change their mode of transportation over a short period. If the interval of a segment is less than a specific criterion, the segment is merged to the previous or next segment. SEEC infers the mode of the segment using speed and merges the segments using the time criterion. As illustrated in Fig. 6, the short-interval segments are assumed to be deceleration or acceleration of automobiles/trains at bus stops or traffic lights. The red points in Fig. 6 indicate a speed of <2 m/s. The blue points indicate that the speed is >2 m/s and <15 m/s.

4 Experiments and Results

To measure the performance of the SEEC algorithm, we tested with actual GPS trajectory data. We used 16 datasets of GPS trajectory data from students and their escorts who travelled in Kyoto as presented in Fig. 7. The red circle points designate "walk" mode. The blue triangle points are "bus" mode and the yellow star-shape points specify "taxi" mode. The correct classification for each point was determined by human verification. Environmental constraints related to the geographical range are essential for SEEC; therefore, the target area of the experiment must be

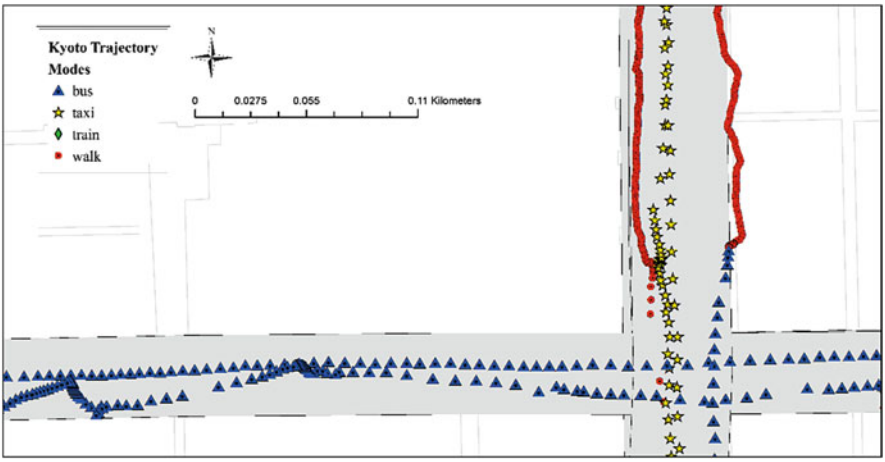

Fig. 7 Actual GPS trajectory data

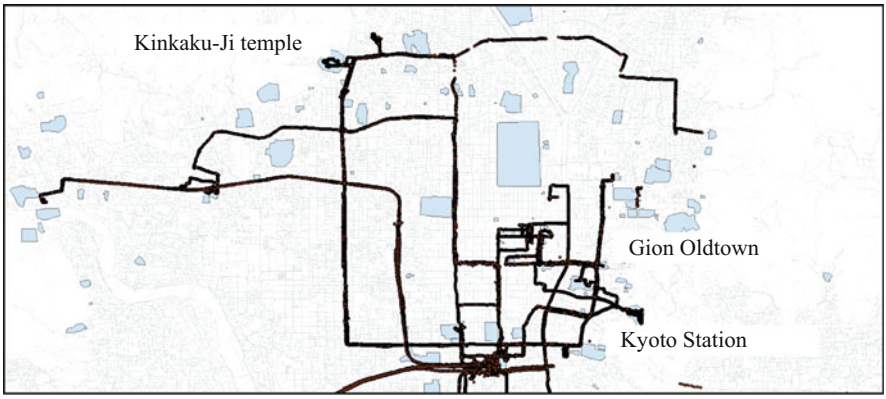

Fig. 8 Target area in Kyoto City

carefully selected. For this experiment, we selected the central Kyoto area described in Fig. 8 because this area includes all transportation routes and is the most popular area for school trip students.

For the environmental constraints, we used the spatial information of bus routes, railways, and pedestrian zones. For the bus routes and railways, we acquired shape files from a map company that are generally used for GIS applications. For pedestrian zones, we obtained the spatial information from Kyoto City local governments. From our experience, we can acquire similar data in other tourism areas from map companies and local governments. We used the ArcGIS application for geographically matching the GPS trajectory data with the environmental constraints. The screening value between walk and bus/taxi sp_w was set to 2 m/s; the

Table 1 Results of the experiments

Inference	Actual				Total count
	Bus	Taxi	Train	Walk	
Bus	**82.8 % (15,601)**	17.5 % (1,413)	0.0 % (0)	4.5 % (5,817)	(22,831)
Taxi	6.1 % (1,158)	**60.1 % (4,847)**	10.6 % (529)	0.3 % (371)	(6,905)
Train	0.2 % (30)	0.3 % (21)	**77.3 % (3,869)**	1.3 % (1,620)	(5,540)
Walk	10.9 % (2,048)	22.1 % (1,779)	12.2 % (609)	**93.9 % (120,418)**	(124,854)
Total count	100.0 % (18,837)	100.0 % (8,060)	100.0 % (5,007)	100.0 % (128,226)	90.4 % (160,130)

Bold indicates inference precision rates (i.e., matches between inference and actual).

screening value between bus/train and train sp_r was 15 m/s. We determined the values of these thresholds from the average speed of each transportation mode. The screening value of stop density between bus and taxi *dense* was 0.1.

From the results of the experiments, the total inference precision rate was 90.4 %. The inference precision rate of "bus" was 82.8 %, "taxi" was 60.1 %, "train" was 77.3 %, and "walk" was 93.9 %. The result of the experiment is described in Table 1.

For comparison with other technique, we test the same data on the same data set by Support Vector Machines (SVM). As the result of fivefold cross validation on the same data set, total inference precision rate is 75.2 %. Each inference precision rates are 88.9 %(bus), 78.9 %(taxi), 67.1 %(train) and 67.7 %(walk). For the comparison test, we used svm function in the e1017 package for R.

The precision of these SEEC results was similar to the former researches using machine learning. For example, the inference results for the four transportation modes by Zheng were 76.5 % (Zheng et al. 2010) and for the six modes by Bolbol were 88 % (Bolbol et al. 2012).

5 Discussion

As the results confirm, we can acquire a high level of accurate inference using the SEEC method. Although, in principle, we should compare the SEEC results with alternative approaches on the same dataset, we can only compare our results with the results of the other papers on their dataset. The SEEC method is a type of procedural approach method. Therefore, a significant quantity of constraint information regarding the target area must be prepared prior to testing. As a rule-based method, previous knowledge regarding the transportation modes that tourists use is required for SEEC. In fact, the model for the experiments was designed as four transportation modes; other transportation modes were not considered. However,

this limitation of requiring previous knowledge is similar to supervised machine-learning methods.

In former research, transportation modes such as “tube”, “bicycle”, and “motorbike” were frequently included (Bolbol et al. 2012). If we can measure efficient GPS trajectory data underground, “tube” can be easily inferred using environmental constraints. “Bicycle” activity can be considered similar to “walk” except for the speed. The average speed of “walk” is approximately 4 km/h and that of “bicycle” is 15–20 km/h. “Motorbike” activity is similar to “taxi.”

Finally, we observed that the amount of the change for “walk” mode is generally lower than that of “bus” or “taxi” modes because these two transportation modes repeatedly accelerate and decelerate during normal movement. Therefore, by modelling the walking behaviour of tourists, we can distinguish between “walk” mode and the other two modes more efficiently.

6 Conclusion and Future Plan

In this research, we proposed a new GPS semantic annotation method called SEEC using environmental constraints based on two assumptions of tourist behavior without machine learning. The results of the experiments indicate the same level accuracy as the previous machine-learning methods. In the future, other transportation mode inferences including “motorbike” and “bicycle” will be addressed in the scope of our research. Moreover, the amount of speed change as an identifier of the “walk” mode will be added to SEEC.

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User Personality and the New User Problem in a Context-Aware Point of Interest Recommender System

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Abstract The new user problem is an important and challenging issue that Context-Aware Recommender Systems (CARSs) must deal with, especially in the early stage of their deployment. It occurs when a new user is added to the system and there is not enough information about the user's preferences in order to compute appropriate recommendations. It is common to address this problem in the recommendation algorithm, by using demographic attributes such as age, gender, and occupation, which are easy to collect and are reasonably good predictors of the user preferences. However, as we show here, user's personality provides even better information for generating context-aware recommendations for places of interest (POI), and it is still easy to assess with a simple questionnaire. In our study, using a rating data set collected by a mobile app called STS (South Tyrol Suggests), we have found that by considering the user personality the system can better rank the recommendations for the new users.

Keywords Context-Aware Recommender Systems • Cold-start problem • New user problem • Personality • Demographics

1 Introduction

With the tremendous growth of information available on the World Wide Web, it has become more and more difficult to search for and find relevant information on the Web. For instance, users of online tourism portals often find it difficult to select a hotel or a place to stay because of the overwhelming number of travel offers and the lack of effective system support. Recommender Systems (RSs) help overcome this information overload by providing users with selected (information) items that match their personal preferences (Ricci et al. 2011). The suggested items can be obtained by comparing the user's profile (which appropriately models the user preferences) with the descriptions of items (content-based approach) or with the profiles of other users (collaborative-filtering approach).

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_39

Context-Aware Recommender Systems (CARSs) are a special type of RSs that generate more relevant recommendations by adapting them to the specific contextual situation of the user (e.g., weather, temperature, season, and companion). Over the last couple of years, increasingly more elaborate recommendation algorithms and techniques for incorporating contextual information into the recommendation process have been proposed. According to (Adomavicius et al. 2011), they can be classified as contextual pre-filtering (or contextualisation of the recommendation input), contextual post-filtering (or contextualisation of the recommendation output) and contextual modelling (or contextualisation of the recommendation function), depending on the computational stage where the available contextual information is used.

Nevertheless, the cold-start problem remains a demanding challenge for CARSs as well. This problem occurs when: (1) a new user without rating history requests a recommendation from the system (new user problem); (2) the RS is asked to generate a recommendation for an unrated item (new item problem); or (3) the RS is requested for recommendations under contextual situations that have not been rated before (new context problem).

This paper focuses on the new user problem, which from the user's point of view is the most important one as it prevents new users from obtaining any recommendation tailored to their interests and needs. A common approach to this problem is either to provide non-personalised recommendations (e.g. popular items) or to utilize simpler recommendation techniques, for instance, those based on demographic user data, such as gender, age group, Zip code and income level. For instance, based on the knowledge that "males like soccer" and "females like figure skating", information items related to soccer and figure skating can be suggested to users with those demographics, respectively.

In this paper, we propose to consider the users' personality to overcome the new user problem in CARSs. We model the personality with the five-factor model (FFM) or Big-5 personality traits (Costa and McCrae 1996), which is currently the most widespread and widely accepted approach. According to this model, user personality is measured along five dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism. The main reason for using personality in RSs is that it is a predictable and stable factor that explains human behaviours. It has been shown that there exist direct links between personality and interests/preferences (Rentfrow and Gosling 2003), and hence, people with similar personality traits have similar interests/preferences. Moreover, user personality can be acquired through self-report questionnaires, such as the Five-Item Personality Inventory (FIPI) (Gosling et al. 2003), which we have used, or the 120 or 240 item International Personality Item Pool Representation of the NEO PI-R (IPIP-NEO) (Goldberg et al. 2006).

In a previous paper (Elahi et al. 2013) we have used the personality not only to generate better recommendations, but also to identify which ratings to acquire from the user, i.e., which POIs are useful for users to rate because they better describe the user preferences. The proposed rating elicitation technique leads to a significant increase in the number of ratings obtained from the users as well as to an

improvement of the recommendation accuracy. In this paper we further develop that analysis by comparing the benefit of exploiting the user personality to the usage of demographic information of the user, which is a more common approach. We investigate the effect of each of the five considered personality factors separately in order to determine which of them largely contribute to the accuracy of the recommendation model. To the best of knowledge, this is a novel work especially in the tourism domain.

In summary, in this article we present the evaluation of the usage of the Big-5 personality traits (Costa and McCrae 1996) in a state-of-the-art CARS algorithm, i.e., CAMF-CC (Baltrunas et al. 2011), and we compare it to a similar model that uses demographic attributes (i.e., age group and gender). Experiments were executed using the rating dataset derived from the South Tyrol Suggests (STS) app (Braunhofer et al. 2014a), an Android-based CARS that provides users with place of interest (POI) recommendations using various contextual factors (e.g., weather, time of day, location, and mood). The results show that the ranking quality and the prediction accuracy of CARSs can be improved by exploiting personality characteristics that cut across demographic categories.

The rest of this paper is organized as follows. Sect. 2 reviews the state of the art. In Sect. 3, we explain the implemented procedure to collect the demographics and user personality in our STS app. In Sect. 4, we present the experimental evaluation and the obtained results. Finally, in Sect. 5 we elaborate conclusions and give future work directions.

2 Related Work

Research on CARSs is a rather fresh topic that has drawn considerable attention in the last years. These systems recommend items personalised for each user by considering the contextual situation of the item and the user (Adomavicius et al. 2011). For instance, *liveCities* (Martin et al. 2011) is a CARS that, by considering the location of the tourists, sends them push-based notifications such as a suggestions about what to do, or discounts offered by nearby restaurants. In fact, various CARSs exploit the contextual information of the tourists to provide them with more relevant suggestions (Costa et al. 2013; Meehan et al. 2013; Barranco et al. 2012).

While recommendation techniques exploited in CARSs can be effective and robust for their frequent users, all of them have poor performance for new users and new items (cold-start problem). Particularly, in collaborative filtering based recommender systems, which are the type of recommenders that we are considering in this work, the cold-start problem is determined by the lack of a sufficient number of ratings for the system to be able to compute relevant and diverse suggestions.

This problem is even worse for CARSs. This is because, in order to properly function, these systems must collect not only ratings given by users to items, but also the description of the contextual situation under which the items were

experienced by the users and that can have influenced the users' appreciation of the items. For instance, consider a CARS that has obtained many low ratings for a mountain hiking route when the weather context of the user experience of the route was "rainy" (which here we assume that influenced negatively the ratings). However, suppose that the system has never collected any rating when the weather context was "sunny", which is a situation that we assume here can be more suited for that experience. In such a case, that route would not be recommended to the users in a sunny day since the system has no knowledge of how the users rate that route in a sunny day and it is not able to make a correct extrapolation from the low ratings given in the "rainy" contextual situation.

A common solution of the cold-start problem in RSs, relies on the usage of demographic information of the users. For example, (Pazzani 1999) computed the user-to-user similarity in a neighbor-based collaborative filtering system by using demographic attributes of the users, e.g., gender, age group, area code, education, or employment. This is an example of a more general class of techniques that is sometimes called *Demographic Filtering* (Adomavicius and Tuzhilin 2005), which is often used in tourism applications. For example, (Wang et al 2012) applies demographic filtering to categorize the tourists by their demographic attributes and generate recommendations based on their demographic classes. The main advantage of such systems is that they do not require any rating or extra knowledge from the users to make recommendations for them.

A more novel line of solutions of the cold-start problem is based on the exploitation of personality information of the users. As mentioned before, personality is a user characteristic that influences very much decision making as well as tastes and interests (Rentfrow and Gosling 2003; John and Srivastava 1999). In fact, people with similar personality usually share similar interests and tastes.

In order to be able to incorporate personality information of the users in the recommendation process, the system must identify and quantify the personality of the user. This can be done either explicitly, by asking the user to complete a personality questionnaire, or implicitly, by observing users' behavioral patterns during the interaction with the system (Kosinski et al. 2013). It has been shown that explicit personality acquisition has higher accuracy and yields to better results in terms of various measures such as user satisfaction, ease of use, and prediction accuracy (Dunn et al. 2009). Moreover, explicit acquisition of user personality is easy. In (Hu and Pu 2009) it has been shown that the users spent significantly less effort, in terms of perceived cognitive or actual task easiness and time, to complete the preference elicitation stage in a personality-based recommender system than in a rating-based recommender system. In other words, it is also easier for the user to reply to questions aimed at scoring the users in a personality model rather than evaluating items in given rating scale (e.g., five star). Users have also expressed a stronger intention for re-using the personality-based system. Hence, using personality characteristics of the user can be a valuable source of information for the recommender systems for better recommendation generation (Hu and Pu 2011; Hu and Pu 2009; Tkalčič et al. 2013).

3 South Tyrol Suggests

South Tyrol Suggests (STS[1]) is an Android-based mobile application that provides tourists with recommendations for approximately 27,000 POIs (i.e., accommodations, attractions, events, public services and restaurants) in South Tyrol (Italy) by exploiting various contextual factors (e.g., weather, time of day, day of week, location, and mood) in a recommendation algorithm that is based on matrix factorisation (Koren and Bell 2011). In particular, in STS, we have extended the CAMF-CC model proposed by Baltrunas et al. (2011). This is a context-aware matrix factorisation approach that integrates additional parameters for each contextual condition and item category combination, besides the standard parameters used in context-free matrix factorisation. We enhanced the original CAMF-CC model by incorporating also demographics and/or personality information of the users, which allows gathering behavioural information regardless of the availability of explicit ratings from the user. This approach follows an analogous solution described in (Koren et al. 2009). Given a user u, an item i, a contextual situation described by the contextual conditions $c_1,\ldots,c_k$ and the set of attributes $T(i)$ associated to item i, it predicts ratings using the following formula:

$$\hat{r}_{uic_1\ldots c_k} = \bar{i} + b_u + \sum_{t\in T(i)}\sum_{j=1}^{k} b_{tc_j} + q_i^T\left(p_u + \sum_{a\in A(u)} y_a\right), \tag{1}$$

where q_i, p_u and y_a are the latent factor vectors representing the item i, the user u and the user attribute a (i.e., a particular gender, age group or Big-5 personality trait score), respectively. $\bar{i}$ is the average rating for item i, b_u is the bias associated to user u, and b_{tcj} is a parameter that models how the contextual condition c_j influences the rating of items belonging to category t. It takes a positive (negative) value depending on whether the contextual condition c_j has a positive (negative) effect on the ratings for items belonging to category t. This allows, for instance, recommending indoor POIs (e.g., museums, churches, castles) on bad weather conditions and outdoor POIs (e.g., lakes, mountain hikes, scenic walks) on good weather conditions.

The model parameters are learned offline, once every 5 min, by minimising the associated regularised squared error function through stochastic gradient descent (Koren and Bell 2011). This learning procedure is fast; it takes only a few seconds to re-train the prediction model when new ratings are acquired.

[1] South Tyrol Suggests (STS): https://play.google.com/store/apps/details?id=it.unibz.sts.android

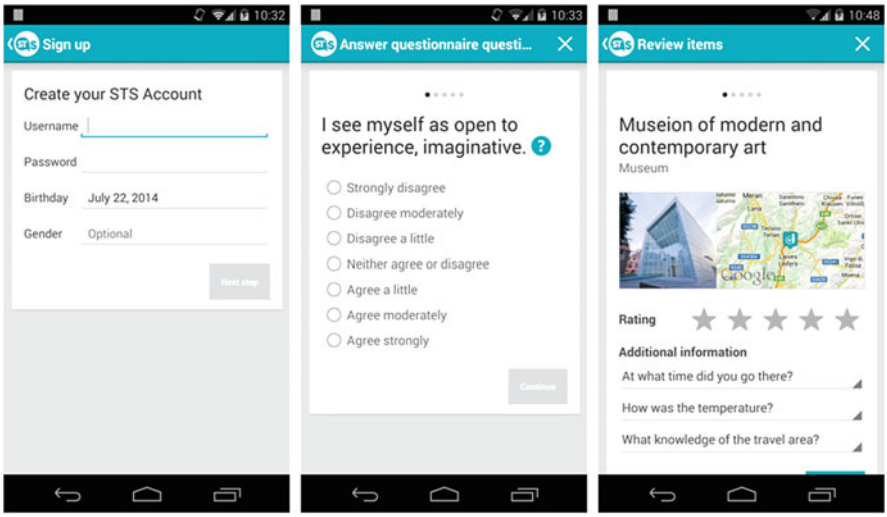

Fig. 1 Sample screenshots of STS

3.1 Demographic Information

During the registration process STS asks to its users the following demographic data (as can be seen in Figure 1, left): gender and birthday. Gender is given in a nominal scale (female/male) and can be easily integrated into the extended matrix factorization model of STS (as shown in Eq. 1), in order to enhance the user representation. Birthday, on the other hand, is an ordinal variable and we converted it to a less fine-grained scale, just using 6 levels: <18, 18–25, 26–39, 40–54, 55–69, and 70+. These age groups can then be used as additional user attributes integrated in the rating prediction factor model, analogously to the gender attribute.

To better illustrate this, let us assume that the prediction model is asked to predict the rating a *female* user u in the *18–25* age group would give to the item i, given that the contextual situation $c_1,\ldots,c_k$ holds. In this case, the rating prediction formula is rewritten as follows:

$$\hat{r}_{uic_1\ldots c_k} = \bar{i} + b_u + \sum_{t\in T(i)}\sum_{j=1}^{k} b_{tc_j} + q_i^T\left(p_u + y_{female} + y_{18-25}\right). \tag{2}$$

Here, user u is now characterized by three components: the latent factor vector p_u (which is learned based on her prior ratings, if any), the latent factor vector y_{female} (which is learned from prior ratings given by female users) and the latent factor vector $y_{18\text{-}25}$ (which is learned from prior ratings of users that are between 18 and 25 years old).

3.2 Personality Information

As part of the registration process, users are also asked to fill out the Five-Item Personality Inventory (FIPI) (Gosling et al. 2003) so that the system can assess their Big-5 personality traits, i.e., openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. Figure 1 (middle) shows a screenshot of STS where one of the questionnaire statements (i.e., "I see myself as open to experience, imaginative.") is displayed. The full FIPI questionnaire takes approximately 1 min to complete, and consists of the following five statements to be rated on a 7-point Likert scale from "strongly disagree" to "strongly agree":

1. I see myself as open to experience, imaginative;
2. I see myself as dependable, organized;
3. I see myself as extraverted, enthusiastic;
4. I see myself as agreeable, kind;
5. I see myself as emotionally stable, calm.

The score for a specific personality trait is calculated by dividing the score (e.g., 0 for "strongly disagree", 1 for "disagree moderately", ..., 6 for "strongly agree") by 6 (i.e., the maximum score), which gives a result in the interval [0, 1]. This result is then discretized into five categories (i.e., "very high", "high", "neutral", "low", "very low") so that it can be integrated into the rating prediction model of STS, in order enhance the user representation as well.

To see how this works, let us again consider an imaginary user u that scored *high* on extraversion (= ext) and *low* on openness to experience (= ope), conscientiousness (= con), agreeableness (= agr) and neuroticism (= neu). Then, her rating prediction formula for item i and contextual situation $c_1,\ldots,c_k$ becomes as follows:

$$\hat{r}_{uic_1\ldots c_k} = \bar{i} + b_u + \sum_{t\in T(i)}\sum_{j=1}^{k} b_{tc_j} + q_i^T\left(p_u + y_{ope\_low} + y_{con\_low} + y_{ext\_high} + y_{agr\_low} + y_{neu\_low}\right). \tag{3}$$

Now, user u is profiled by six components: the latent factor vector p_u and the latent factor vectors y_{ope_low}, y_{con_low}, y_{ext_high}, y_{agr_low} and y_{neu_low}, which are derived from the prior ratings of users that scored high on extraversion and low on openness, conscientiousness, agreeableness and neuroticism, respectively.

4 Evaluation Methodology

In order to compare the effectiveness of the context-aware recommendation model of STS when it is using the demographic information vs. the personality information, we performed an offline experiment. The goal was twofold: (1) to compare the

recommendation accuracy for new users that is achieved by using the demographics information versus that achieved by using the Big-5 personality traits; and (2) to identify the demographic attributes or the Big-5 personality traits that, if introduced in the prediction model, cause it to generate more accurate recommendations for new users.

4.1 Dataset

The rating dataset that we have used in the experiments was collected in about 1 year of activity of our STS app. In total, the STS dataset contains 2,534 ratings expressed on an ordinal scale from 1 (= "I didn't like it") to 5 (= "I liked it very much"), with the steps of 1. Many ratings (i.e., 64.17 %) contained in this dataset are augmented with the information about the contextual situations (at the time the items were experienced) described by up to 14 contextual conditions (e.g., weather, temperature, season, daytime, companion), which could be specified by the user by means of an appropriate graphical user interface within the application, as shown in Fig. 1 (right). Moreover, the STS dataset contains basic demographics (i.e., age group and gender) and personality information (i.e., Big-5 personality trait scores) of the users.

Some of the ratings contained in the STS dataset were entered by users for which no demographic and personality information was available. This happened when users did not enter birthday/gender data on the registration screen or skipped the personality questionnaire. Since in the evaluation, we wanted to compare the effect of using personality information vs. using demographics in the CAMF model, we considered only ratings from users for which both demographics and personality information were available. In this way we obtained a dataset of 1,379 ratings, whose details are summarized in Table 1.

4.2 Evaluation Procedure

In order to compare the effectiveness of the system to produce recommendations for new users in the two mentioned conditions, we carried out a tenfold cross-validation scheme as in Braunhofer et al. (2014b) and Shani et al. (2008). First, we randomly split the users in the entire rating dataset into ten mutually exclusive subsets of approximately equal size. Then, in each cross-validation run, we used the ratings coming from one of the obtained user splits as testing set and the remaining ones as training set to train the several distinct variants of the CAMF-CC model. In this manner, we created a test set of ratings coming from users that have no ratings in the training set, i.e., really cold (new) users without any observed rating. For each of the ten iterations, two performance metrics were recorded:

Table 1 STS dataset information

Total number of ratings	1,379
Number of users	239
Number of items	184
Number of contextual factors	14
Number of contextual conditions	56
Number of contextual situations	799
Number of demographic attributes	2
Number of personality attributes	5

1. *Mean Absolute Error (MAE)* (Shani and Gunawardana 2011): This metric evaluates the accuracy of predicted ratings. This is achieved by predicting the rating $\hat{r}_{uic_1 \ldots c_k}$ for each user-item-context triple $(u, i, c_1 \ldots c_k)$ in the test set T and comparing it with the actual rating $r_{uic_1 \ldots c_k}$, as it is done in the following formula:

$$MAE = \frac{1}{|T|} \sum_{(u,i,c_1 \ldots c_k) \in T} \left| \hat{r}_{uic_1 \ldots c_k} - r_{uic_1 \ldots c_k} \right| \tag{4}$$

2. *Normalized Discounted Cumulative Gain (nDCG)* (Shani and Gunawardana 2011): nDCG is a measure used to determine the effectiveness of RSs in correctly ranking the recommendations compared with an optimal ranking.

Both, nDCG and MAE, were calculated based on the commonly accepted test procedure proposed by Park and Chu (2009), which attempts to avoid performance bias that is caused by the overrepresentation of high raters. It does so by clustering items based on the ratings given by each user, and then randomly sampling one item for each cluster to be used as test item. MAE and $nDCG_1$ were then calculated on the basis of these test items. We also calculated $nDCG_k$, with $k = 2, \ldots 5$, but for lack of space and since they gave similar results we omit them.

Finally, the obtained MAE and nDCG estimates were averaged over all 10 runs, to produce cross-validation estimates of MAE and nDCG.

4.3 Evaluation Results

The obtained results are shown in Table 2. As can be noted, profiling new users through personality information led to more accurate recommendations, compared to profiling them by demographics. Overall, the context-aware rating prediction model achieved an MAE of 0.968 ($SD = 0.079$) by using the users' Big-5 personality trait information, whereas it achieved an MAE of 0.970 ($SD = 0.081$) by relying on demographics (the lower the better). Similar results were obtained in terms of nDCG; nDCG was higher by using personality than by using demographics ($M = 0.723$, $SD = 0.055$ vs. $M = 0.665$, $SD = 0.065$) (the higher the better). Subsequent t-tests performed on both MAE and nDCG differences between models

Table 2 Evaluation results

Type	Attribute	MAE	nDCG	Total MAE	Total nDCG
Demographics	Gender	0.969	0.679	0.970	0.665
	Age group	0.975	0.676		
Personality	Extraversion	0.968	0.680	0.968	0.723
	Agreeableness	0.971	0.671		
	Conscientiousness	0.973	0.694		
	Emotional stability	0.959	0.704		
	Openness to experience	0.979	0.689		

revealed that the MAE difference was not significant ($p = 0.452$), whereas it was statistically significant the difference of nDCG ($p = 0.001$). We believe that with a larger rating dataset also the difference in MAE will likely become statistically significant. Hence, these observations support our hypothesis that recommendations for new users are more effective when they are generated based on the user's personality type.

Moreover, Table 2 shows a comparison of the MAE and nDCG obtained by enhancing the user representation in the context-aware rating prediction model with individual demographic attributes (i.e., gender and age group) and personality traits (i.e., extraversion, agreeableness, conscientiousness, emotional stability and openness to experience). It can be seen that the best recommendation performance in terms of both MAE ($M = 0.959$, $SD = 0.092$) and nDCG ($M = 0.704$, $SD = 0.046$) is achieved using the emotional stability factor. This shows that emotional stability can be a significant predictor for the user's POI preferences, which is in line with previous findings that showed emotional stability to be a good predictor of media preferences (Hertel et al. 2008) and music preferences (Rentfrow and Gosling 2006).

To sum up, the obtained results seem encouraging as they suggest that adapting the recommendations to the target user's personality profile can increase the system recommendation effectiveness.

5 Discussions and Future Works

In this paper we have illustrated the benefits of incorporating the user personality information in order to tackle the cold-start problem in a mobile context aware recommender system for tourism called South Tyrol Suggests. We have analysed the impact of utilizing personality traits, either individually or together, on the quality of the recommendations, measured with well-known quality metrics, i.e., MAE (indicator of rating prediction error) and nDCG (indicator of ranking quality). We have shown that utilizing personality information is more effective than utilizing demographic information of users, which is a more common approach to tackle the cold-start problem. Moreover, we have shown that utilizing even a single

trait out of the five personality traits can still result in a significant improvement of the recommendation quality. This last result implies that the personality traits are not equally informative of the users' long-term behavioural characteristics. Hence, identifying the more important traits, that better represent and model the users' characteristics, can be beneficial in designing and implementing better and easier to apply personality-based recommendation algorithms.

There are several research directions that we can consider for future work. First, we are interested in analysing the usage of mobile phones and smart gadgets, such as smart bracelets, in order to predict the user personality. In fact, it has been shown that there are relations between people's personality traits and the usage behaviours they exhibit, which can be monitored by the above-mentioned devices. For example, (Lane and Manner 2011) showed that extravert people access more the texting functionality of the smartphones while users with higher agreeableness exploit more the calling functionality. Therefore, using the usage data collected by smart gadgets (e.g., how, when, where the gadget is used), one can predict the user personality and then, as shown in this article, generate more relevant recommendations.

Moreover, we would like to repeat our offline experiments by using other datasets, such as that collected by *MyPersonality*, a Facebook app for taking psychometric tests by users. The users who took the tests using this app came from different age groups, backgrounds and cultures. That makes the dataset unique and valuable. This dataset, currently, has more than 6,000,000 test results together with more than 4,000,000 Facebook profiles of the users who took the tests (My Personality Project 2014). For instance, there are more than 900,000 results for the Big-5 personality test. By repeating our experiments on this larger dataset we can obtain a stronger confirmation of our working hypotheses.

Finally, we would like to investigate the possibility of mining the social network accounts of the users of STS in order to identify their personality. In fact, it has been shown that the personality of the users can be learnt from their interactions in social networks (Bachrach et al. 2012), and afterward, be used in collaborative filtering based RSs (Fernández-Tobías and Cantador 2014). This is particularly interesting for the users that skip the personality questionnaire during the registration phase.

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Spatiotemporal Analysis of Rambling Activities: Approach to Inferring Visitor Satisfaction

Masakatsu Ohta, Yuta Watanabe, and Toshiaki Miyazaki

Abstract A method for investigating trajectories of rambling objects is proposed. The goal of this study is to infer people's satisfaction with their experiences by using their trajectories. Two aspects of rambling activities—multi-stop and multi-purpose trips, and trips with unplanned stops at various destination—are examined using mathematical knot theory. A two-dimensional trajectory is transformed into a three-dimensional curve composed of geographical location and dwell time at the visited spots. The aspects of rambling activities are reflected in the shapes of the knots obtained by deforming the curve. An experiment using 135 participant trajectories obtained at a campus festival confirmed: (1) trajectories caused by rambling were effectively detected; and (2) our method reproduced the relation between rambling activities and a participant's satisfaction with the festival. Namely, the more satisfied a participant was with the festival, the more likely he was to move around the venue. It is concluded that this method infers visitors' satisfaction with their experiences and is useful for designing ideal spaces to induce rambling activities.

Keywords Rambling activities • Visitor satisfaction • Trajectory • Knot theory • Topological feature

1 Introduction

Increasingly, ICT (information and communication technology) is enabling travellers to access useful information and plan trips efficiently (Buhalis and Law 2008; Xiang and Gretzel 2010). In some online social networking sites, users interact and provide their reviews on places such as hotels, restaurants, and local attractions. These reviews help travellers with time and budget constraints to make practical plans. During the trips made according to these plans, however, people usually stop

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_40

and visit various places such as popular shops and restaurants that they find by chance. These stops are not scheduled beforehand and they gradually make the trajectories more complex as they deviate from the efficient routes originally planned. This behaviour is referred to as *rambling* activity. While a person is rambling, he will encounter unexpected things and will successively determine where to go next as he likes. Neuroscience reveals that the human brain craves the unexpected even though experiences encountered unexpectedly might not originally seem very interesting to the person (Berns et al. 2001). Moreover, after making a choice, a person subsequently values the selected alternative more strongly than he initially had and rates the discarded one less so (Sharot et al. 2009, 2010). For example, after a tourist chooses a restaurant from equally valued alternatives, his expected pleasure with the selected restaurant is enhanced and he feels content about the choice. The point is that he makes the decision by himself. If someone else makes the choice for him, the enhancement is not observed. Rambling activities meet these conditions involving encounters with the unexpected and making independent choices. A person goes around an area such as a city, town, and venue while searching for something interesting. He would continue to ramble if he is satisfied with his experience at each visited spot; otherwise he would go away from that area. Therefore, the more a person rambles in areas, the more likely it is that such areas will be attractive to him.

For this reason, much effort has been made to design spaces that will induce people to ramble. In urban planning, transit malls that are open to pedestrians and public transportation such as light rail transit have been aimed at enabling comfortable movement around cities or towns (TriMet: The Portland Transit Mall n.d.). Shopping malls usually have various non-shopping facilities such as restaurants and movie theatres, and stores that are attractive to many customers are arranged apart from each other. Consequently, people spend a lot of time in malls, where they visit many stores and buy a lot of merchandise (Underhill 2004).

Several studies have addressed trajectory analysis. One study applied spatiotemporal clustering to extract routes frequently followed by moving objects (Giannotti et al. 2007). Other studies (Morzy 2006, 2007; Monreale et al. 2009; Mathew et al. 2012) predicted the next location of objects by using sequence analysis such as Apriori and Prefixspan algorithms and a Markov model. Some studies reconstructed trajectories from data in which some parts were missing (Wei et al. 2012; Zheng et al. 2012). Indoor localisation and navigation based on radio signals such as Wi-Fi (Wireless Fidelity), Bluetooth, and RFID (radio frequency identification) have been proposed (Delail et al. 2013; Oksar 2014; shopkick n.d.). Rambling activities involve multi-stop and multi-purpose trips (Hanson 1980). Because people have various interests, however, the places that are visited are not common to all visitors. However, these works analyse trajectories based on the occurrence rate of the visited spots; hence they miss the less common visits. Ohta and Imada (2013) characterized a topological structure of trajectories that can be compared across different environments such as towns and cities. As is done in business process benchmarking (Boxwell and Boxwell 1994), a comparison in other environments, especially best practices, is effective for designing ideal spaces

to induce rambling activities. This work does not deal with a person's dwell time at each visited spot. However, how a person constrained in time spends his time at each spot is an important feature of the trajectory. The work in some studies (Alzua-Sorzabal et al. 2012; Kim and Fesenmaier 2013) measured the emotional states of tourists using the Pleasure-Arousal-Dominance (PAD) theory (Mehrabian 1995) and the electrodermal activity (EDA). EDA is a physiological response and is hard to fake. However, it is difficult to identify what places or activities it responds to.

A method is proposed here for investigating the topological feature of trajectories caused by the rambling activities of moving objects. This method examines whether or not people have rambled in areas. A person rambling in areas is likely attracted to them. Thus, this study contributes to tourism industries by evaluating the performance of their efforts toward sustainable development. Two aspects of rambling activities are focused on: a multi-stop and multi-purpose trip, and a trip with unplanned stops. Mathematical knot theory is used to examine these aspects by forming a knot from a trajectory using a dynamic relaxation technique.

2 Characteristics of Rambling Activities

Here, the attributes prominent in the trajectories caused by rambling are introduced.

Spatiotemporal Dispersal of Visits In terms of tourism development, people are expected to visit also various spots other than tourist attractions. The more a person rambles in an area such as a city or town, the more likely that person will be to visit various spots in that area. Consequently, the spots tend to be dispersed throughout the area, and the dwell time at each spot varies. This variation of a person's dwell times at the visited spots can help determine whether that person has rambled or been lost in that area.

Unplanned Stopping by People often come across and drop into certain places that they did not plan to visit before they started rambling. In this case, it is expected that they will spend more money on experiences or purchases than originally planned. They immediately change their current plans and head for the newfound spots; thus, their trajectories are not efficient. The more that this *unplanned stopping by* increases, the more likely it is that a trajectory will intersect itself. Here, the trajectory is the polygonal curve connecting the visited spots. We examine how trajectories intersect themselves and hence do not deal with those consisting of only spots in a row.

Mathematical knot theory is introduced to examine whether or not these attributes are prominent in a person's trajectory.

3 Methodology

3.1 Knot Theory

Knot theory is intended to investigate the topological structure of a mathematical knot, which is a closed curve in three-dimensional Euclidean space and does not intersect itself anywhere (Adams 2004). Each knot is represented by a diagram that projects the knot on a two-dimensional plane. The points at which a knot intersects itself in a diagram are called crossings. The deformations of a knot through space without permitting the curve to pass through itself are equivalent (Fig. 1). Therefore, the knots with the same number of crossings are finite. Knots are classified according to the number of crossings (Fig. 2). An unknotted circle is the simplest knot and is called an unknot.

In this study, a two-dimensional trajectory (x, y) was transformed into a three-dimensional curve (x, y, z), where x and y are coordinates of the visited spots and z relates to the dwell time at the spots. Then the curve was examined to determine whether it was a knot or an unknot. If both *spatiotemporal dispersal of visits* and *unplanned stopping by* are prominent on a trajectory, the transformed curve is likely to be a knot. If the curve is a knot, it is assumed that the person has rambled around the area.

3.2 Creating Knot from Trajectory

Dwell Time Adjustment The length of dwell time at each spot does not always reflect a visitor's interest in the spot. For example, dwell times at restaurants are likely to be longer than those in retail stores and hence they are not directly

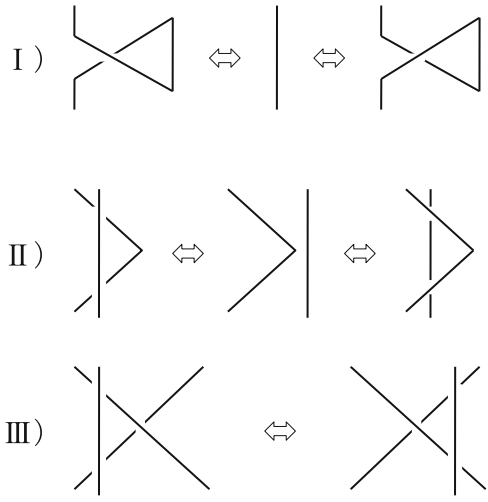

Fig. 1 Reidemeister move. Diagrams are magnified around crossings

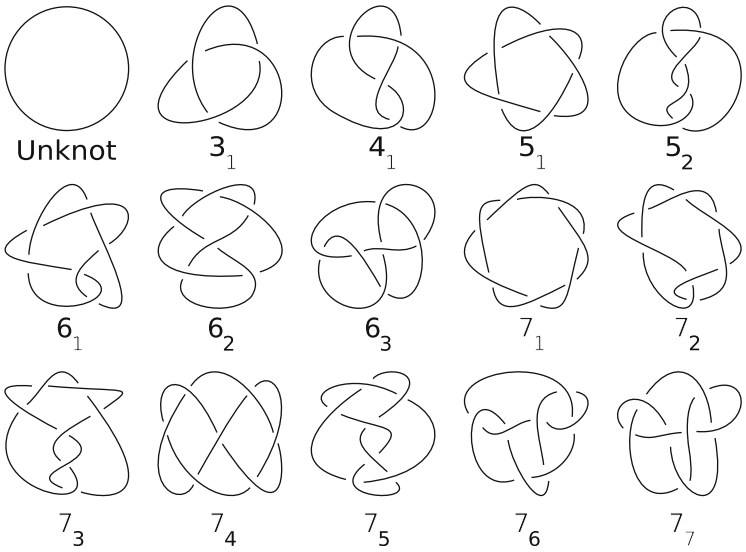

Fig. 2 Knot diagram up to seven crossings

comparable with each other. Therefore, we emphasize the variation in the amount of time each person spends at the visited spots. Dwell times are adjusted in order of their length at even intervals. For example, if a person visits five spots and the dwell times are 10, 120, 30, 10, and 60 min, the adjusted dwell times are L, 4 L, 2 L, L, and 3 L respectively, where L (>0) is a parameter. The adjusted dwell times are set to the z values of their respective spots. The z values of the start and end points of a trajectory are set to zero. A closed curve is obtained by connecting the three-dimensional points in order of time, and then finally connecting the start and end points.

Knot Simplification If there are many intersections in a trajectory, the obtained curve will have many crossings and will become intricately tangled. In this case, it is difficult to visually determine whether the curve is a knot or an unknot. We can simplify a curve by applying dynamic relaxation corresponding to the deformations shown in Fig. 1. This relaxation changes a curve into its equivalents with fewer crossings (Morikawa 2005; Ohta and Imada 2013).

A curve is assumed to be a chain of particles successively connected by springs. The elastic energy of the chain is represented as

$$E = \sum_i \left(\left| \vec{q}_{i-1} - \vec{q}_i \right|^2 + \left| \vec{q}_{i+1} - \vec{q}_i \right|^2 \right), \tag{1}$$

where $\vec{q}_i$ is the position vector of the i-th particle. Updating $\vec{q}_i$ in order to reduce Eq. (1) is done as follows:

$$\Delta\vec{q}_i^{\,s} = -\alpha\frac{\partial E}{\partial\vec{q}_i}, \tag{2}$$

where α is a parameter and is sufficiently small. As the elastic energy decreases, the particles come close to each other and the curve shrinks over time.

Since a curve is not permitted to pass through itself, we introduce a hard-sphere model to avoid the collision of particles (Fig. 3). The *i*-th particle behaves as a hard sphere for the particle set:

$$K_i = \left\{k \mid l_{ik} > \pi D/2,\ d_{ik} < D,\ k \neq i\right\}, \tag{3}$$

where D is the diameter of particles, l_{ik} is the minimum length between the i-th and k-th particles through the curve, and d_{ik} is the linear distance between the two particles. To avoid the collision of particles $\vec{q}_i$ is updated using the following equation:

$$\Delta\vec{q}_i^{\,h} = \frac{1}{|K_i|}\sum\nolimits_{k\in K_i}\left\{\left(D - \left|\vec{q}_i - \vec{q}_k\right|\right)\frac{\left(\vec{q}_i - \vec{q}_k\right)}{\left|\vec{q}_i - \vec{q}_k\right|}\right\}. \tag{4}$$

By avoiding the collision, a curve stops shrinking at a certain size.

The following procedure is used in the simplification. First, some particles are interpolated into a curve at intervals of $D/2$. Second, $\vec{q}_i$ is updated according to Eq. (2), and then $\vec{q}_i$ is updated according to Eq. (4). These steps are repeated until the length of the curve converges.

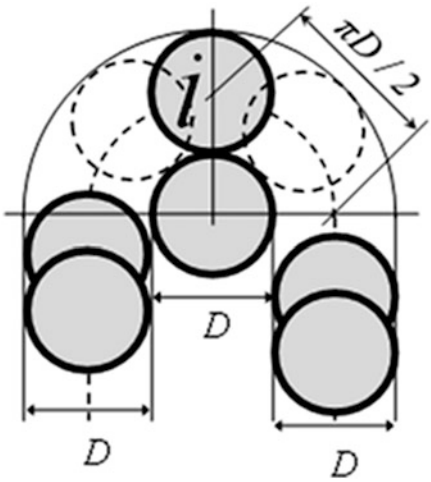

Fig. 3 Hard sphere model. Particle *i* behaves as hard sphere for those denoted as *solid circles*

4 Case Study

4.1 Dataset and Settings

We evaluated the performance of our method on a dataset collected at the campus festival held at the University of Aizu in Japan between October 12th and 13th, 2013. The festival was open to the public and the number of visitors was about 5,000. The dataset was consisting of the trajectories of 135 participants randomly selected from the visitors on October 13th, 2013. The festival was similar to a town in that it had various spots and entertaining events such as concession stands, concerts, and lectures. A small Bluetooth beacon (StickNFind n.d.) was distributed to every participant, and reader devices that received the beacon signals and recorded the receipt time were set up at 21 locations at the venue (Fig. 4).

The venue was divided into several areas on different themes such as concerts, lectures, stands and so on. Each area was covered by several reader devices. The location of each reader device, which was measured by GPS (global positioning system), was considered a *spot*. If a reader device received the signal of a participant's beacon for a certain amount of time, that participant was deemed to have *stopped by* the corresponding spot. Moreover, participants were asked about how much time they were planning to spend at the venue and whether they had visited the festival before. A data summary is given in Table 1.

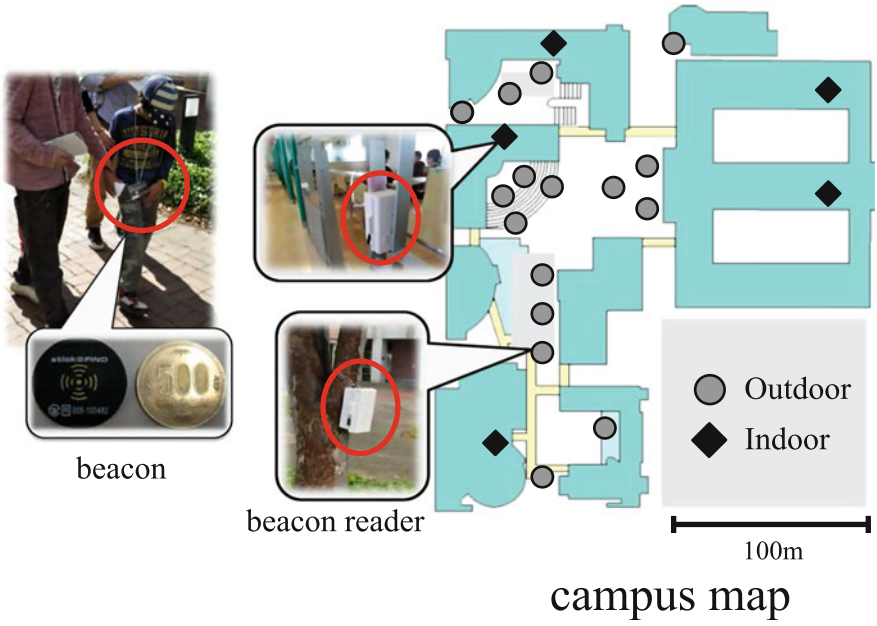

Fig. 4 Location of reader devices

Table 1 Data summary

	Min	Max	Average	Std. deviation
Spending time (hours)	0.3	6.1	2.2	1.3
Trajectory length (km)	0.3	4.4	1.2	0.7
Number of participant groups	135			
Regular visitor rate (%)	77			

4.2 Analysis

Inferring Satisfaction The more that people go around an area, the more likely the area is to be attractive to them. The first point that requires clarification is that the participants deemed by our method to *ramble* were satisfied with the festival. However, it is difficult to understand participants' satisfaction by asking a direct question such as "How did you enjoy this festival?" Unfortunately, some participants spent a lot of time at the festival even if it did not entertain them very much. This usually results in the participants feeling discontent. Cognitive dissonance theory (Festinger 1957) states that a person will unconsciously try to get rid of such feelings and will change his true impression. In this case, a visitor to the festival would likely answer such a direct question with "I was satisfied with this festival".

As shown in net surfing, people are inclined to spend a longer time than originally planned if they feel the current experience is more interesting than they expected. Thus, we estimated participant satisfaction by means of an *overspending* time rate. This is defined as the actual time spent that was greater than their *spending time* (the time they planned to spend). Since 77 % of participants were regular visitors (Table 1), participants seemed to predict their spending time with considerable accuracy. Therefore, if they stayed longer than they originally predicted, they probably enjoyed the festival more than they had expected to. The error in planning their spending time was estimated to 0.25; hence, a participant stayed at the venue on schedule if the overspending time rate was from 0.75 to 1.25. For example, if a participant planned to stay for 1 h and actually stayed for 45 to 75 min, he was considered to be on schedule. A participant was assumed to be more satisfied with the festival than expected if the overspending time rate was >1.25.

The parameter L for dwell time adjustment and D in Eq. (3) were set to 10 m by considering the GPS accuracy. Figure 5 shows examples of creating knots. Only the trajectory with both attributes of *spatiotemporal dispersal of visits* and *unplanned stopping by* is transformed into a knot.

Participants were classified into two groups based on whether or not their overspending time rates were larger than 1.25. Since most of the participants were regular visitors, 73 % of them stayed on schedule or stayed a shorter time than planned. All of the trajectories for each participant group were transformed into knots or unknots, and then the number of knots and unknots was examined (Table 2). To confirm the hypothesis that a participant whose trajectory was

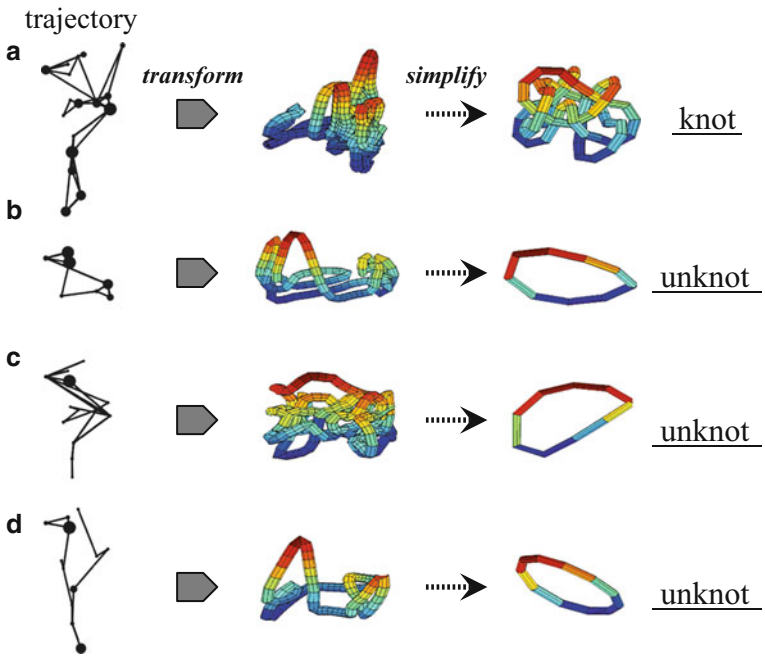

Fig. 5 Creating knots. The size of the *circle* in a trajectory denotes the dwell time at each spot. (**a**) Trajectory with both attributes of *spatiotemporal dispersal of visits* and *unplanned stopping by*. The others are: (**b**) spatially biased; (**c**) temporally biased; and (**d**) well-scheduled

Table 2 Dependence of rambling activities on overspending time rate

	Overspending time rate	
	$\leq$1.25 Stayed shorter than originally planned	1.25 < Stayed longer than originally planned
Unknots	72	18
Knots	26	19
Knots/ unknots	0.36	1.1

transformed into a knot was satisfied with the festival, we conducted Fisher's Exact Test (Fisher 1934). The p-value was 0.008 and the null hypothesis was rejected at the 5 % significance level. Therefore, it can be said that the participants whose trajectories were transformed into knots were more satisfied with the festival than expected. This indicates that our method is suitable for detecting rambling activities and inferring a participant's satisfaction with the festival.

Conventionally, rambling activities have been estimated by using the parameters of spending time and length of trajectories (Underhill 2004). If trajectories are long in both length and spending time, they seem to be due to rambling. Figure 6 shows

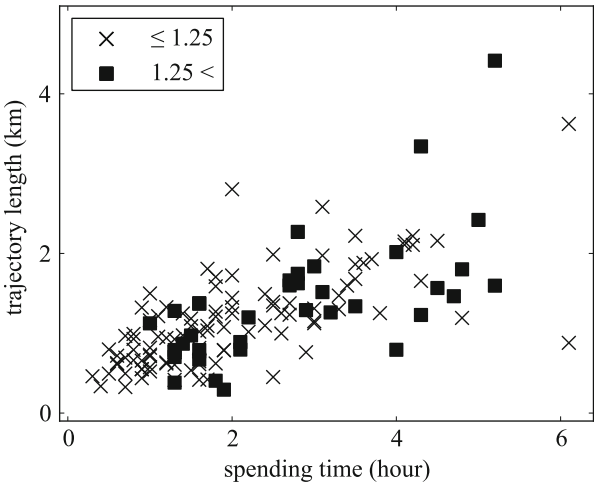

Fig. 6 Distribution of trajectories. Each trajectory is classified in terms of the overspending time rates

Table 3 Difference between regular and non-regular visitors

	Visitors	
	Regular	Non-regular
Unknots	71	19
Knots	33	12
Knots/unknots	0.46	0.63

the distribution of the trajectories. Some trajectories with an overspending time rate >1.25 exist in the range of short spending time or short length, which makes it difficult to infer the participant's satisfaction. This means that the conventional method is not sufficient to deal with the relation between rambling activities and the visitor's satisfaction. In contrast, our method satisfies this relation when detecting rambling activities.

Difference Between Regular and Non-regular Visitors It was assumed that the non-regular visitors had less information about the festival than the regular visitors and hence would not go around the venue as efficiently. Thus, after the participants were classified into regular and non-regular visitors, the number of knots and unknots for each group was examined (Table 3). The p-value determined by conducting Fisher's Exact Test was 0.51; thus, there were no significant differences in the trajectories between the regular and non-regular visitors. One possible explanation for this result is that the non-regular participants paid attention to and imitated what the other visitors did. People are very influenced by others' opinions and behaviours, especially when they are in uncertain situations. This is known as *social validation* (Latane and Darley 1968; Cialdini 2009). Therefore, it is assumed that the non-regular participants were unsure of what to do at the venue and so

behaved like the others. Moreover, 77 % of the participants were regular visitors; thus, there were no appreciable differences among the participants' trajectories.

5 Conclusions

We proposed a method for investigating the topological feature of trajectories caused by rambling objects. Two aspects of rambling activities—a multi-stop and multi-purpose trip and unplanned stopping by—were examined by applying mathematical knot theory. An experiment using trajectories at a campus festival indicated that our method effectively detected the trajectories caused by rambling. Moreover, our method reproduced a relation between rambling activities and a person's satisfaction with his experience; a rambling visitor was likely to be more satisfied with the festival than originally expected. This demonstrates that our method is effective for inferring people's satisfaction with their experiences and is useful in situations where some cognitive biases prevent people from answering questions about their true impressions (Festinger 1957).

We estimated a person's interest in the visited spots based on their dwell time there. Some factors such as a shop's being crowded, however, would affect dwell time and would be independent of the person's actual interest. Therefore, rather than using dwell time alone, the use of a physiological response such as EDA is considered to be useful.

The future direction of this study will be to compare rambling activities between different environments. This comparison will be useful for designing ideal spaces to induce rambling activities. This method deals with a topological feature; therefore, the same framework for a comparison in one environment will be applicable between different environments.

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Tourists and Municipal Wi-Fi Networks (MWN): The Case of Lugano (Switzerland)

Anna Picco-Schwendener and Lorenzo Cantoni

Abstract Being always connected is among the new needs of tourists, who are using more and more smartphones for that goal. Still, data roaming costs are a major obstacle to that end. If hotel Wi-Fi connections are offering part of the solution, municipal Wi-Fi networks are the most interesting offer for connectivity on the go, a connectivity offered both to own citizens and tourists. The touristic city of Lugano (Switzerland) has been offering an open Wi-Fi network since 2008. In the paper usage data, assessed via log files as well as via a survey automatically displayed to connecting users, are presented and discussed, providing a vivid profile of users (personas), and of their usage-patterns; they also offer insights about the difference between citizens and tourists when it comes to their usage of the Wi-Fi network.

Keywords Wi-Fi connectivity • Mobile tourism • Municipal wireless networks (MWN)

1 Introduction

Today we live in an increasingly mobile and connected world. Mobile devices such as smartphones and tablets are omnipresent and they need connectivity to fully exploit their potential. In Switzerland smartphone penetration rate reached 54 % in 2013 with 64 % using it to access the Internet on a daily basis (Google and Ipsos MediaCT 2013). More and more travellers expect to be able to connect to the Internet not only at home or in the office, but also when on the go and in public places, asking for connectivity everywhere and at any time. This has favoured a massive adoption of wireless technologies. 3G/4G networks are certainly the most widely adopted solutions. They are ubiquitous and reliable but (sometimes) slow and expensive, especially when used abroad, due to data-roaming costs. Wi-Fi technology offers an interesting alternative, as it is usually faster and cheaper for the end user, even though it covers only limited range (Gass and Diot 2010).

Offices and commercial businesses, like shopping malls and restaurants, started to take advantage of this technology to provide Internet access to employees and

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_41

customers. However, in public areas like streets and parks Wi-Fi access remains scarce. In order to fill this gap and to reach people and businesses that have remained unreached, many municipalities developed Municipal Wireless Networks (MWNs). Tourists were not the primary audience of MWNs when they first emerged. Nevertheless, they certainly have strong motivations to use them. Most tourists nowadays are equipped with mobile devices, which they carry around when exploring a city. Foreigners rely on the availability of wireless networks whenever possible, as they do not want to pay high roaming costs. MWNs allow tourists to access information on the place they are visiting and to connect with friends and families.

The goal of this paper is to present the case of the MWN "Wi-Fi Lugano". Lugano is a popular tourist destination in Switzerland and among the first cities to implement a MWN in the country. This study aims at understanding *who* are the people accessing "WiFi Lugano", *what* they use it for (thus being able to infer *why* they get connected), *where* they preferably connect, and *when* they use the network. By doing so, the article wants to define some usage patterns and *personas* for leisure tourists, business travellers, and non-tourists (residents and commuters).

2 Literature Review

2.1 Municipal Wireless Networks

In the first years of the new millennium, a number of cities around the globe planned or implemented Municipal Wireless Networks in order to offer broadband Internet access to employees, citizens and visitors (Middleton 2007). Their goals ranged from fostering digital inclusion (Bar and Park 2006; Farkas et al. 2009; Tapia and Ortiz 2008), to strengthening local economy (Estevez 2006) by enhancing attractiveness and competitiveness (Ojala et al. 2007). To achieve these ambitious goals, municipalities started to provide primary Internet access (main access to broadband connectivity) (Middleton 2007). Access to broadband Internet was meant to become a public service: "the electricity of the twenty-first century" (Middleton et al. 2006), to which everyone should have had access (Estevez 2006; Middleton et al. 2006). Wi-Fi seemed to be the perfect technology to achieve this, thanks to its "low barriers to entry" (Gillett 2006). It has relatively low installation costs—"streets do not have to be dug up" (Gillett 2006), uses unlicensed spectrums, performs well, and is easy to use (Bar and Galperin 2004; Middleton et al. 2008).

Yet, the initial euphoria about municipal Wi-Fi quickly evidenced problems and disappointments. First, the implementation of ubiquitous MWNs was more complex and onerous than expected especially for providing connectivity not only outside but also inside buildings (Fraser 2009). Second, as primary access providers, cities became direct competitors to Internet Service Providers (ISPs), which started lobbying to prohibit or strongly limit municipal broadband. Furthermore,

most initiatives were not able to identify a suitable and sustainable business model to guarantee service over time (Christensen 2006; Estevez 2006; Hudson 2010). Finally, in many cases, it was simply taken for granted that public Wi-Fi access is something citizens really need, while the service was not used as much as expected (Chesley 2009; Fraser 2009; Hudson 2010). These barriers led to several municipal Wi-Fi initiatives (e.g. Philadelphia, San Francisco or Chicago) to be abandoned after only 2 or 3 years (Chesley 2009; Fraser 2009; Jassem 2010).

On the other hand there is no doubt that MWNs can be useful to people who require connectivity (Middleton 2007), and municipalities and scholars are advocating for new ways of taking advantage of this service. Cities started thinking about MWN in smaller terms (Chesley 2009). Especially in Europe, where market players are preferred to governments to develop wireless networks, more limited solutions of MWNs emerged Chesley (2009) provides the example of Prague MWN, and notes that the service is not a substitute for existing broadband access but just a service to provide information about essential city services. Hudson (2010) argues that municipalities should aim at providing broadband access in limited, well-selected outdoors public areas, such as public parks, squares, or community centres. This allows to contain the costs as only small areas have to be covered (Chesley 2009) and to better match the technical characteristics of Wi-Fi (by covering outdoor areas). Thus, successful public Wi-Fi should be limited in scope and scale (Fraser 2009). As a consequence, priorities of MWN changed. Whereas offering secondary access (e.g. access when on the go) to tourists, business travellers and citizens was a minor goal of first MWNs, it became a major purpose for cities offering Wi-Fi broadband in public places (Estevez 2006; Middleton et al. 2008).

2.2 MWNs and Tourism

Tourism and Travel industry are expected to benefit largely from wireless technologies. These markets consist of highly mobile consumers, who want to be able to communicate with everyone, anywhere, and anytime (Buhalis and Pistidda 2009). Always-on connectivity offers opportunities for interactivity at the destination and allows retrieving personalized, contextualized, and location-based services (LSB) (Buhalis and Law 2008). Three-quarters of smartphone owners use LBS Zickuhr (2012). According to a study of Google, "92 % of smartphone users look for local information on their phone and 85 % take action as a result, such as making a purchase or contacting a business" (Google and Ipsos MediaCT 2013). Thus, the tourism industry should be very interested in these behaviours, and MWNs, are not only relevant for tourists but also for the local economy.

Visitors demand access to travel information: they want to be able to look up maps, get directions, find shops, and read restaurant reviews (Estevez 2006). Wireless technologies, together with mobile devices, allow tourists to feel close to home (White and White 2007). The new vision of MWNs is able to perfectly

meet the needs of people who are on the move but still want to be connected. MWNs offer interesting and affordable solutions especially for foreigners, as roaming fees for 3G/4G are still quite expensive. The importance of Wi-Fi access for travellers is also shown by the significance of free Wi-Fi services in hotels and restaurants. Internet access in hotels is nowadays expected by "the new tourist" and is not just a diversification tool (Pirnar et al. 2010). Bulchand-Gidumal et al. (2011) showed that offering free Wi-Fi helps hotels to improve their rankings by up to 8 %. Of all amenities, free Wi-Fi has the highest significance level for client satisfaction, and is important to both business and leisure travellers. Also for venues like restaurants, offering Wi-Fi is important to attract customers (Molloy 2011).

2.3 Users' Needs

For municipalities, it is fundamental to understand the needs of MWNs' users, be they locals or tourists. Pirnar et al. (2010) highlight the importance of understanding profiles and demand patterns for the so-called "new tourist". Understanding consumer and demand dimensions together with technological innovation has been identified as a key research issue for the tourism field (Buhalis and Law 2008). The same is true for MWNs: Middleton (2007) points out the importance of understanding who the people using a wireless network are, and how, where and what they use it for, as "good public infrastructure should meet the needs of its users" (Middleton 2007). Careful analysis on what users expect from a city Wi-Fi network, where they expect to use it, what they expect to do with it, and what kind of devices they use, might highlight important information on how to implement MWNs (Middleton 2007). However, there still are not many studies focusing on the users' perspectives of city Wi-Fi. Afanasyev et al. (2010) studied the usage of the Mountain View Google Wi-Fi Network and analysed the temporal activity of clients, traffic demand, and mobility of users as they roamed through the city. His study was entirely based on network statistics (28 days in spring 2008), and did not include any type of client information. A similar study characterized user behaviour of a public Wi-Fi area at a conference in San Diego to understand wireless user behaviour and wireless network performance (Balachandran et al. 2002).

The paper at hand addresses exactly this research gap by analysing both log-data and user information provided by users of a Swiss MWN ("Wi-Fi Lugano"). In this way, usage patterns will be highlighted and personas (descriptions of the user in a scenario (Nielsen 2004) for leisure tourists, business travellers and non-tourists will be defined. This will allow to better understand which user requirements should be taken into account when creating new MWNs and how existing ones might be improved.

3 Study Context: "Wi-Fi Lugano"

For this study, the MWN of Lugano called "Wi-Fi Lugano" has been chosen. Lugano is the 9th largest city of Switzerland and the largest city in Ticino, Switzerland's Italian speaking region. Lugano was among the first cities in Switzerland to implement public Wi-Fi access back in 2008. The case of Lugano is particularly interesting as the city is a very popular tourist destination for both leisure and business tourists, from within and outside Switzerland. Lugano is in very close proximity to Italy and thus many Italian commuters regularly work in Lugano. Its relatively mild climate favours usage of outdoor Wi-Fi connectivity. "Wi-Fi Lugano" has been available to the public since April 2008 in the centre of Lugano, and soon after it was implemented also inside the stadium Cornaredo, and at Lugano-Agno airport. The project has been promoted by the city of Lugano together with AIL SA (Aziende Industriali di Lugano), Lugano Casinò, and Lugano Tourism. The city's goal is to offer citizens, business travellers and leisure tourists free access to the Internet in some selected areas of the city (AIL 2014). To access the network it is necessary to subscribe by providing a phone number. People can connect for free for 30 min but can reconnect as often as they want. Currently, there are 36 Access Points (AP) installed in the city; by April 2015 additional 15 APs should be installed in order to extend the reach of the network.

4 Methodology

The goal of the study is to answer two research questions:

- RQ1: *who* are the users of the MWN "Wi-Fi Lugano"? To do *what* and *why* do they use public Wi-Fi connectivity? *When*, *where*, *how* and *with what devices* do they use it?
- RQ2: are there differences in the usage between leisure tourists, business travellers, and residents?

With the help of AIL, data from two different sources were collected: (1) anonymised log-data providing information about each user-session, and (2) information provided by users through a short mobile questionnaire. Log-data is registered every time a user connects successfully to the "Wi-Fi Lugano" network. It provides information on when, how long, where (IP address of AP), device id (MAC address), amount of data transmitted in and out and the country code of the registered phone number. This data only provides information on single sessions (not on single users) and it allows describing usage only from a technical point of view.

To collect user data, a very short questionnaire has been developed and put on the splash page of "Wi-Fi Lugano". When a user has logged-in successfully, he/she is asked to provide information about him/herself and his/her current network

usage. They have been asked questions about the type of device they were using, what they were going to do online, their position in the city, information about their stay, whether they have a Swiss data contract and demographics. For all questions, multiple choice answers were proposed. At the end, those who wished could leave a comment.

In order to address a vast audience, the survey was available in the three official Swiss languages, German, Italian, and French and in English. Filling in the survey was not mandatory. The questionnaire has been active since April 2013. For the current study the amount of data has been limited to 3 months in order to allow the matching of log-data and survey data, which cannot be done completely in automatic. The period from June until August 2013 has been chosen, as these summer months are the most important ones for the local tourism sector.

Matching each submitted survey with its corresponding session-log is important mainly for two reasons: (1) in order to use the phone country code to infer the user's country of origin, and (2) in order to be able to eliminate duplicate survey answers from the same device (and thus user). In order to do the matching, it was necessary to use the survey start-date/time and the session start-date/time. It was not possible to use a unique identifier such as the MAC address, as this information was not recorded by the online survey system. The matching was based on survey and session start-date/time, and it was necessary to check all matched records manually.

During the selected 3 months, a total of 28,354 sessions were registered. From those it was necessary to eliminate failed connection attempts (301) and records that did neither have a MAC address nor a country code (108), resulting in a total of 27,945 valid records. During the same period 3,796 surveys have been completed. Of those, 3,464 (−332 records) have been successfully matched to their corresponding log-entry. As some respondents answered more than once, only the first survey answered by each device (MAC address) has been kept for further analysis (−1,525 duplicate surveys). The MAC address was used because it was the best possible way to identify a single user. However it cannot be excluded that a user connected to "Wi-Fi Lugano" using multiple devices, or that a single device had been used by more than one user. In total, 1,939 survey entries were considered valid. In the analysis, users have been grouped into the three categories business-, leisure and non-tourists (residents and commuters) by using their reason for being in Lugano.

5 Results and Discussion

5.1 Network Usage Based on All Sessions

During the three summer months 4,820 single devices (single MAC addresses) have made a total of 27,945 connections to the "Wi-Fi Lugano" network. Of those, 2,340 devices (48.6 %) connected more than once, meaning that returning users account

for nearly half of all connections. Most returning users (92.7 %) connect always in the same place. Based on the AP's IP addresses four usage areas can be distinguished: (1) center/airport, (2) stadium, (3) exhibition centre and (4) Lugano casino. The centre/airport area is by far the most used one with 68.9 % of connections. Being it the largest and most important area of "Wi-Fi Lugano", this is no surprise. In the selected period, on average one device connected 5.8 times to the network with some few devices connecting very frequently. 36 devices (0.8 %) connected more than 100 times with one reaching even 791 connections.

On average, 302.8 connections per day can be recorded, with peaks going up to 753 connections on a single day, on a Saturday during a tattoo fair at Exhibition Centre. The peak is mainly due to the connections at the Exhibition Centre (386 connections) while on an average Saturday there are only 28.6 connections from the area. Also connections from the city-centre area slightly increased due to this event (298 vs. 210.3 on an average Saturday).

5.2 Who Are the Users Connecting to "Wi-Fi Lugano"?

In this section, the study gives an overview of who the people connecting to "Wi-Fi Lugano" are. This includes understanding where they are from, for what reason they are in Lugano, what kind of devices they use, in which area of the city and when they use the network, whether they are alone or with others, whether they have a Swiss data contract, and evidencing differences in gender and age. During the three summer months, 1,939 valid and matchable surveys were collected. This means that 40.2 % of the connected devices have answered the survey (Table 1).

Gender Little more than 2/3 (66.8 %) of the network users are male, whereas females only account for 1/3 (33.2 %). This is not surprising as males are usually more passionate about technology than females, who might prefer easier solutions to connect to the Internet, like 3G. However, about the same number of males and females have a Swiss data contract (36.7 % and 38.1 % respectively).

Devices A vast majority of respondents (73.4 %) connects to "Wi-Fi Lugano" with a smartphone. This confirms the importance of smartphones for getting access to wireless networks and is in accordance with the 2012 Wireless Broadband Alliance (WBA) survey, which concluded that "smartphones have overtaken laptops in connecting to Wi-Fi hotspots" (Vos 2012). Also in this study, only a few respondents used Laptops (12.8 %) or Tablets (12.3 %) to connect to the network. Laptops and Tablets are slightly more used at the airport (22.5 % and 22.8 %, respectively). This is due to the fact that many business travellers connect from there and they are the ones that are more likely to use Laptops. Furthermore, the airport is an indoor area where people have longer waiting times, also for starting up a Laptop. Outdoor areas such as the Lido (recreational area with pool) and the city centre, instead, favour the usage of small portable devices such as Smartphones. 80.4 % of users

Table 1 Gender, devices used, swiss data contract, alone/together

Gender	
Male	66.8 %
Female	33.2 %
Device used	
Smartphone	73.4 %
Laptop/notebook	12.8 %
Tablet	12.3 %
Other (e.g. Console)	1.5 %
Swiss data contract	
Yes	37.4 %
No	62.6 %
Alone/with others	
Alone	44.3 %
Together with others	55.7 %

connecting in the Lido and 78.0 % of those connecting in the centre use Smartphones.

Swiss 3G Data Contract Only 37.4 % of all respondents have a Swiss 3G data contract. This can be explained by the fact that about half of all network users are foreigners and thus not likely to have a Swiss data contract. In fact, of those having a Swiss 3G contract, 88.0 % are Swiss, and 64.0 % of those not having a Swiss 3G data contract are foreigners. This shows that public Wi-Fi access is an important alternative to 3G connectivity in order to connect to the Internet when on the go.

Alone/with Others When connecting to "Wi-Fi Lugano", the majority of respondents (55.7 %) is with other people, whereas 44.3 % are alone. There are slight differences depending on the area where users connect. People connecting at the Lido (open pool area), for example, tend to be together more often (67.6 %), and those connecting at the airport tend to me more often alone (34.4 %). In fact, going to the Lido is a social activity, while most people connecting at the airport are business travellers and travel alone. Also, respondents coming from further away (other countries: 60.2 %, and rest of Switzerland: 61.8 %) are more often with others when using "Wi-Fi Lugano".

Age Groups The typical user of Lugano's MWN is between 20 and 49 years old. Surprisingly, the youngsters (below 20) do not use the network very frequently. This might be because very young people do not yet own Wi-Fi enabled devices.

Where from People from more than 40 countries connected to the network. It is not possible to define the exact number of countries as only the first two digits of the country code (e.g. +41) were available to the researchers and thus countries using three digits could not been distinguished. Users with a Swiss phone number account for more than half of all connections (54.9 %) while 23.3 % of connections are made by users with an Italian number. This is as expected as Italy is the closest country to Lugano and many Italian people regularly work in Lugano or come for

short visits. This means that only 21.8 % of users are from other countries than Switzerland or Italy. Of those Germany (4.8 %), UK (3.4 %), France (2.7 %), and the Netherlands (1.5 %) are the most represented. In order to know more about the provenience of Swiss people, respondents were asked to specify whether they are from Lugano, the region Ticino, or from the rest of Switzerland. In this case, 52.6 % of respondents answered to be from somewhere within Switzerland: of those, 60.0 % declared to be from Lugano, 19.8 % from Ticino, and 20.2 % from the rest of Switzerland.

City Areas Respondents have been asked where in the city they currently are. A vast majority of users connects from the city centre and lake front (47.7 %), followed by the airport (17.0 %) and the Lido (18.2 %). "Wi-Fi Lugano" is not used that much in the Stadium (4.6 %), and from the Exhibition Centre (4.2 %). In fact, the Exhibition centre has high peaks when an exhibition or fair is taking place (e.g. August 31th—TiTatoo event) but during normal days has only few visits.

When According to the analysis of all sessions, usage during the different weekdays is quite even. Slightly more people use the network during the second half of the week (Thursday to Sunday) with Saturday having the highest connection rate (17.3 %). As for the hours of the day, we found that people coming from the rest of Switzerland have a connection peak between 6 pm and 7 pm (16.4 %), and the same is true for business tourists and the airport area: in that hour two flights leave from airport Lugano with direction Zürich and Geneva.

Reason for Being in Lugano Respondents could choose among 8 different reasons for being in Lugano. Tourism (20.6 %), regularly working in Lugano (18.3 %), doing a day trip to Lugano (17.5 %), and doing a business trip (10.3 %) are the most selected ones. Other reasons are studying (8.3 %), attending an event/festival (6.3 %), and shopping or going for a walk (3.4 %). "Other reasons" was mentioned 15.4 % of the times, and might indicate people living in Lugano.

This study wants to distinguish between three user categories: (1) business tourists, (2) leisure tourists, and 3) non-tourists (residents and commuters). People who were in Lugano for a day trip, an event or festival, or for tourism are considered *leisure tourists* (44.4 % of respondents), while those declaring to study, regularly work, shop or go for a walk and have other reasons to be in Lugano, are considered *non-tourists* (45.3 % of respondents). Being a *business tourist* (10.3 % of respondents) is a category by itself. Business tourists are less represented than the other two categories, probably due to the fact that business travellers have other means of accessing the Internet.

Usages In order to understand people's motivations to connect to the wireless network of Lugano, users were asked to select all applications they intended to use, from a given list. It emerged that communication activities are by far the most used ones with 60.0 % of respondents planning to use email and 27.2 % social media. The only exception is VoiceOverIP: they are only used by 7.4 % of people. Tourist related activities such as looking for tourist information (20.1 %), using maps/orientation (17.1 %), and looking for free time activities (14.0 %), even though

performed less frequently, are still important usages of "Wi-Fi Lugano". These activities are expected to be performed more frequently by travellers than by residents. 21.9 % of respondents use "Wi-Fi Lugano" for other browsing activities, which have not been defined in more detail. Most respondents (59.8 %) planned to use only one application during their session, whereas all others indicated multiple activities.

User Comments 5.7 % of respondents left a comment at the end of the survey, many of them expressing positively about "Wi-Fi Lugano". Nevertheless, some issues were raised, especially regarding signal quality and speed, extension of the network and the difficulty of accessing the network.

In the next section, users will be distinguished between business-, leisure-, and non-tourists. Differences in their usage of the Wi-Fi network will be highlighted, and a user profile for each category will be traced.

5.3 Business-, Leisure- and Non-tourists

Table 2 presents three distinct user profiles of Lugano's Wi-Fi network, where differences and similarities emerge. Interestingly, in some cases the business tourist is more similar to the non-tourist than to the leisure tourist. This emerges especially when looking at the activities they do when connected to "Wi-Fi Lugano". Email is the most important usage for all categories but it is most important for the business tourist. While looking for tourist information and using maps, result to be of major importance for the leisure tourist, it is less relevant for the business and non-tourist.

For other aspects, the business-tourist has clearly a different profile than the other two categories. Even though smartphones are the most used devices by all categories, for business tourists also Laptops are of major importance. In fact they use smartphones less and laptops more than the other two categories. Furthermore, business tourist's preferred area of connection is Lugano airport while the other two categories mostly connect from the city centre. Leisure- and non-tourists also like to use the network at the Lido, while business tourists hardly ever connect from there. This is plausible as going to the Lido is a free-time activity and business travellers usually do not have time for such activities. Another aspect where business travellers stand out is the amount of traffic generated (incoming traffic). They tend to be medium (1–10 MB)/heavy (>10 MB) users while leisure- and non-tourists are medium/low (<1 MB) users. Business tourists use the network more during the week, and mostly between 6 pm and 7 pm (when waiting for the plane at the airport), while leisure tourists are more active on weekends during the afternoon. Non-tourists have similar usage during all weekdays, and are slightly more active in the evening. Furthermore, business tourists tend to be older than leisure- and non-tourists. Business tourists are similar to leisure tourists only in two aspects: most of them are from abroad (while non-tourists mostly are from Switzerland) and neither of them tends to have a Swiss data contract.

Table 2 Usage profiles

	Business tourist (n = 199)	Leisure tourist (n = 861)	Non-tourist (n = 879)
Gender	Male (80.9 %)	2/3 male; 1/3 female	2/3 male; 1/3 female
Age	40–50 years	20–50 years	20–40 years
Alone: yes/no	Alone	Company	Same
Where from	Other country (58.3 %)	Other country (60.9 %)	Switzerland (68.3 %)
CH 3G contr.	No	No	Yes/No
Usages	**+ Email (74.4 %)** + Other browsing (27.6 %) − Tourist info. (13.6 %) − Social media (13.6 %)	+ Email (62.4 %) **+ Tourist info. (25.5 %)** + Social media (25.1 %) − Other browsing (17.2 %)	+ Email (54.5 %) **+ Social media (32.4 %)** + Other browsing (25.1 %) − Tourist info. (13.0 %)
Devices	Smartphone (52.8 %) **Laptop (26.6 %)** Tablet (18.6 %) Other (2.0 %)	**Smartphone (77.2 %)** Tablet (11.4 %) Laptop (10.8 %) Other (0.6 %)	**Smartphone (74.3 %)** Laptop (11.7 %) Tablet (11.7 %) Other (2.3 %)
City area	**+ Airport (49.2 %)** + City (21.6 %) Lido & stadium → no	**+ City (60.6 %)** + Lido (15.6 %) Exhib. & stadium → no	**+ City (40.8 %)** + Lido (23.4 %) Exhib. → no
Weekday	Thu./Fri.	Fri./Sat./Sun.	Same for all days
Time	6 pm (peak)	Afternoon (12 am–19 am)	Evening (18 pm–11 pm)
Data in	Medium/heavy	Medium/low	Medium/low

The *business tourist* is a man, aged between 40 and 50 years, who comes from abroad, does not have a Swiss 3G data contract, and is alone when connecting to "Wi-Fi Lugano". He accesses "Wi-Fi Lugano" on Thursday or Friday between 6 pm and 7 pm at the airport of Lugano. He either uses his smartphone or laptop to connect, and accesses the wireless network either to manage emails or for other browsing activities but not to access tourism related information or social media. He generates medium to heavy traffic during his sessions.

The *leisure tourist* is usually male but might be female too, is aged between 20 and 50 years, and comes from abroad. He is typically together with friends or family when connecting to "Wi-Fi Lugano", and does not have a Swiss 3G data contract. He uses a smartphone to access the network as he does not carry around larger devices while visiting Lugano. He generally connects while walking around in the city or while relaxing at the Lido, mostly during weekends (Fri-Sun) and in the afternoon. He accesses the Internet in order to check emails, to look for tourist-related information or to use social networks. He does not generate much traffic (medium/low).

The *Non-Tourist* is usually male but can also be female. He is aged between 20 and 40, and thus younger than the business and leisure tourist. Unlike the other

two tourist types, he is from Lugano. He preferably connects to "Wi-Fi Lugano" when going out for a drink in the evening either in the city centre or at the Lido (which commutes to a bar/disco in the evening) during any day of he week. He uses his smartphone to connect. While connected he checks emails, accesses social media platforms and does some other browsing. Generally he does not generate much traffic (medium/low).

6 Conclusions

This study analysed the usage of the MWN "Wi-Fi Lugano" by combining log-data and user information in order to understand who the users of the network are and how they use it. Users have been grouped into three different categories: business-, leisure- and non-tourists, each one having different characteristics and showing different Wi-Fi usage behaviour. All three user profiles clearly evidence characteristics and usage behaviours linked to the reasons why they are in Lugano. The typical business tourists are male, in their 40s, and tend to be alone when accessing "Wi-Fi Lugano". They are not interested in accessing tourist related information and they use email extensively. They are the only ones using laptops, and get frequently connected from Lugano airport. Leisure- and non-tourists demonstrate very different behaviours: they tend to connect mostly during their free time and are more socially oriented. They are younger, and access the network mainly while walking around in the centre or while relaxing at the Lido. Leisure tourists connect mostly in the afternoon of weekends and are interested also in accessing tourist information and using maps to orient themselves in the city.

The study shows that all business, leisure, and non-tourists use "Wi-Fi Lugano", even though business travellers account for fewer connections. Email is the key application, suggesting that it is still playing a major role in online interpersonal communication, and that it is important for cities not to restrict access to webmail platforms. The city centre is the place where most users connect indicating that this is probably the area on which to focus in order to improve network performance. The exhibition centre is not used very much in general, but has high peaks during events, suggesting that it might be important to strengthen the network during these periods. This paper has contributed to a better understanding of mobile practices of people visiting a city, and of differences/similarities between business-, leisure- and non-tourists. The role that a MWN can play in order to support their connection needs has been explored through the case of "Wi-Fi Lugano". Besides its contribution to the wider field of e- and m-Tourism research, it provides also an interesting contribution to the field of e-Government, offering to policy- and decision-makers data on which to take informed decisions about managing a MWN.

Future studies should extend the period to be analysed, from a few summer months to a full year, so to explore the impact of seasonality on Wi-Fi accesses and usages. In addition, research should go beyond the descriptive statistic phase, exploring relevant correlations and usage patterns. The limits of the study are that

only behaviours of clients that successfully connected to "Wi-Fi Lugano" could be analysed and thus potential users that were unable or choose not to connect are not represented. Further studies should then also integrate the voices of tourists/locals visiting the city, so to better understand the reasons of people using "Wi-Fi Lugano", as well as those of people not using it.

Acknowledgements This study was only possible thanks to the kind collaboration of AIL (Aziende Industriali di Lugano).

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Part VI
Tourism Website Analytics

Drivers of Responsive Website Design Innovation by Destination Marketing Organizations

Chris Gibbs and Ulrike Gretzel

Abstract Mobile devices like smartphones and tablet computers are becoming an integral part of how people consume travel destinations. With the tremendous growth in mobile devices for travel planning and consumption purposes, this paper focuses on mobile and responsive website design and the organizational and environmental factors that drive mobile optimization strategies. Using a sample of United States state tourism offices, this research looked at mobile optimization techniques using different website emulators. The findings indicate that destination marketing organizations with lower budgets and organizations with higher website traffic have a greater likelihood of adopting responsive website design.

Keywords Innovation • Web design • Responsive web design • Technology adoption • Mobile website • Destination marketing organization

1 Introduction

Mobile devices like smartphones and tablet computers are causing a paradigm shift in how hospitality and tourism marketers interact with their target markets (Buhalis and Law 2008) and how tourists consume destination information (Wang et al. 2012). Due to the increased usage of mobile devices for travel decision-making by consumers, destination marketing organizations (DMOs) need to re-think the traditional website that is designed for a 1,200-pixel-by-800-pixel desktop. These small hand-held devices allow the traveler to be constantly connected and able to tailor travel experiences. With the average smartphone display being 320 pixels by 480 pixels and the tablet being 786 pixels by 1,024 pixels, the different sizes are adding new layers of complexity to website design. Therefore, Hyun et al. (2009) identified the innovativeness of DMOs as a critical factor in facilitating mobile experiences for travel consumers.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_42

Initially DMOs have been responding to the mobile traveler by adopting mobile websites and/or by offering mobile applications for smart phones. Each of these approaches to the mobile traveler has inherent disadvantages. Mobile websites have less functionality than regular websites and mobile applications require significant investments by the DMO (e.g. separate programming for different operating systems), regular maintenance/updates and assume multiple/regular interactions to make the download and potential customization worthwhile, which is often not the case for tourism destinations. Instead of having to manage multiple platforms with varying degrees of content, some DMOs are choosing to use responsive website design (RWD) which automatically adapts to the different screen sizes used to access the internet.

Preliminary industry reports about RWD suggest that it improves search ranking, bounce rate, and the user experience (Francis 2014). For search ranking, Google resources for web developers boldly state that responsive web design is the "recommended configuration" for search algorithms (Google n.d.). In a case study by Miles Destination Marketing, Colorado tourism experienced a 43 % increase in mobile traffic 3 months after eliminating a mobile website and using RWD (Adams 2014). This increase in traffic is a result of a lower bounce rate because mobile users stayed on the site when they arrived and also an overall improved experience for the mobile user. Following Rogers' (2003) assumptions about the diffusion of innovation, such clear comparative advantage should lead to rapid adoption in a market.

While previous studies have addressed the adoption of technology by destination marketing organizations (e.g. Doolin et al. 2002; Yuan et al. 2003, 2006; Wang and Fesenmaier 2006; Wang 2008; Fuchs et al. 2010; Hays et al. 2013), no studies exist about mobile technology or RWD. Previous research suggests differing levels of adoption propensity in DMOs (Wang et al. 2006), leading to varying levels of sophistication in technology use, especially with respect to websites.

To expand the existing literature on innovation and technology adoption in DMOs, the purpose of this research is to survey current levels of mobile readiness among DMOs and, specifically, to investigate whether organizational resources, market orientation or environmental factors drive mobile optimization tactics. To explore this topic, organizational and environmental factors for 43 U.S. state tourism offices were identified and regressed against their level of mobile website design sophistication.

2 Background

2.1 Responsive Website Design

The term RWD was coined by the web designer Ethan Marcotte on his blog (Marcotte 2010). Contrary to what some may believe, Ethan did not invent or

create a new technology, he simply used existing design techniques to change the way people think about web design. Most importantly, he created an approach to web design that adapts the viewing experience to the device that is being used to access a web page. This technique has been so popular that Mashable named 2013 the Year of RWD (Cashmore 2012) and Forbes magazine has featured several stories recently about the importance of responsive websites (Faletski 2012; Forbes 2014; Gunelius 2013; Steimle 2013).

The driving factor behind the need for RWD is the proliferation of mobile devices (Mohorovicic 2013) and a need for marketers to consider a mobile first strategy when designing websites (Wroblewski 2011). Some indicators pushing the mobile first strategy include the increase in adoption of mobile devices and the corresponding increase in web traffic from mobile devices. The International Data Corporation reported already for 2012 that smartphones and tablet computers represented 70 % of the overall consumption of connected devices (2013). The growth in mobile connected devices adoption led to explosive growth in mobile website traffic. In 2012, mobile traffic represented 20 % of website traffic compared to 2009 when the desktop and laptop computer represented almost 99 % (Keizer 2013).

Extensive mobile device adoption by consumers naturally affects how they search for travel information and book travel products. The 2012 Traveler study by Google and Ipsos reports that 38 % of US leisure travelers and 57 % of business travelers are using mobile devices for travel information. This increase in use for information is also having an impact on travel sales from mobile devices (Google 2012). As of 2013, mobile devices represented 10 % of overall digital travel sales and by 2017 they are expected to reach 30 % (e-Marketer 2013). Interestingly, mobile travel research also finds that when planning travel, consumers are constantly connected and use multiple devices to accomplish a task. It is reported that over 90 % use multiple screens and 43 % go between devices when planning (Google 2013). This multi-screen world is going to be troublesome for destinations who have not embraced multi-device optimization for their websites.

While there is a growing body of literature on mobile device adoption by travel consumers and research specifically looking at the various effects of mobile device use on travel experiences, there is a lack of understanding of if and how the industry responds to such changes in device use by travel consumers.

2.2 Sophistication in Website Adoption and Innovation

Existing literature that sees websites as important arenas for organizational innovation has early on identified different stages in sophistication of websites that result from the adoption of different features and approaches to website design. Hanson (2000) modeled websites as basic (Stage 1) brochure-like websites, intermediate (Stage 2) interactive websites and sophisticated (Stage 3) data-driven websites. Zach et al. (2010) as well as Wang et al. (2006) suggest that initial

adoption of websites at a specific level is one issue but continuous innovation and investment in ensuring the website is up-to-date sets DMOs apart. Continuous innovation is more difficult in many ways as it often requires abandoning initially adopted technologies due to rapid changes in website design standards. Therefore, many times these changes do not simply represent incremental add-ons but rather radical make overs. In this sense, heavy investment in initially available technology can lead to less sophisticated technology use later on if it results in lock-in (Liebowitz and Margolis 1995). RWD represents a rather radical website design innovation that can be conceptualized as more sophisticated than simple mobile optimization of a website.

2.3 Innovation in Destination Marketing Organizations

The great reliance of DMOs on technology, and specifically websites, has been well established (Gretzel et al. 2006). According to Zach et al. (2007), essentially all DMOs have a website. Despite the obvious benefits to be gained from investing heavily in their websites, empirical studies have indicated that DMOs differ quite substantially in their ability to continuously adapt websites (Yuan et al. 2003, 2006; Zach 2012) and often do not take full advantage of available technologies that could enhance their web presence (Wang et al. 2006). More recent research has shown similar results for the adoption of social media by DMOs (Hays et al. 2013; Hamill et al. 2012).

The literature identifies a number of factors that influence DMOs' innovation propensity, including organizational size, type of organization, leadership characteristics, collaboration and access to sufficient resources (Wang 2008; Zach et al. 2010; Zach 2012). The latter is also discussed by Hays et al. (2013), suggesting that DMOs are increasingly faced with budget crises that stifle their efforts to keep up with technological change. However, the relationship between organizational factors and innovation are complex. Zach et al. (2010) show that bigger budgets significantly drive initial technology adoption but find that very small budgets can actually encourage continuous innovation. It is the goal of this study to shed further light on factors that encourage innovation adoption in DMOs, with the focus being on innovations that pertain to optimizing websites for use across different devices.

2.4 Conceptual Framework and Hypotheses

A major theme in the innovation literature is understanding whether innovation happens proactively from within an organization or reactively in response to market demands. Zach (2012) mentions both internal capabilities and market orientation as important drivers of innovation in DMOs. The general organizational environment

is also frequently identified in the literature as a factor that encourages or inhibits innovation and technology adoption (Burns and Stalker 1961).

Hubbard and Van Belle (2013) identified internal technology slack resources as important drivers of organizations' capability to develop mobile compatible websites. Website design innovations are especially resource-intense for DMOs as they typically do not have in-house capabilities and need to out-source website design work. Access to sufficient resources is therefore key in facilitating technology adoption and innovation. As mentioned above, Zach et al. (2010) find that overall DMO budget is a significant factor in determining innovation adoption, with DMOs with higher budgets being more likely to adopt a new technology and DMOs with very small budgets being more likely to engage in continuous innovation.

Fuchs et al. (2010) identified pressure from customers as an important driver of technology adoption and innovation in DMOs. As far as such market orientation is concerned, programs like Google Analytics make it easy for DMOs to track web traffic and the type of device/browser used by website visitors. As mentioned above, while most DMOs have websites, there are significant differences in innovation activities by DMOs as far as their websites are concerned. If market orientation is the impetus for DMO innovation adoption, high consumer demand for the DMO website should lead to knowledge of shifts in consumer needs and perceptions that investments in optimizing the website are important.

DMOs are organizations that are typically governed by a board of directors representing different stakeholders at the destination (Morrison 2013). Accountability has become an important buzzword for DMOs who have to increasingly justify their existence (Gretzel et al. 2006). It can be assumed that a prominent role of tourism at the destination and thriving tourism demand would make it easier for DMOs to justify website expenses geared at better serving potential and existing tourists.

Based on these theoretical considerations, we formulate the following hypotheses:

H1. DMOs with higher budgets are more likely to adopt more advanced mobile website designs.
H2. DMOs with higher web traffic are more likely to adopt more advanced mobile website designs.
H3. DMOs with higher travel expenditures at the destination are more likely to adopt more advanced mobile website designs.

3 Methods/Procedures

3.1 Sample

DMOs are responsible for promoting tourism at their respective destinations and increasingly rely on websites and other internet technologies to serve their mandate

(Morrison 2013). They operate at different levels of destinations (local, regional and national), with the breadth of their agenda as well as budgets increasing at every level. Most existing studies on technology adoption by DMOs have focused on either the local or the national levels. The current study therefore deliberately selected DMOs at the regional/state level. Further, when considering which set of DMOs to use as a sample, the access to high quality secondary information related to organizational and environmental factors was an important deciding factor. While previous studies have used phone and mail surveys to collect such data about DMOs (e.g. Zach 2012; Wang et al. 2006), it was decided to combine data from different published sources as response rates in organizational surveys are often extremely low.

While a lot of information exists about external environmental factors such as tourist arrivals and expenditures, very little information is available about internal factors such as budget. The best available research that could be accessed to provide internal budget information for DMOs was available from the United States Tourism Association. Their annual study publishes benchmark information from 50 different states. For the availability of credible information, the sample for this exploratory study was limited to the United States state tourism offices.

3.2 Data Collection

The collection of the data for this research occurred in two stages. First, organizational data was collected using credible secondary sources. To collect information about website traffic, the researchers had access to results for annual website traffic for 2013 (Quantcast 2014). While the researchers sought to acquire detailed data for mobile and desktop traffic, it was not available. The best available measure of website traffic available for the research was number of unique visitors. For information related to organizations' annual budget, a report from the United States Travel Association (USTA) was used (United States Travel Association 2013). Finally, for information about annual travel expenditures, was pulled using an online tool for communicating the economic impact of travel (USTA).

The second stage of the data collection required the researchers to use a mobile device and mobile website emulators to test for the presence of mobile optimization strategies. To start with, researchers reviewed the home page for the destination website looking for reference to a mobile website. After that the researchers used a mobile device to search for the presences of both a mobile and responsive website. Once it was determined that the DMO had or did not have a mobile website, the homepage URL for the destination was used with two different mobile website emulators www.responsivetest.net and www.ami.responsivedesign.is to test for the presence of RWD. If the DMO website on both the mobile device and the emulators adapted to different screen sizes, that it was deemed to use RWD.

Table 1 Organizational and environmental factor summary

	Top quartile ($n = 11$)		Middle quartile ($n = 21$)		Bottom quartile ($n = 11$)	
Factor	High	Low	High	Low	High	Low
Budget ($'s)	74,971,500	14,749,000	14,391,534	7,182,808	7,071,098	710,000
Web traffic[a]	4,972,935	1,577,700	1,528,534	371,700	33,555	95,987
Travel exp ($'s)[b]	110,800	18,600	17,700	6,100	4,400	1,800

[a]Web traffic is a measure of unique visitors
[b]Travel exp = Travel expenditures communicated in $ millions

3.3 Data Analysis

While data was collected on all 50 states, only 43 of the states had all the data and could be used for data analysis. Due to the diverse nature of tourism popularity in the United States, the factors taken into account varied significantly across the 43 DMOs. As an example, travel expenditures ranged from $110.8 billion to $1.8 billion (USTA) and web traffic ranged from 4.9 million to 96,000. With a small sample size to start with, drivers with a wide range would make it more difficult to identify statistically significant results. Therefore, to make the data more comparable, the factors for each DMO were classified into categories based on distribution; high (top 25 %, n = 11), middle (26–74 %, n = 21) and bottom (75–100 %, n = 11). A summary of the first stage of data collection using the classification is presented in Table 1.

For stage two of data collection, it was identified that 72 % of US state DMOs had adopted a mobile website and 46.5 % used RWD. Interestingly, 25 % of the destinations used both, suggesting that RWD does not necessarily replace mobile websites.

In order to explain the three different hypothesis related to DMO organizational/environmental factors and the likelihood of mobile optimization strategies, a logistic regression was applied. The dependent variable was coded 1 for the use of each of the different mobile optimization strategies and 0 if otherwise (See Table 2). The predictors were: budget, web traffic, and travel expenditures (See Table 1). A logistic regression model was created for each of the three predictors to explain the likelihood of mobile optimization strategies used. The base reference group for each of the regression models was the top quartile for budget, web traffic and web expenditures group. For the logistic regression formula (See Fig. 1), x represented the predictor or categorical independent variables.

For each of the three predictor or categorical independent variables (budget, web traffic and travel expenditures) a logit model was used to calculate the coefficient and a logistic regression was used to calculate the odds ratio. Logistic regressions are a frequently used form of data analysis to describe the relationship between a dependent and one or more independent variables (International Data Corporation 2013).

Table 2 Mobile optimization tactics

Mobile tactics used	*n*	%
Not mobile ready	3	7.0
Mobile website	31	72.1
RWD	20	46.5
Mobile and RWD	11	25.6

Fig. 1 Logit model formula

$$y = \frac{\exp(x\beta)}{(1 + \exp(x\beta)}$$

4 Results

The logistic regression identified important significant relationships between the organizational and environmental factors and the method of mobile optimization.

H1 Budget—Not Supported The assumption that DMOs with higher budgets would increase the probability of mobile website sophistication was incorrect. On the contrary, the probability that DMOs in the bottom quartile would use more sophisticated website design was greater than the probability for DMOs in the top quartile. Specifically, DMOs in the bottom quartile were 21 times more likely to have implemented responsive website design relative to DMOs in the top quartile. This measure increased to 71 times more likely when both Mobile and RWD were considered.

This result is counter intuitive to what one would think of resource availability and technology sophistication. Upon further thought and consideration, complexity and focus could be possible explanations. The DMOs with smaller budgets are less complex organizations and would also have a simpler websites, making it faster and easier for the DMO to adopt the latest mobile optimization tactics for their website. Similarly, the DMO with the small budget could be placing more focus on digital media platforms as opposed to larger budget DMOs who may place a greater importance on traditional advertising and other forms of media.

Another explanation to this result that was counter to the hypothesis could be related to the larger organizations. Larger organizations could have recently locked into mobile websites as their optimization strategy, making it more difficult for them to quickly switch strategies. Finally, in relation to the findings of Zach et al. (2010), this could be interpreted as meaning that RWD is seen as a continuous innovation by DMOs and, accordingly, smaller DMOs would have a greater propensity to engage in it (Table 3).

H2 Website Traffic—Supported The assumption that DMOs with higher website traffic would increase the likelihood for mobile optimization techniques was correct. The probability that DMOs in the top quartile would use more sophisticated website design was greater than DMOs in the bottom quartile. Specifically, DMOs in the top quartile for web traffic were 29 times more likely to use RWD relative to

Table 3 Logit model and logistic regression results

	Mobile website[a]		RWD[b]		Mobile and RWD[c]	
Logit coef.	Odds ratio	Logit coef.	Odds ratio	Logit coef.	Odds ratio	
Budget quartile						
Middle	0.0900	1.0900	0.4400	1.5500	1.0400	2.8300
Bottom	−0.7200	0.4900	3.05**	21.05**	4.27**	71.42**
Web traffic						
Middle	1.1600	3.1800	−1.64*	0.19*	−2.08*	0.12*
Bottom	0.7100	2.0300	−3.38**	0.03**	−4.48**	0.01**
Travel expenditures						
Middle	−1.0200	0.3600	0.8900	2.4200	0.4400	1.5600
Bottom	−0.5600	0.5700	0.0300	1.0200	0.5100	1.6700

*$p < 0.10$; **$p < 0.05$

[a]Mobile website overall model evaluation: likelihood ratio 3.25 ($p > \chi^2 = 0.7765$), score test 2.95 ($p > \chi^2 = 0.8147$), goodness-of-fitness test 9.49 ($p > \chi^2 = 0.4866$)

[b]Responsive web design model evaluation: likelihood ratio 9.71 ($p > \chi^2 = 0.1372$), score test 6.89 ($p > \chi^2 = 0.3313$), goodness-of-fitness test 18.89 ($p > \chi^2 = 0.0417$)

[c]Mobile and RWD overall model evaluation: likelihood ratio 10.52 ($p > \chi^2 = 0.1044$), score test 7.08 ($p > \chi^2 = 0.3133$), goodness-of-fitness test 14.00 ($p > \chi^2 = 0.1731$)

DMOs in the top quartile. This measure increased to 88 times more likely when both Mobile and RWD were considered.

This result is consistent with the hypothesis and it can therefore be clearly stated that the greater the website traffic, the greater the likelihood a DMO uses RWD. This means that market orientation is a clear factor in driving website innovation for DMOs.

H3 Travel Expenditures—Not Supported The assumption that travel expenditures for a destination would have an impact on mobile optimization was incorrect. There was no significant relationship between travel expenditures and mobile optimization. This result is not consistent with the thinking that the greater the travel expenditures generated by a destination, the more likely destinations are to use mobile optimization techniques.

While traveler expenditures are a good measure of the popularity of one destination versus another, they are not a predictive measure of mobile optimization strategies. They are, however, only one possible indicator of the organizational environment. The finding suggests that maybe more direct measures of the negotiating power of the DMO or the favorable attitudes toward tourism at the destination are needed in order to understand technology adoption and innovation activities.

5 Conclusions

Given the growing usage of mobile devices for travel related purposes, this study was the first to look at mobile optimization strategies and more specifically responsive website design. The results from the study reveal a widespread adoption and usage of mobile websites by DMOs, but a much lower adoption of RWD as a method of mobile optimization. This study is important because it was the first to look at mobile optimization strategies used by organizations. For the smaller DMOs, it demonstrates that budget may not be a barrier to using RWD. For the larger DMOs with a higher budget it demonstrates that smaller organizations are early adopters of that they may need to look outside their competitive set when following shifts in technology use.

This study is also important because it is one of first attempts to understand how DMOs are responding to the growing importance of mobile communications. All indicators are that mobile communications will continue to play an increasingly important role for tourism marketers and more traditional website strategies will need to be adapted or DMOs will be left behind by smaller more flexible DMOs. The study contributes theoretically to the growing literature on innovation in tourism and specifically on technology adoption in DMOs. It also provides insights for national DMOs or tourism ministries wanting to foster website innovation as well as for website design companies trying to sell services to the DMO market.

The research has limitations. First, due to lack of availability of organizational information about DMOs, the sample size was relatively small. A larger sample size with other organizational factors could have identified other important relationships. Also, only one type of DMO was included in the analysis and the geographic scope was limited; however, keeping the regulatory and economic environment constant also has advantages in that there is less variance in the data regarding broader environmental factors.

Given the limited nature of this study, future studies about RWD may want to look into expanding on these initial findings by conducting long qualitative interviews with DMOs to obtain more detailed insights into awareness and decision-making processes. In doing so, the insights could be used to develop a better understanding of RWD and help DMOs make decisions about future mobile optimization strategies. It is also recommended that the examination of the relationship between organizational characteristics and mobile optimization strategies be done with different types of DMOs and using different independent variables such as type of organization, use of external resources and overall IT innovation.

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Perceived Usability, Attractiveness and Intuitiveness of Responsive Mobile Tourism Websites: A User Experience Study

Aleksander Groth and Daniel Haslwanter

Abstract Users increasingly access the internet through their smartphones creating the need for a different web design approach in order to meet the requirements of new user behaviour. Responsive Web design (RWD) is an approach to develop websites dynamically and adjust their layout and content to the screen size of a user's device. This study investigates the impact of RWD on perceived usability, perceived attractiveness and intuitiveness through a user experience experiment of two touristic information websites (desktop and mobile versions) with varying levels of compliance to those guidelines. Results indicate that there are significant differences in perceived usability and user experience between desktop computers and smartphones in general. Additionally, mobile information services following a stricter approach to RWD are perceived as easier and more intuitive to use, yet they fail to create emotion and consequently are less recommended by users.

Keywords Responsive web design • Intuitiveness • User experience • Attractiveness

1 Introduction

The growing variety of mobile devices, their characteristics and features is enormous, and developers need to be aware of all restrictions inherent in those devices. A common development approach is to reduce the delivered content and strictly adhere to basic standards in order to support as many devices as possible, at the expense of cutting-edge features. Another approach is to customize the design to meet the requirements of those devices that offer the best possibilities (e.g. user base, distribution system) for a business (Wessels et al. 2011).

Especially in the context of tourism, we can witness an incredible development of mobile services supporting tourists in finding information on touristic products (e.g. hiking routes, sightseeing), offering location-based information or tour guides with online check-in capabilities, booking possibilities via mobile apps, weather

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_43

information, travel blogging, social communication and sharing, and rating and reviewing of touristic products on location (e.g. Grün et al. 2008; Rasinger et al. 2007; Ricci 2010). These services are even powerful enough to impact the overall travel experience by influencing the sense of tourism, the nature of travel, and the value of places or locations (Gretzel et al. 2008). Accordingly, DMO's and other providers of eTourism websites (e.g. hotels, skiing areas) have to consider, whether offering their content on mobile devices and developing a specially adapted mobile website next to their desktop version is worth the (quite substantial) investment.

Mobile devices are considered very personal and users are affected by a variety of parameters such as the attractiveness of the device and the applications, the brand, their prior experiences, and the context of use. So far, research focused on the general characteristics of mobile devices (e.g. screen size) and their implications on user experience (Raptis et al. 2013), on the examination of different uses of smartphones and their impact on travel experiences (Wang and Fesenmaier 2013), on the benefits of responsive web design (Gardner 2011), or on the challenges and benefits of bringing web applications to mobile devices (Wessels et al. 2011).

This paper presents an initial step towards understanding the impact of a responsively designed touristic mobile information website on perceived usability, user experience, intuitiveness, and the overall attractiveness.

2 Theoretical Background

2.1 Responsive Web Design

Essentially, Responsive Web Design (RWD) is a methodology introduced to help realizing the vision of a "One Web" (Gardner 2011). Hence, RWD aims to combine the capabilities of HTML5 and CSS3 with a new design paradigm for website architectures, which are able to flexibly adapt to different screen sizes. Marcotte (2011) emphasises this need for an answer to an increasing number of diverse mobile devices and a shifting in user behaviour: "Rather than creating disconnected designs, each tailored to a particular device or browser, we should instead treat them as facets of the same experience." (p. 8).

Websites without optimizations for mobile devices simply shrink the website to fit the viewable area. This method requires the user to zoom into the website (using touch) in order to read the content properly. A RWD approach alters the layout of the website based upon the viewport of the device, transforming static websites into responsive, adjustable, and fluid layouts, which are much more flexible in handling elements and automatically rearrange them accordingly (Bohyun 2013). RWD changes the way of web development, forcing content providers and developers to consider carefully, what is essential about their content. Therefore, this approach starts with providing minimal services and content in an effective way on the smallest portable device. Afterwards, functionalities and components are added to match devices with larger screen dimensions and different sets of input/output

devices. With the lack of proper guidelines, categories are used, which have been derived from an examination of typical device characteristics (Fox 2012). Champeon (2013) summarized this approach under the term *Progressive enhancement*, encouraging designers to emphasise accessibility, semantic HTML mark-up, external style sheets and scripting technologies. Marcotte (2011) summarizes RWD as a composition of three distinct parts: (1) a *flexible grid*, (2) *flexible images* or rather images that work in a flexible context, and (3) *media queries* to optimize the design for different viewing contexts (devices), and spot-fix bugs that occur at different resolution ranges. Ultimately, RWD effectively adjusts the content and layout to the context of the device and ensures that users have a better and richer viewing experience (Gardner 2011).

2.2 Usability and Mobile Devices

Following Jacob Nielsen (2012), the term usability defines an attribute with qualitative character that assesses the ease-of-use of user interfaces. Usability refers to methods for enhancing this attribute during the design process phase, spreading onto five quality components: learnability, efficiency, memorability, errors, satisfaction, and utility. Usability directly refers to the design's functionality and investigates, whether the system's functions meet the user needs.

Within ISO 9241-11, Usability is defined as "The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use." In more detail, effectiveness covers the accuracy and completeness with which users achieve goals, efficiency evaluates all resources spent in achieving these goals, and satisfaction explains a user's comfort with and positive attitude towards the use of the system. Although usability provides a valid basis to describe a certain fit of a technology and a user, this three dimensions—effectiveness, efficiency, and satisfaction—limit this approach down to a very functional ‚way-of-doing-things'. Usability therefore stands as a basic evaluation criterion of a technical system (Brau and Sarodnick 2006).

The term "mobile" is traditionally associated with on-the-move, dynamic and portable, while mobile devices are considered personal, portable, and immediate (Wessels et al. 2011). With the appearance of smartphones, an increasing number of users are accessing the mobile Internet via their phone on-the-go, leaving more stationary and familiar settings, like at home or at work (Church and Oliver 2011). Nielsen and Budiu (2013) compared conversion rates when studying e-commerce websites, defining them as "the percentage of visiting users who end up taking a desired action, observing differences, depending on the used device". Results showed that desktop computers have a 3.5 % rate compared to mobile phones with only 1.4 %. Two possible explanations evolved: (1) Mobile user experience must be horrible, as mobile sales could be 2.5 times higher if mobile websites would be as easy to use as desktop sites, and (2) it is assumed that there is no commitment to invest in mobile design because mobile users do not account for very much business.

2.3 *Attractiveness and Intuitiveness in User Experience*

An experience that is created when using a system has also implications for certain non-functional aspects within a user interaction (Hassenzahl et al. 2009). Nevertheless, usability should not be considered less important, but should be put into perspective towards a good, or even outstanding, user experience. Within ISO 9241-210, this focus on the individual and its interaction with different objects has been expressed as followed: "A person's perceptions and responses that result from the use or anticipated use of a product, system or service." The scope of the term "user experience" is applicable to all objects (tools, entertainment services, knowledge systems, and websites) a person can interact with through a user interface. Studies show that the attractiveness of a product does play an important role in perceiving usability (Chawda et al. 2005). In the field of mobile computing, attractiveness does have the highest influence on usability ratings, followed by effectiveness and efficiency (Quinn and Tran 2010), implying that an attractive phone could have a high usability rating, even when scoring low on either effectiveness or efficiency.

While intuitive interaction lacks a solid best-practice definition and implementation (Ingram et al. 2012) new technologies and interaction gestures (or patterns) provide users with new freedoms, when interacting with user interfaces. This enables developers to design interfaces and create emotions, harvesting on already learned interaction gestures (Tanimura and Ueno 2013). Responsive design and progressive enhancement can be seen here as a natural extension, acknowledging the change in user behaviour. Intuitive interaction is defined as a non-challenging cognitive process and can be narrowed down to mainly information-based activities within a specific context of a task, goal, user, environment, and technical system (Hurtienne et al. 2006). A technical system may be classified as intuitive, whenever an either natural or non-conscious utilization with (or without) a user's pre-experience leads to an effective interaction (Diefenbach and Ullrich 2011). When designing website experiences for mobile devices through RWD, the interface should therefore not only adhere towards responsive design principles, but should also be designed to emphasise intuitive interaction patterns.

3 Methodology

A user experience experiment was conducted to measure the influence and effect of two different RWD approaches on users' perceived usability, user experience, intuitiveness, and attractiveness. Two different websites of touristic organizations were chosen: one adhering strictly to RWD principles (Website A, regional tourism marketing) and one following a rather classic approach, providing a mobile website that stays closer to its desktop version (Website B, local DMO). Both offer desktop and mobile versions. The experiment comprised two sessions, where users

performed a series of tasks on a desktop computer and a smartphone. Device-wise an Apple iPhone 5s (iOS 7.1.1) and a desktop PC running Microsoft Windows 7 were chosen.

20 persons (14 male, 6 female, age between 16 and 29) participated in the experiment. All participants had at least a basic understanding of using smartphones and the internet in order to cope with the required tasks and all owned a smartphone. As only web browsing was observed, a possible unfamiliarity of Android users with iOS' look and feel can be assumed not to have any effect in the experiment. The following research hypotheses have been formulated:

H1: There is a general difference between the desktop and the smartphone version of the two websites regarding their perceived usability.
H2: A stricter implementation of RWD will have a positive effect on the perceived usability of the participants.
H3: A stricter implementation of RWD will have a positive effect on the user experience (perceived attractiveness and intuitiveness) of the participants.

3.1 Procedure

The experiment was split in two sessions, one session on the desktop computer and one on the smartphone. In the introduction phase, the participants were introduced to the topic and the setting of the experiment was described. Within the experiment, participants had to accomplish five tasks: three information-seeking and two function-based. All five were classified according to their levels of difficulty (easy, medium, difficult) and the degree of scrolling (easy, medium, heavy). The latter was used to measure its effects on effectiveness and efficiency. None of the participants had any previous experiences with the selected websites (Raptis et al. 2013).

Task 1: Subscribe to the newsletter of the website (easy, light scrolling).
Task 2: Inform yourself about the Aqua Dome. Please note down the address and phone number (easy, light scrolling).
Task 3: Inform yourself about the Hiking Tours in Tirol—"Adlerweg". Inform yourself about the Hiking Tours in Ötztal—"Ötztal-Trek". Please note down, how much elevation/how many kilometres the tour comprises (medium, light scrolling).
Task 4: Inform yourself about the National Parks. What is the duration in hours of the hiking tour to the Trelebitschsee/Frischmannhütte in the National Park "Hohe Tauern"? (difficult, medium scrolling).
Task 5: Please book a vacation using your own criteria on the website, using a budget of 1,500 Euros. Define your trip first using the following attributes: Date of Arrival/Departure, City/Village, Category, and Number of adults/children (difficult, heavy scrolling).

The aim was to discover the content and functionalities of the two different providers and the two versions. Tasks were executed in an A/B test-setting (also called split testing) comparing two versions of a web page (Website A and B) to identify which one performs better (Brau and Sarodnick 2006). Users worked randomly with either the first or the second version of websites and were separated into Group A and Group B (Sauro and Lewis 2012). Predefined criteria were measured in order to compare the results of the two tested groups. After 2 weeks, participants concluded the experiment, working with the other two versions of the websites. During the experiment, participants were invited to share their thoughts thinking aloud. User screen activity and audio was recorded. After finishing all tasks, participants completed a post-test questionnaire.

3.2 Applied Measures

In order to collect a multi-dimensional rating of the participants and to assess the performance of the users the following measures were used:

Perceived Usability The participants evaluated each version of the websites via the System Usability Scale questionnaire (SUS) (Brooke 1996). SUS comprises ten questions (on a 5 or 7-point Likert Scale) and calculates a value between 0 and 100 (100 = perfect usability).

Perceived Satisfaction and Promotion The participants evaluated each version of the websites using the Net Promoter© Score (NPS) questionnaire (Reichheld 2003). NPS comprises one question (How likely would you recommend X to a friend?) on a 1–10 scale. Users are then categorized as Promoters (score 9–10) and Detractors (score 0–6). NPS is calculated as the % of Promoters minus the % or Detractors (score between: −100 and 100). In order to predict the NPS out of SUS scores, Lewis (2012) used over 2,000 pairs of scores in order to establish a regression equation. For a more simplified version of this equation (LTR—Likelihood to recommend) the following formula can be used:

$$LTR = \frac{SUS}{10}$$

Perceived Intuitiveness The intuitiveness of the different versions of the websites was measured with the INTUI questionnaire. INTUI offers a differentiated interpretation of evaluation results, measuring intuitiveness on four dimensions: (1) *Effortlessness (E)*, (2) *Gut feeling (G)*, (3) *Magical Experience (X)*, and (4) *Verbalizability (V)* (Ullrich and Diefenbach 2010).

Perceived Attractiveness The AttrakDiff2 questionnaire (www.attrakdiff.de) was used in order to measure the perceived attractiveness of the different website versions and to evaluate their interactivity. The questionnaire records the perceived

pragmatic quality, the hedonic quality and the attractiveness of an interactive product (Hassenzahl et al. 2003).

4 Results

Perceived Usability The following mean SUS scores, standard deviations, and confidence intervals ($\alpha = 5$ %) were measured for all four versions of websites. As the sample size of the usability study was smaller than 25 participants, the geometric mean was used to estimate the mean values of the different versions (Sauro and Lewis 2012).

Comparing the SUS scores, a measurable difference between smartphone versions and desktop versions is identifiable—desktop versions were rated significantly higher than their smartphone counterparts: Website B (less responsive) was rated higher by 14.44 (Mean-Desk: 77.35, Mean-Smart: 62.91) compared to Website A (more responsive) with 9.52 (Mean-Desk: 73.58, Mean-Smart: 64.06). Applying the adjective rating scale from Bangor et al. (2009) both desktop website scores were rated "Good", while the smartphone version scores were between "OK" and "Good". In relation to a comparative SUS study crossing different domains, desktop web interfaces average on 68.2 while mobile phones average on 65.9.

Net Promoter Score The best NPS score is −5 (SD = 1.94, mean 7.1) by Website A-Desk. Website A-Smart reached −40 (SD = 2.52, mean 6.0). Website B-Smart reached −45 (SD = 2.82, mean 5.4), and the desktop version −10 (SD = 1.72, mean 7.3). The general average NPS for companies and services is about 5–10. Results below zero imply more detractors than promoters for the tested product or service. Our results show a significant difference between desktop and smartphone versions. A NPS for smartphone versions with −40 for Website A-Smart (Mean-SUS: 58) and −45 for Website B-Smart (Mean-SUS: 55) implies that there are 40 and 45 % more detractors than promoters (Mean SUS: Website-A: 82.5; Website-B: 84.2), while desktop versions seem more neutral with NPS scores of −5 for Website A-Desk and −10 for Website B-Desk.

INTUI Results show a significant difference within *Effortlessness (E)*. Both desktop versions were perceived as easier to use (Website A: 5.37; Website B: 5.47; higher means better). This result is in line with SUS results where both desktop versions were also rated higher. *Gut feeling (G)* showed that all versions are rather mind-driven. Website A-Smart (3.67) was the one perceived as the most feelings-driven version (Website B-Smart: 3.20), supporting the theory that a higher compliance with guidelines of mobile usability and RWD leads to an experience that feels more intuitive. *Magical Experience (X)* showed that Website B-Desk (4.44) and B-Smart (3.83) are perceived as more magical compared to Website A (Desk: 3.64; Smart: 3.40) due to a more picture-rich presentation and design. *Verbalizability (V)* showed no difference between all versions, meaning that all

Fig. 1 Portfolio with average values of the dimensions PQ and HQ and the respective confidence rectangles—Smartphone (*left*) and Desktop (*right*)

operating steps were quite easy to remember and verbalizable (mean 5.06). Interestingly, Website A-Smart achieved higher mean values of E, G, X, V than its desktop version and also performed better than Website B-Smart. The observation is another indication that the stricter approach to responsive design guidelines leads to an easier use of the system. The overall intuitiveness of the websites was measured with the component of *Global Intuitiveness (INT)* with Website B-Desk scoring best (4.70), followed by Website A-Desk (4.63), Website A-Smart (4.33), and Website B-Smart (4.11), 1 being not and 7 being very intuitive.

AttrackDiff2 Within the portfolio-view, the relative characteristics of the two dimensions of pragmatic quality (PQ) and hedonic quality (HQ) are analysed and combined, resulting in a special character for each tested product (see Fig. 1).

Website A-Smart was rated generally neutral, lacking on hedonic quality, and being stronger on the pragmatic side, possibly due to a stronger adherence of responsiveness, lacking pictures and focusing more on the content. Nevertheless users still seem to be stimulated by the site. Website B-Smart shows a higher evaluation of hedonic quality, due to a richer use of graphical components and pictures, but no improvement towards the pragmatic quality. Both desktop websites improve their score significantly on both dimensions, with Website B-Desk achieving the highest score, possibly again due to a richer graphical design and look and feel, implying a strong emotionally stimulating factor of this website. The diagram of means for the different components was measured to show the critical dimensions of the tested websites and visualize where the websites differ from each other (see Fig. 2).

Website A-Smart is rated average, or rather ordinary, on all dimensions: *Pragmatic Quality (PQ)*, *Hedonic Quality-Identity (HQ-I)*, *Hedonic Quality-Stimulation (HQ-S)*, and *Attractiveness (ATT)*. For Website B-Smart, HQ-S is evaluated significantly better, than for Website A-Smart. Both desktop versions improve in all dimensions, especially on attractiveness, with Website B being rated higher on HQ-I, HQ-S and ATT. The main message of the diagram of means is similar to the results of the portfolio-view: Website B achieved slightly better results in the categories of HQ-I, HQ-S and ATT. The component of PQ showed no differences between the two websites when used on either version. The general trend that the

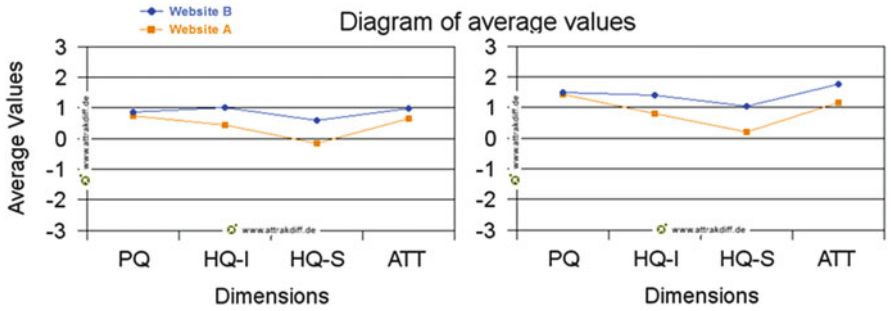

Fig. 2 Mean values of the four AttrakDiff2 dimensions for the two websites—Smartphone (*left*) and Desktop (*right*)

smartphone versions were rated lower was underpinned by comparing the average values. The components of ATT and HQ-S underline that Website B was perceived as more attractive and more creative.

4.1 Statistical Analysis

A within-subjects ANOVA was performed for the measures of perceived usability (SUS and INTUI-E). The components of overall *Intuitiveness (INT)* and *Magical Experience (X)* were also analysed using a Kruskal-Wallis test. The effect of the participants' operating system on SUS was measured with a two-tailed *T*-Test. Each of the following analyses ran through the required pre-tests of the chosen model (Shapiro-Wilk and Mauchly test).

H1: There is a general difference between the desktop and the smartphone version of the two websites regarding their perceived usability.

An analysis was conducted to investigate the effect of all tested website versions on perceived usability. The variables used were the different SUS scores for all versions. Results for the first within-subjects ANOVA showed that there is a significant effect for the version of the websites on perceived usability, Wilks' Lambda = 0.62, $F(3,17) = 3.48$, $p = 0.039$, partial $Eta^2 = 0.38$ and compliance with Mauchly's Sphericity $p = 0.662$. A post-hoc analysis (Fischer's Least Significant Difference Test = LSD) was conducted. The pairwise comparisons indicated, that there is a significant difference between Website B-Smart and Website B-Desk ($p = 0.022$), but no difference between Website A-Smart and Website A-Desk ($p = 0.158$). As a first conclusion, H1 cannot be substantially proven, showing a significant difference on perceived usability between Websites B, but none between Websites A. No significant difference between smartphone versions ($p = 0.829$) can be found, hence H2 has to be rejected.

H2: A stricter implementation of RWD will have a positive effect on the perceived usability of the participants.

In order to investigate H1 and H2 from another perspective, a second analysis was conducted. As Ulrich and Diefenbach (2010) mentioned that *Effortlessness (E)* has the strongest relation to classical usability metrics, related effects of each website version on this component were analysed. Results of the within-subjects ANOVA show a significant effect of the version of the website on usability, when compared with the component of Effortlessness: Wilks' Lambda = 0.46, $F(3,17) = 6.75$, $p = 0.003$, partial $Eta^2 = 0.54$ and compliance with Mauchly's Sphericity $p = 0.296$. Post-hoc analysis (Bonferroni) indicated a significant difference between Website B-Desk and Website B-Smart ($p = 0.006$) and no significant difference between Website A-Desk and Website A-Smart ($p = 1.000$). Again the post-hoc analysis indicated that H2 cannot be substantially proven. In addition, no significant differences between the both smartphone versions could be found.

H3: A stricter implementation of RWD will have a positive effect on the user experience (perceived attractiveness and intuitiveness) of the participants.

The component of overall *Intuitiveness (INT)* was used to measure the effect of each website version on global intuitive interaction. As the data cannot assumed to be normally distributed (Shapiro-Wilk: $p < 0.05$) a second Kruskal-Wallis test was applied. The test resulted in no significant difference between the versions ($p = 0.256$). A second analysis using *Magical Experience (X)* was conducted to approach the assumption from another perspective. As the data for Website B cannot assumed to be normally distributed (Shapiro-Wilk: $p < 0.05$) a Kruskal-Wallis test was used. The analysis showed no significant differences between the versions ($p = 0.065$). This implies that the third hypothesis (H3) had to be rejected. In addition, AttrakDiff2 results indicate that differences in terms of user experience were not relevant enough to be significant.

Correlations Between SUS and NPS Scores

A Spearman-test and Pearson-test have been applied to measure correlations between SUS and NPS. Sauro and Lewis (2010) compared the data of 146 users who were asked to complete both a SUS for perceived usability and a NPS for customer loyalty and found a significant correlation ($r = 0.61$, $p > 0.001$) between the two variables. Hence, promoters have an average SUS of 82, compared to detractors with an average SUS of 67. In our study these correlations for Website A-Smart (Mean SUS—Prom.: 82.5; Detrac.: 58), Website A-Desk (Prom.: 88; Detrac.: 62.5), Website B-Smart (Prom.: 84.2; Detrac.: 55), and Website B-Desk (Prom. 92.5; Detrac.: 62.5) were significant at an alpha level of 0.01. The outcome strongly supports above assumptions, with detractors and promoters varying at the same level. The correlation underlines that participants who face problems in the task execution and express those problems through SUS are transferring their collected impressions when evaluating the NPS.

5 Discussion

"*Does a higher (=stricter) degree of responsive web design enhance the usability (perceived and measured) of a mobile information website?*" Website A-Smart (stronger compliance to RWD) achieved better results in terms of *Perceived Usability* and *Intuitiveness*. However, the differences were only significant for Websites B and not for Websites A, leading to contradictory results. Additional research needs to be conducted to further investigate the impact of RWD on perceived usability. The general differences between the two smartphone versions showed that Website A was marginally ahead in terms of SUS scores, NPS, and overall intuition, the overall *Attractiveness* of Website B-Smart was slightly better. Our conclusion here is that RWD is a possible way to enhance perceived usability, but that a noticeable trade-off towards being too pragmatic (or boring) is likely to be created and smartphone users will be negatively affected by it.

"*How does a stricter approach of responsive web design influence the user experience?*" Our data analysis did not discover a significant difference between the two tested websites (H3 was rejected). However, the participants indicated that Website A-Smart was perceived as easier to use and that single operating steps were easier to remember. On the other hand, again Website B-Smart was rated higher in terms of *Magical Experience*, meaning that the interaction with the website was perceived as extraordinary and fascinating. This is due to the website's better use of mainly optical features, such as good design, number of pictures and overall attractiveness. Participants who preferred Website A-Smart answered more in a direction of logical reasons, like clear structure, ease-of-use and well-designed content. Concluding, users who favour websites with a focus on aesthetics and design will be negatively influenced by stricter approaches to RWD. The challenge of successfully implementing a mobile website will be to find an adequate balance between aesthetical aspects and efforts to optimize the usability and compatibility according to a device's requirements. This should not imply that efforts to optimize for mobile interfaces automatically lead to negative user experiences, but that all efforts in the process of reducing functions and design elements should be considered very carefully, as a direct negative influence towards promoting the website was identified.

Our user experience study illustrates that there are still massive differences in usability and user experience scores between desktop computers and smartphones. While both websites had different approaches to the implementation of RWD, the one that had a more compliant adherence to the guidelines achieved better overall results, but failed to attract and be recommended. Implementing guidelines alone does not lead to better results of usability and user experience. They have to be prioritized by criticality in order to achieve a higher relation to the effects on performance and/or satisfaction. As a result, developers should select and integrate RWD guidelines based on their content and level of importance to their strategic goals (Hart et al. 2008).

6 Conclusion

The impact of responsive web design on user experience needs to be addressed from multiple viewpoints. The outcome of this study indicates that strong reductions on visual features can have negative consequences for the user experience, which impacts users of touristic mobile website, who expect to encounter very picture rich and graphical designs. On the other hand, such reductions can also lead to improved usability and increased overall satisfaction. The discovered correlation between SUS and NPS scores clearly illustrates the connection between usability and user experience and their influence on promotion and detraction of a mobile information service, being a critical success factor especially for DMO's and tourism service providers. As Reichheld (2003) stated, no one is going to recommend a product or service without really liking it. Consequently, the increasingly growing mobile user group needs to be addressed with greatest care, employing a user-centred design process that relies on established models and guidelines. Ultimately, users will decide on the success or failure of such implementations. However, magical experiences and attractiveness should not be neglected—rainbows and unicorns included.

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Visual Appeal of Hotel Websites: An Exploratory Eye Tracking Study on Chinese Generation Y

Jin-Xing Hao, Rui Tang, Yan Yu, Nao Li, and Rob Law

Abstract With increasing recognition of experience as the essence of tourism, studying visual appeal of web design and striking a balance between usability and aesthetic considerations have elicited considerable attention from tourism and hospitality researchers. In this study, we attempt to explore visual appeal of hotel websites to Chinese Generation Y. Based on prior research, two preeminent web characteristics (i.e., a large main picture and little text) of hotel websites are identified that may be particularly preferable to Chinese Generation Y. A survey and an eye-tracking experiment are triangulated to validate the findings. Results show that web pages of hotel websites with large main pictures and little text are indeed visually appealing to Chinese Generation Y. The visual responses of participants captured by an unobtrusive eye-tracker further support our findings.

Keywords Visual appeal • Chinese generation Y • Hotel website • Eye tracking

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_44

1 Introduction

The importance of experience as the essence of tourism has been increasingly recognized, leading to a shift in focus towards a more general experiential perspective (Tussyadiah 2014). Accordingly, the need of website evaluation to transcend usability and utility to the whole user experience has been emphasized (Kim and Fesenmaier 2008; Leung and Law 2012). Visual appeal contributes heavily to positive user experiences. Beautiful designs have been shown to be usable (Tractinsky et al. 2000). In addition, reliable associations have been established between perceived visual appeal and subjective evaluations of a website's content, credibility, trustworthiness, and usability (Lavie and Tractinsky 2004; Leung and Law 2012; Lindgaard et al. 2006; Moshagen and Thielsch 2010). Given the intensive competition in the hotel industry, developing and maintaining a visually appealing website has become critically important.

Chinese Generation Y, roughly 200 million born 1981–1995, has been raised in modern China and is poised to be a major force in China's technological and economic future (Stanat 2006). This generation, who has generally lived with the Internet and has embraced high technology in everyday life, has been characterized as technological savvy. This generation is more involved in online travel than other generations. A recent China online travel sector report (iResearch 2014) shows that the Chinese Generation Y cohort represents 68.7 % of online travel users. This generation is also economically powerful. According to a survey by Credit Suisse First Boston, the incomes of this cohort grew 34 % in the past 3 years, by far the biggest of any age group in China (Elegant 2007). Therefore, as an increasingly important market segment, hoteliers must make websites visually appealing to this group of users.

In spite of the increasing importance of Generation Y to hotel business (Benckendorff et al. 2010; Leask et al. 2014), scarce research discusses visual appeal of hotel websites to this generation. Therefore, in this study we attempt to explore the following research questions:

1. What are the preeminent characteristics of web pages to make hotel websites visually appeal to Chinese Generation Y?
2. How do members of this generation visually respond to these characteristics?

To increase the credibility and validity of our results, methodological triangulation involving a survey (Study I) and an eye-tracking experiment (Study II) is employed in our research.

2 Theoretical Foundations and Hypotheses

2.1 Visual Appeal in Website Evaluation

Visual appeal has been studied under different names (e.g., visual aesthetics and beauty) using different approaches (e.g., philosophical approach and empirical

approach) by different schools of thought (e.g., objectivist, subjectivist, and interactionist) (Choi and Lee 2012; Lavie and Tractinsky 2004; Tuch et al. 2012). In our study, we adopt the interactionist perspective and define visual appeal as an immediate pleasurable subjective experience that is directed toward an object and not mediated by intervening reasoning. Such a definition fits the context of web design and pinpoints three key properties of visual appeal, i.e., value positive, intrinsic, and objectified (Lavie and Tractinsky 2004; Moshagen and Thielsch 2010). Visual appeal is value positive because it provides pleasure when interacting with a hotel website. Visual appeal is intrinsic, implying that aesthetic responses occur at the first sight of a hotel website, instead of after extended cognitive efforts. Visual appeal is also objectified in that it lies in a specific hotel website, rather than exclusively the results of a positive sensation. Consequently, studying visual appeal of hotel websites, we need to consider both properties of hotel websites and characteristics of perceivers.

Website evaluation literature has long focused on effectiveness and efficiency of interactions (Lavie and Tractinsky 2004; Law et al. 2010; Leung and Law 2012). Although visual appeal criterion is undoubtedly an integral part of effective interaction, usable products may not be pleasurable products, of which visual appeal is an essential property (Jordan 1998). Increasingly, researchers seek to study the aesthetic aspects of web design and to strike a balance between usability and aesthetic considerations. In addition, recent studies show that perceived usability of websites are actually driven by visual appeal (Lindgaard et al. 2011). Evidence also indicates that visual appeal can influence perceptions beyond usability, such as website performance (e.g., Palmer 2002) and trustworthiness (e.g., Cyr et al. 2010). Moreover, visual appeal is also a strong determinant of affective constructs including pleasure (e.g., Mathwick et al. 2001), satisfaction, and loyalty (e.g., Cyr et al. 2008).

2.2 Web Characteristics Influencing Visual Appeal

Given the increasing importance of visual appeal in website evaluation, it is vital to identify distinct web characteristics that yield an immediate impression of visual appeal. Prior studies have examined several web characteristics of aesthetic objects including colours, structure, simplicity, complexity, novelty, prototypicality (e.g., Cyr et al. 2010; Pandir and Knight 2006; Schmidt et al. 2009; Tuch et al. 2012).

In particular, the work of Djamasbi et al. (2010) identifies four preeminent web characteristics preferred by Generation Y. These characteristics include a large main picture, a search feature, little text, and images of celebrities. Considering the context of hotel websites, we observe that nearly all of websites have search features, and very few websites have images of celebrities. Therefore, in this study we hypothesize on effects of a large main picture and little text.

2.3 Hypotheses

Theory of visual rhetoric (Scott 1994) purports that images are more efficient to communicate complex messages. Therefore, prior studies generally agree that web pages with pictures are more visually appealing. We argue that this is particularly true for Chinese Generation Y. Studies on the characteristics of this generation show that they generally have a short attention span and do not like to read "long boring text" (Perez 2008). Thus, we posit that members of this generation prefers communications based on pictures rather than text.

Strauss and Howe's generational theory (Strauss and Howe 1991) persists that each generation has common values that give it a specific character. This combination of technological savvy and economic power shape the unique values of Chinese Generation Y, including innovation and entertainment (Tapscott 2008). These unique values further influence their perceptions on visual appeal (Djamasbi et al. 2011).

Members of Chinese Generation Y love novelty instead of mediocrity (Stanat 2006; Tapscott 2008). The functionality of hotel websites is relatively stereotypical, which normally contains textual information including hotel descriptions, facilities, reservations, and surrounding areas (Ip et al. 2012). The psychobiology theory on aesthetics (Berlyne 1971) argues that a stimulus that is merely simple is perceived as boring and eventually results in a negative aesthetic response. Chinese Generation Y no longer expects a minimum of such functionality. Rather, this generation desires positive user experiences via novel web designs. Large main pictures, ideally with animated transition effects, can better serve such a purpose, as opposed to long text. A recent study on persuasive websites argues that emphasis on scenic beauty (using visual and imagery-oriented features) can build a strong and positive associative link or image about the hotel and to create seductive experiences so that these images encourage potential tourists to visit (Kim and Fesenmaier 2008).

Furthermore, Chinese Generation Y is partial to entertainment. More interesting interfaces increase users' arousal, sustaining their interest and effectiveness (Gait 1985). During this process, the size of picture also matters. A study has shown that young people are more easily inspired by a large picture dominating the entire web page (Tullis and Tullis 2007).

We, therefore, propose the following hypotheses regarding the two characteristics of web pages for Chinese Generation Y:

H1: For Chinese Generation Y, web pages of hotel websites with a large main picture are more visually appealing than those without a large main picture.

H2: For Chinese Generation Y, web pages of hotel websites with little text are more visually appealing than those with blocks of text.

3 Research Method

To answer the two research questions proposed in Sect. 1, methodological triangulation was used to enhance credibility and validity of the results. First, to identify preeminent web characteristics preferred by Chinese Generation Y and to test related hypotheses, we employed a survey method in Study I. Specifically, we gathered participant's self-reported ratings of visual appeal of hotel websites. According to Gestalt theory (Arnheim 1954), such ratings reflected participant's perceptions of whole objects rather than isolated elements. Second, to refine our findings in Study I and to explore how participants look at these web characteristics, we used an eye-tracking method in Study II. Self-reported measures can only capture a snapshot of participant behaviours at a specific time point, whereas an eye-tracking method can provide an objective and continuous measure of participant's reactions by eye movements.

For the two studies, we picked up the top 50 hotel brands in China based on Meadin Brand Index developed by Meadin.com, a famous tourism research institute in China. These hotels covered two major categories: luxury (45 %) and economy (55 %). One hotel was dropped because their website was consistently inaccessible during the experiment period. The remaining 49 hotel websites were all carefully designed and maintained for marketing purposes. To maintain consistency throughout the two studies, we captured screenshots of their homepages instead of live versions.

4 Study I: Survey

4.1 Participants and Procedure

Study I aims to test the proposed hypotheses and to identify the preeminent web characteristics preferred by Chinese Generation Y. We employed an online survey to solicit participant appraisal on visual appeal of randomly displayed screenshots of hotel website homepages.

The population of the study consists of members of Chinese Generation Y, who possess high levels of Internet skill and more than 1-year experience with online travel services. Email solicitations were sent to undergraduate and MBA students of a renowned university in China. A total of 53 volunteers anonymously participated the survey. The age of participants ranged from 19 to 35. Of the participants, 30 (55 %) were male and 23 (45 %) were female. After completing the survey, participants were awarded with a gift valued approximately CNY 10.

Participants were informed to rate the pages solely based on visual appeal instead of content. As in prior research (Hassanein and Head 2007; Tractinsky et al. 2000), the assessment of visual appeal is a single-item measure on 9-point Likert scale, with one indicating "not at all appealing" and nine indicating "very

appealing". The final visual appeal rating of a particular web page is the average rating of 53 participants.

For each homepage of selected hotel websites, we also coded its web characteristics (i.e., a large main picture and/or little text). Similar to prior studies (e.g., Djamasbi et al. 2010), we finalized a coding scheme based on the presence or absence of the characteristics described above. Specifically, if 40 % of a web page is occupied by a large picture, then the "a large main picture" characteristic of the page is coded as 1, otherwise 0. If the total number of characters on a page is less than average, then the "little text" characteristic of the page is coded as 1, otherwise 0.

Three independently expert judges coded each page individually. If any divergent opinions occurred about the coding results of a page, then the three judges discussed to reach consensus. Cohen's Kappa is used to measure inter-rater reliability (Cohen 1960). Results show that the average Kappa among the three judges was as high as 0.95, suggesting that the coding scheme and coding process were reliable.

4.2 Results

Table 1 presents the descriptive statistics and correlation of visual appeal and the two variables about web characteristics. In general, visual appeal of home pages of the 49 hotel websites are satisfactory ($M = 6.350$, $S.D. = 0.909$) based on the ratings of 53 members of Chinese Generation Y. Among these pages, 39 out of 49 hotel websites are without a large main picture ($M = 0.200$, $S.D. = 0.407$), and 31 out of 49 hotel websites are without little text ($M = 0.370$, $S.D. = 0.446$). Both the two web characteristics, i.e., a large main picture ($r = 0.770$, $p < 0.001$) and little text ($r = 0.714$, $p < 0.001$), have significant positive correlation with visual appeal of pages, indicating the two characteristics are possible predicators of visual appeal ratings.

We further tested Hypotheses H1 and H2 using linear regressions. The confidence level of $p < 0.05$ was adopted as the acceptance criterion for our hypotheses. The statistical data were carefully examined to ensure the hierarchical regression assumptions were satisfied. The result is shown in Table 2.

Variables *A Large Main Picture* and *Little Text* explain 64.3 % of the variance in *Visual Appeal* ratings. Specifically, *Visual Appeal* rating is significantly related to *A Large Main Picture* ($B = 1.189$, $p < 0.001$) and *Little Text* ($B = 0.664$, $p < 0.05$).

Table 1 Descriptive statistics and correlation

Variables	*N*	Mean	*S.D.*	1. VA	2. P	3. T
1. Visual appeal (VA)	49	6.350	0.909	–		
2. A large main picture (P)	49	0.200	0.407	0.770***	–	
3. Little text (T)	49	0.370	0.446	0.714***	0.728***	–

***$p < 0.001$, two-tailed tests

Table 2 Regression on visual appeal

	Dependent variable: visual appeal				
Predictor	B	S.D.	Beta	t	Sig
Intercept	6.595***	0.251		26.244	0.000
A large main picture	1.189***	0.287	0.533	4.144	0.000
Little text	0.664**	0.262	0.326	2.533	0.015
R^2	0.643***				
Adjusted R^2	0.627***				

N = 49, **$p < 0.05$, ***$p < 0.01$

The average *Visual Appeal* ratings of pages without a large main picture and little text (base group) is 6.595. For pages with a large main picture only, the average visual appeal ratings made by Chinese Generation Y participants is 1.189 higher than the base group. For pages with little text only, the average visual appeal ratings made by Chinese Generation Y participants is 0.664 higher than those of the base group. Accordingly, the two hypotheses H1 and H2 are supported.

5 Study II: Eye-Tracking

5.1 Participants

The objective of Study II is to explore the viewing behaviour of Chinese Generation Y and to answer how this generation visually responds to the identified web characteristics, i.e., a large main picture and little text. To avoid participant fatigue, based on the results of Study I, we selected the three most visually appealing websites and the three least visually appealing websites as stimuli for an eye tracking experiment. During the experiment, participant's eye movement data were captured by an unobtrusive eye-tracking device.

A total of 20 participants, aged from 19 to 35, volunteered to take the experiment. Due to the eye tracking nature of Study II, 20 subjects were generally considered sufficient to get robust eye-movement data (Pernice and Nielsen 2009). Each participant received a CNY 10 gift as an incentive after the experiment.

5.2 Experiment Settings

The experiment took place in a room containing a desktop computer, mouse, keyboard, camera, and eye-tracking device. A Tobii T120 eye-tracker was used to collect eye movement data with the support of Tobii Studio software. The eye-tracker was controlled by Tobii Studio software. This software offered a platform for recording eye movements, exporting raw eye gaze data, and multiple display visualizations such as video captures, gaze plots, and heat maps.

5.3 Procedure

The task of the experiment was to assess visual appeal of the six selected websites. The experiment lasted for approximately 10 min and the time was determined by a two-round pilot study. The general procedure of the experiment was as follows: (1) a facilitator welcomed the participant, explained the facilities, and had him/her sign the consent form. (2) The facilitator gave instructions to view each web page for a minimum of 10 s and emphasized that rating is based on visual appeal instead of content. (3) The participant conducted eye-tracker calibration using the standard option in Tobii Studio. The process took approximately 15 s, with participants following moving red dots on the screen with eyes. (4) Web pages from six selected websites were randomly displayed to the participant for viewing and assessment. Each web page was shown for at least 10 s. (5) After viewing the six pages, the participant were asked to complete a short survey and an interview regarding their visual appeal. (6) Finally, the participant was thanked and debriefed.

5.4 Measures

For the experiment, we gathered participant's visual appeal ratings, conducted interviews to explore the reasons for the ratings, and more importantly collected their eye-movement data. Two general types of eye movements were observed: fixations and saccades. Fixations refer to periods of 200–300 ms in which eyes remain relatively still. Saccades are eye movements that occur between fixations (Rayner 1998). In this experiment, we focused on the fixation data, which was transformed into heat maps, of which different types might be calculated (Bojko 2009). We computed heat maps that indicated absolute gaze duration (see Figs. 1 and 2) to reflect the accumulated time participants spent looking at the different areas of a web page.

5.5 Results

In this section, we illustrate the results of heat maps and provide qualitative interpretations to identify whether the identified web characteristics can attract participant attention.

A heat map uses different colours to show the duration that participants fixated within certain areas of a stimulus. Red usually indicates the longest time, and green the least, with varying levels in between. Areas without colour are not fixated upon. According to eye-mind assumption (Just and Carpenter 1980), eye gaze and attention have close relationship during the process of visual information presentation. Eye fixation reflects people are interested in a particular area, while eye

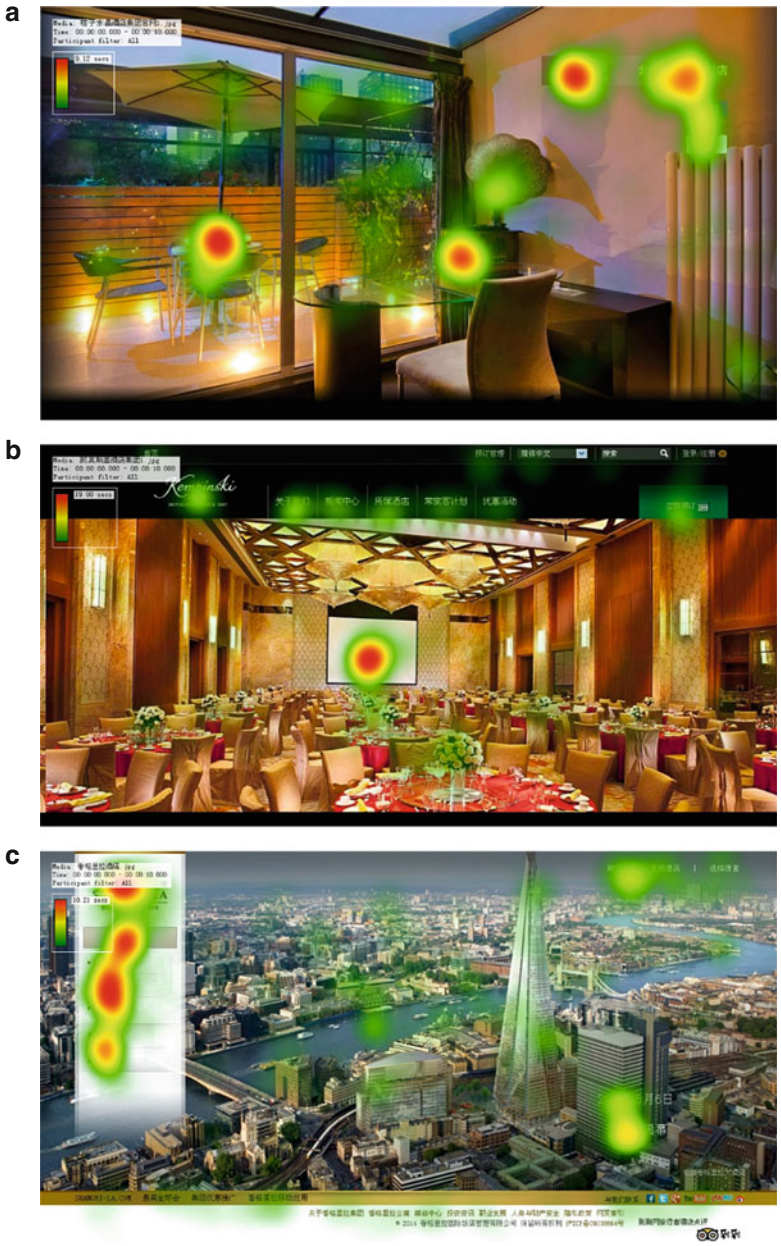

Fig. 1 Heat map for the most visually appealing web pages. (**a**) Orange Hotel. (**b**) Kempinski Hotel. (**c**) Shangri-la Hotel

Fig. 2 Heat maps for the least visually appealing web pages. (**a**) 100 Inn. (**b**) Xilong Hotel. (**c**) Shindom Inn

movement represents attentional shifts. Therefore, longer gaze duration indicates greater attention from the participant. Figures 1 and 2 show heat maps for the three most visually appealing websites and the least visually appealing websites, respectively.

As aforementioned, visual appeal is formed within a very brief stimulus exposure time, so if a web component can draw the attention during this period, it is more likely to highly rate for this aspect. Based on heat maps, web pages in Fig. 1 have focal bright red hot spots, located at the large main pictures, suggesting that considerable attention has been given to these areas of interest. By contrast, the hot spots in web pages in Fig. 2 are much more scattered, reflecting that nothing immediately catches participant attention during such a short timeframe. From the web characteristics point of view of, the major differences of web pages in Figs. 1 and 2 may be observed in the large main pictures and little text. Accordingly, the two characteristics may contribute to the attention differences of the two categories of web pages and, subsequently, the perception differences of visual appeal.

As reflected by Hypotheses H1 and H2, Chinese Generation Y may prefer large pictures and little text. This is confirmed by the three heat maps in Fig. 1. Relatively high fixations were observed on large main pictures, as indicated by bright red hot spots, and relatively low fixation on textual information, as indicated by yellow or green hot spots. These results suggest that participants of Chinese Generation Y pay more attention to the large main pictures than they do to text.

Further, we find that picture size matters. For pages with low visual appeal in Fig. 2, several pictures attracted participant attention to a certain extent. However, this only occurred for pictures located in top centre, as indicated by yellow-to-green hot spots, whereas pictures at the bottom were generally ignored. By contrast, for pages with high visual appeal in Fig. 1, bright red spots were observed on all large pictures. Accordingly, we conjecture that it is a large main picture, instead of a normal-sized picture, that can attract undivided attention of Chinese Generation Y.

In summary, participant's viewing behaviours reflected by heat maps support our arguments about visual appeal of hotel websites to Chinese Generation Y. Such conclusions are also confirmed by the interviews conducted in this experiment.

6 Conclusions

In this study, we attempt to explore visual appeal of hotel websites to Chinese Generation Y. Two preeminent web characteristics (i.e., a large main picture and little text) of hotel websites are identified that may be particularly preferable to Chinese Generation Y. A survey and an eye-tracking experiment are triangulated to validate the findings.

This study has several limitations, which deserve intensive future research. Firstly, the present study used a student sample to test hypotheses, which may jeopardize the generalizability of the study. Experiments with representative

samples and larger sample size have been planned for our next study. Secondly, the qualitative analysis of heat maps may limit the power of eye-tracking study. In the future, we will quantitatively compare the eye-tracking indicators (e.g., fixation duration) across the most and the least visually appeal websites to support our arguments. In addition, we are also interested in investigating relations between visual appeal of hotel websites and traditional website evaluation indicators, such as usability and trustworthiness.

The study entails important theoretical, methodological and practical implications. Theoretically, this study reinforces our understanding of visual appeal in the context of hotel websites, and calls for more research on visual aesthetics relevant to Generation Y. Methodologically, our study demonstrates that methodological triangulation, which combines two (or more) research methods to cross-check the results, is an effective way to explore new phenomena. Practically, our study suggests that hoteliers pay more attention to Generation Y and visual appeal of their websites if they want to lead the future experience economy.

Acknowledgements The research is partially supported by the National Science Foundation of China (Nos. 71101005, 71331007, and 71471011), Beijing Natural Science Foundation (Nos. 9142010, and 9142011), Beijing Social Science Foundation (No. 13JGC092), Fundamental Research Funds for the Central Universities of Beihang University, and the Hong Kong Scholars Program (No. G-YZ28). Dr. Yan Yu is the corresponding author of this paper.

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Hotel Attributes and Visual Image: A Comparison Between Website and User-Generated Photos

Francesca Negri and Vania Vigolo

Abstract The internet has greatly increased the variety and availability of travel-information sources. In particular, the development of the new Web 2.0 applications has meant the online visual image of hotels is no longer exclusively controlled by hotels themselves. Tourists have increased opportunities to define hotels' visual image by creating and uploading photos to describe their hotel experience on media-sharing websites. This study intends to explore the differences between the visual images of hotels as presented on hotel websites and as perceived by hotels guests with the aim of analysing the gap that exists between what users consider is important in certain features of hotels and the information that hotels provide to users through photos on their website. This study employs content analysis as its primary method to analyse 1,710 images selected from hotel websites and a media-sharing website (i.e., TripAdvisor). The results demonstrate that website photos from hotels and user-generated photos tend to focus on different hotel attributes. This has important implications for academic research as well for managerial applications.

Keywords Hotel attributes • Photos • User-generated content • TripAdvisor • Social media • Visual image

1 Introduction

The culture of participation (Ahlqvist et al. 2010) is characterised by open access to platforms that allows people to create and share content such as simple comments, in-depth reviews, photos, videos and stories. The internet enables free interaction with other people, companies and organisations. Social media, and in particular social-networking sites, enable active participation in the form of 'communicating,

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_45

creating, joining, collaborating, working, sharing, socializing, playing, buying and selling, and learning within interactive and interdependent networks' (Tuten and Solomon 2014, p. 4). The field of communication and marketing no longer operates through a 'one-to-many' vertically oriented paradigm. Instead, communication is now multi-way (i.e. one to many, many to one, and many to many), and includes many new and different types of publishers (e.g. mommy bloggers and Wikipedia contributors). In this context, each additional user can be considered to add value for all internet users. Web 2.0 decreases the gap between companies and people (producers and customers) and elevates the role of the customer because Web 2.0 allows customers or users to evaluate the producer, and users trust other users as a source of information and knowledge (Campbell et al. 2011). This phenomenon applies to many different contexts, including the tourism-services industry.

A large amount of the data shared by tourists via the internet and on social media consists of photos. Tourists often rely on images and descriptions in their decision-making process (Maurer and Hinterdorfer 2013). Photos provide an opportunity for tourists to share their travel experiences with others (Bynum Boley et al. 2013; Groves and Timothy 2001). Given that visual images are highly powerful and can influence people subconsciously (Ottino 2003; Maurer and Hinterdorfer 2014), photos are particularly relevant for marketing activities in the tourism industry, including the hotel industry. A recent study found that the presence of photos on a hotel website was the most significant factor influencing customers' booking decision (Phelan et al. 2011). Yet, relatively little research has been conducted on the role of online photos in tourism behaviour (Lo et al. 2011). Some recent studies have addressed the role of photos from a destination-management perspective. For example, Koerbitz and Onder (2014) used geotagged photos on Flickr to identify the destinations the users had visited in a benchmarking approach. However, little is known about the role of photos in the tourism industry.

Although extant literature has widely assessed the role of hotel attributes in determining customer satisfaction and service quality (Albayrak and Caber 2015; Dolnicar and Otter 2003; Shanahan and Hyman 2007), there is a need to investigate further the hotel attributes upon which tourists tend to focus when searching for, and sharing information about, hotels over the internet. This study contributes to filling the gap in this knowledge. It will investigate the visual image of hotels as presented on hotel websites and compare this to internet postings by hotels guests on social media (using TripAdvisor as the source). Hotels located in two medium-sized destinations in the north of Italy were chosen as the case study for this empirical research, which employs a comparative-content-analysis approach.

This article begins with a literature review about information sources for hotel choices and the role of share photos in the era of social networking. The method and the main findings of this study are then discussed, and possible future directions for this area of research are suggested. The results of this study contribute to the existent literature in tourism marketing and new media. The originality of this study consists in it approaching a well-known phenomenon (i.e. examining the role of social media in tourist behaviour from a new perspective). While extant literature has focused mainly on the role of ratings and reviews (Hays et al. 2013; Zhang et al. 2011), this study considers the role of the photo-sharing process.

2 Literature Review

2.1 Information Sources and Hotel Choice

The decision-making process of tourists is a complex multi-faceted process in which tourists' choices are interrelated and evolve (Dellaert et al. 1998). It is well established in the literature that the decision-making process for purchasing consists of six stages: problem recognition, information search, product options, evaluation, purchase decision and post-purchase behaviour. For tourism activities, tourists first decide whether to go on holiday and the length of their stay (Nicolau and Mas 2006). Subsequently, they select their destination, and from that moment, they continue the decision-making process with a series of derivative decisions on factors such as accommodation, which travel company to select, and transportation.

The choice of accommodation is usually made in the pre-travel phase, and is influenced by information searches. Information sources can be internal or external. Internal sources include personal experience (Huertas-Garcia et al. 2014), while external sources include marketing sources such as advertising or promotional activities. Sources can also be classified as interpersonal sources (e.g. discussion with friends) and impersonal sources (e.g. commercial advertisements, travel guides and travel brochures). Traditionally, travel brochures have played a major role as a visual-information source for tourists (Huertas-Garcia et al. 2014). In recent years, the variety of information sources has expanded, thus increasing tourists' choices for information searches and their evaluation of alternatives (Buhalis and Law 2008). According to Andereck (2005), tourists who have little information about a hotel from internal sources tend to use external sources. The internet has greatly increased visibility for external impersonal sources such as hotel websites. For example, many hotels have replaced travel brochures and leaflets with websites containing written information and visual material such as photos and videos. Moreover, Web 2.0 enables tourists to share their experiences with other tourists (Munar and Jacobsen 2014) by posting written or visual content on media-sharing websites such as TripAdvisor in the post-purchase stage. As such, tourists can be seen as 'co-marketers, co-designers, co-producers and co-consumers of travel and tourism experiences' (Sotiriadis and van Zyl 2013). User-generated content (UGC) has become extremely important in travel planning (Litvin et al. 2008; Xiang and Gretzel 2010). According to a recent study, tourists are more likely to trust information provided by other consumers on social-media websites than information provided by travel-agent websites (Pantelidis 2010).

A variety of attributes influences tourists' choices of hotels. A recent study revealed that when customers choose a hotel, they consider not only functional attributes (e.g. cleanliness and amenities), but also hedonic attributes (e.g. entertaining) and sensory attributes (e.g. atmosphere) (Palazon and Delgado-Ballester 2013). However, when evaluating choices, functional attributes are easier to compare than hedonic or sensory attributes. As such, this study will focus on the functional attributes of hotels because of their key role in tourists' decision-making

process. Utilitarian attributes create utilitarian value, which focuses on the functional and instrumental value of offers made to consumers (Chitturi et al. 2008). Hence, understanding the role of utilitarian attributes is extremely relevant for the hotel industry. In particular, knowing the attributes that influence accommodation choice, and the features that are perceived as important, enables hotel managers to improve their strategy decisions (Dolnicar and Otter 2003). The relevance of hotel attributes can be investigated directly (i.e. by asking tourists) or be derived from other kinds of data such as UGC. This study will attempt to identify the hotel attributes that are considered relevant by tourists by analysing the photos they share on TripAdvisor.

2.2 The Rise of Sharing Power

The literature has described a new customer who, through their efforts, labours and passions add 'cultural and affective value to market' (Cova and Dalli 2009, p. 215). The result is a more active and constructive customer. Everyday people create and post content online (e.g. videos, photos, comments, podcasts and product reviews) for personal reasons rather than for financial reward: this is known as 'UGC'. What is new is that due to the internet and social media, people are now able to share their content with others beyond their immediate geographical area (Tuten and Solomon 2014). Literature distinguishes between *organic* content (i.e. content that a person feels intrinsically motivated to prepare and share) and *incentivised* content (i.e. content that is encouraged by companies with the offer of an incentive such as winning a contest). Incentivised content constitutes a 'call-to-action'. Among UGC, ratings and reviews are very important. Ratings can be considered 'heuristic', offering a mental shortcut for customers to use to make a (perceived) perfect and rational consumption choice. As demonstrated by O'Connor (2010, p. 754), UGC is 'rapidly gaining traction as an input into the consumer purchase decision making process'. The literature has demonstrated that UGC has an increasing influence in the decision-making process of tourists through factors such as price comparison, information collection, and sharing experiences (Sweeney et al. 2008). Further, it has been found that UGC (e.g. online reviews) can increase or decrease sales in the hotel sector (Ye et al. 2011). It has also been found that negative reviews have more influence than positive reviews because the internet users consider them more authentic (Papathanassis and Knolle 2011). From a destination marketing organisation's (DMO's) perspective, hotels may track UGC (e.g. online reviews on TripAdvisor) to obtain useful customer insight (O'Connor 2010).

TripAdvisor was an early adopter of UGC. The reviews and ratings website is free to users, who provide most of the content (e.g. reviews, ratings and photos). Ratings are simply scores that users, acting in the role of critics, assign to something as an indicator of its quality. Reviews are written assessments with detailed comments (and sometimes photos) about the object in question, reflecting the user's perceived experience and satisfaction level. Such reviews are very useful

for the entire TripAdvisor community, which composed of active contributors (reviewers) and spectators (i.e. lurkers, who consume the content but keep their presence and identity hidden). The TripAdvisor business model is becoming what can be termed 'social commerce'. In recent years, many people have booked their hotel through TripAdvisor rather than directly through the hotels' own sites. However, TripAdvisor has been sharply criticised for allowing anonymous reviews to be posted because these have sometimes been false, that is, contributors are able to rate hotels (and restaurants) to which they have not been (Ayeh et al. 2013). In May 2014, Italy's competition authority Autorità Garante della Concorrenza e del Mercato (AGCM) (http://www.agcm.it/) launched a formal investigation into TripAdvisor after receiving complaints that its claims to provide trustworthy and honest reviews from tourists are false. The AGCM has also opened investigations into the online booking websites Expedia and Booking.com, stating that the agreements these sites have with hotels may prevent consumers from obtaining a competitive deal.

2.3 Sharing Photos in Tourism

As with most social media, TripAdvisor affords a special role to visual images collected by customers or offered by company management. The role of visual signs (e.g. images, photos, emoticons and info graphics) has increased in the internet era. Even postcards are going digital. Munar and Jacobsen (2013) state that photos and short videos will be the new postcards, sent by mobile phones. The rise of the presence of the visual sign is a cross-referring topic in social media and tourism, and its relevance is closely connected with the 'emotional contagion' that can arise from photos shared on the internet. As demonstrated by Kramer et al. (2014, p. 8788), emotional states 'can be transferred to others via emotional contagion, leading people to experience the same emotions without their awareness'. Through a Facebook experiment, Kramer et al. demonstrated that people transfer positive and negative emotions to others through a mediated relationship. Kramer et al.'s (2014, p. 8788) study concludes that 'in-person interaction and nonverbal cues are not strictly necessary for emotional contagion, and that the observation of others' positive experiences constitutes a positive experience for people'. However, in the area of UGC, the influence of photographic images is still under researched (Stepchenkova and Zhan 2013).

Through photography, customers act as 'recorders of their own experience and are in control of how they represent themselves and their lives' (Mayan 2009, p. 44). Through photos, these consumers can communicate their experiences, needs and sentiments in ways that are unavailable through written text (Ottino 2003). According to a recent study on Hong Kong residents' use of online photo-sharing technologies (Lo et al. 2011), 89 % of pleasure travellers take photos and 41 % of these post their photos online. Tourists not only enjoy sharing photos of their travels, they also search for photos when planning their travels. Nielsen and Pernice

(2010) demonstrated that visual images are extremely relevant in the initial perception of a webpage. In their study about eye tracking web usability, they asked respondents what they liked most about the homepage of a website and the answer was photos (Nielsen and Pernice 2010). Hence, from a methodological perspective, the traditional approaches of data collection such as surveys and polls 'are unable to capture travel behaviour comprehensively, nor to accurately reflect travel patterns' (Vu et al. 2015, p. 231). Recent studies have considered photos as a unit of analysis. For example, Koerbitz and Onder (2014) and Vu et al. (2015) analysed geotagged photos, while Zhang and Mao (2012) studied the effect on customer loyalty of visual images of hotels published in travel blogs. Although in recent years many different qualitative research projects have been adopted to explore the role of photos in different contexts, quantitative studies in this area are still limited (Reavey 2011). According to Stepchenkova and Zhan (2013), the increasing relevance of visual communication means that quantitative generalisation of the results of qualitative research in this area is important.

3 Methodology

3.1 Data Collection

For purpose of this study, two types of sources were used to collect pictures: hotel websites and TripAdvisor. Specifically, the hotels of two medium-sized destinations located in the north of Italy (i.e. Parma and Mantua) were chosen. These two towns are very similar in their accessibility, dimensions, main attractions (i.e. art and food), tourist arrivals, and the types of hotels they offer. For the sample from the hotel websites, all the photos included in the photo gallery were collected when a photo gallery was available. Otherwise, all the photos uploaded on the website's pages were considered. TripAdvisor offers both professional photos and tourist photos. For purpose of this study, only user-generated photos on TripAdvisor were considered. For both sources (i.e. websites and TripAdvisor), the entire population of the hotels in each town were considered: a total of 14 hotels in Mantua and 20 hotels in Parma. Given that photos on hotel websites are periodically updated and that the number and order of photos on TripAdvisor change over time, data collection for each hotel was completed in no more than 1 day. The entire process of data collection was completed in 2 weeks during August 2014. The oldest photos were dated June 2009; the most recent photos were dated August 2014. Overall, the dataset consists of more than 1,700 photos, collected from hotel websites and TripAdvisor. The dataset is detailed in Table 1.

To minimise technical errors in the data-collection process, the photos were downloaded and associated with four numbers: (1) the final sample identification (ID) (i.e. the ID of the destination); (2) the ID of the hotel; (3) the source's ('hwb' for hotel websites or 'usg' for TripAdvisor); (4) the progressive number of the photos for each hotel.

Table 1 The dataset

Categories	N° of hotels	N° of user generated photos on TripAdvisor	N° of professional photos on hotels' websites
Mantua hotels	14	320	422
Parma hotels	20	554	414
Unit of content analysis		1,710	

3.2 Data Coding

Following Stepchenkova and Zhan (2013), a set of attribute categories for hotels was developed prior to content analysis. It was decided not to define labels in advance, but only during the direct study of TripAdvisor and the hotel websites. The authors examined approximately 10 % of photos collected from hotel websites and TripAdvisor independently to identify the principal functional attributes of the hotels as represented in the photos. The authors then refined all the categories in subsequent steps and described these categories in a coding guidebook with pictorial examples. Twenty-four categories were highlighted through researcher triangulation, according to the rule that different analysts may apply these categories to the same body of content and obtain similar results.

3.3 Data Analysis

Kassarjian (1977, pp. 8–9) states that content analysis is 'a phase of information processing in which communications content is transformed, through objective and systematic application of categorization rules, into data that can be summarized and compared'. Content analysis must be objective, systematic and quantitative. According to Kassarjian (1977, p. 8), 'there is no doubt that much of the subject matter of the social sciences including consumer studies is in the form of verbal and symbolic behavior'. Content analysis is the study of the message, and the message can be expressed through signs and symbols, i.e. visual images. As such, in this paper the interest lies in what can be expressed through photos. With this regard, Stepchenkova and Zhan (2013) conducted a quantitatively oriented content analysis by comparing photos from DMOs and user-generated photos of Peru. Similarly, this paper adopted a comparative-content-analysis approach. Each photo posted on the hotel websites and on TripAdvisor was considered a single unit of content (Krippendorff 2004; Neuendorf 2002), which was classified into only one category (Weber 1990). Where available, tags were considered to confirm the content classification by the authors. In most cases, the tags were consistent with the authors' evaluation. Only in some cases (fewer than 2 %), the ironic tags were ignored because they were not useful to content analysis. Inclusion and exclusion of each single-unit content into the identified categories served as a basis for subsequent chi-square analyses.

4 Findings

As shown in Table 2, the findings revealed that bedroom (24.2 %) and common areas (21.1 %) were by far the most frequent content categories in hotel-website photos. Bedroom was also the most frequent category for user-generated photos (25.3 %). However, the second most frequent category in the photos shared by users was bathroom (16.7 %), followed by common areas (10.3 %). Car parks and location obtained less than 1 % of frequency for both hotel websites and the UGC on TripAdvisor. Some categories were identified only in user-generated photos. For example, the categories 'maintenance' and 'cleanliness' were the prevailing category in 3.4 and 1.7 % (respectively) of TripAdvisor photos, but they were absent in hotel websites.

A set of chi-square analyses were performed to investigate the differences between website and user-generated photos through their content categories. Specifically, significant differences ($p < 0.01$) emerged for 13 out of 23 categories. The results of chi-square tests revealed that hotels are more likely to post photos about common areas, the breakfast room, destination attractions, food, personnel, business facilities and sport facilities. Conversely, tourists are more likely to share photos about room views, bathroom, technology, implicit quality, cleanliness, and workspace in the bedroom. Hotel websites and UGC presented no significant differences in the photos concerning bedroom, furniture, hotel front, breakfast, car park, bar, hotel location, and amenities.

5 Discussion and Conclusions

The analysis demonstrates significant differences between what hotels publish in their websites and what is considered relevant and is therefore shared by consumers on TripAdvisor. Hotels are more likely to post photos about common areas, the breakfast room, destination attractions, food, personnel, business facilities and sport facilities. Conversely, tourists seem to be more interested in photos about room views, bathroom and technology. This implies that hotels are not completely tuned in with tourists' expectations and principal interests because they offer photos that tourists do not consider to be of primary relevance. As such, they miss the opportunity to retain customers for the entire customer journey, from the initial consideration phase to the post-purchase experience.

This study offers several contributions to the understanding of the use of online photos in the hotel industry by comparing tourists' perspectives and the perspective of the hotel industry. First, the results of the content analysis demonstrate a significant difference in attribute categories between photos on hotel websites and tourists' photos on TripAdvisor. Specifically, several categories of photos posted by tourists on TripAdvisor were not available with sufficient detail on hotel websites. For example, before choosing a hotel, customers desire to examine the bathroom in

Table 2 Attribute frequencies and chi-square tests

Categories	TripAdvisor N = 874 (%)	Hotel N = 828 (%)	Delta	Chi-square
Common areas	10.3	21.1	−10.9	37.991*
View	8.2	1.2	7.0	45.826*
Bedroom	25.3	24.2	1.1	–
Bathroom	16.7	5.9	10.8	49.009*
Furniture	3.0	2.2	0.8	–
Hotel front	6.9	5.0	1.9	–
Breakfast	5.3	4.0	1.3	–
Breakfast room	1.9	5.3	−3.4	13.892*
Technology	3.1	1.2	1.9	7.117**
Car park	0.5	0.5	0.0	–
Bar	1.6	2.2	0.6	–
Hotel location	0.6	0.7	−0.1	–
Destination attractions	1.5	8.1	−6.6	41.255*
Maintenance	3.4	0.0	3.4	29.000*
Cleanliness	1.7	0.0	1.7	14.371*
Food (not breakfast)	3.0	8.0	−5.0	20.646*
Personnel	0.1	1.2	−1.1	7.892**
Business facilities	0.2	5.0	−4.8	38.409*
Awards	0.1	0.0	0.1	–
Selfies	1.3	0.0	1.3	–
Amenities (minibar. slippers, vanity, ...)	2.6	1.9	0.7	–
Workspace (in room)	1.9	0.2	1.7	11.213**
Sport facilities (swimming pool, gym, tennis court, ...)	0.6	2.2	−1.6	8.150**
Others (events, ...)	0.2	0.0	0.2	–
Total	100.0	100.0	–	–

*$p < 0.001$; **$p < 0.01$

detail, as demonstrated in Table 2. As such, this study confirms a gap between perceptions on the supply and demand sides, thus recalling the service quality (SERV-QUAL) or gap model (Parasuraman et al. 1985). This model suggests that service quality derives from the comparison between customers' expectations and their perceptions of actual performance. This study provides evidence that a gap exists in the perception of tourists' expectations by hotel management (demonstrated through hotel websites) versus that of the tourists themselves (demonstrated through TripAdvisor).

Second, the findings demonstrate that tourists tend to focus on individual dimensions of hotel experience (i.e. their room and connected services and facilities) rather than on common areas or services, whereas hotels focus on opposite factors. These results suggest that tourists are motivated by individualistic concerns

when seeking and sharing visual information about hotels, while hotels are motivated by collectivistic values (Kim and Lee 2000). The importance of the room for tourists is supported by extant literature. For example, in their study about online perceptions of United Kingdom hotels, Ramanathan and Ramanathan (2011) found that room quality was consistently recognised as a key driver of dissatisfaction. Specifically, any perception of reduced room quality was likely to have a negative effect on tourists' intention to stay in the hotel again (Ramanathan and Ramanathan 2011). Finally, the findings demonstrate that tourists post significantly more photos on TripAdvisor about maintenance and cleanliness than do hotel websites. These dimensions recall the basic level of service quality (i.e. implicit quality) defined by Kano as 'must-be' attributes (Kano et al. 1984). That is, the presence of these features does not contribute to differentiating hotels and is assumed by tourists; however, their absence causes extreme dissatisfaction. Hence, the findings suggest that implicit service quality is a major concern among tourists.

The findings suggest marketing and managerial implications for hotel management and TripAdvisor management. First, hotel management should conduct research about their specific target before selecting the photos to post on their website. It could also be useful to enable customers to share their photo diaries on the hotel website. As on the TripAdvisor website, hotels could consider a double gallery: the first comprising the official photos, and the second one comprising user-generated photos. Second, hotels should not underestimate the importance of certain room-specific attributes such as bathroom details, room views and business facilities in the room. On their websites, hotels could place greater emphasis on the tourists' individual experience and the possibilities for a tailor-made service. Third, while implicit quality does not attract tourists, negative photos about elementary features of the hotel's service might be destructive for the hotel's reputation. According to Fombrun (1996), reputation is the result of three different elements: identity, what the company is; image, what the customers think it is; and desired identity, what the company says it is. In the internet era, the reputation construction is 'going digital', and is correlated with the image people garner from shared online opinions, and from public information in communication channels made available through Web 2.0. Given this information online is theoretically accessible to everyone, it often represents the first form of contact and the first information source, and most importantly, the most authentic information source. Google identifies this 'online decision making moment' as the 'Zero Moment of Truth' (ZMOT) (Lecinski 2011). It has a significant relevance to determine the opinion that people create in their mind about products, services and companies. User-generated photos are trusted, and contribute to the digital reputation construction of the hotel, and this can be either positive or negative.

Finally, in the TripAdvisor gallery for each hotel, there are many photo duplicates. For example, three or more photos out of 40 portrayed the hotel front. To be useful, the user-generated photos should be better organised by TripAdvisor. Further, some photos were very old (a photo from June 2009 was the oldest found) and did not represent the hotel after recent renovations.

Despite the contributions made in this study, a set of limitations needs to be considered; these limitations can be addressed in future research. First, even if the data set is consistent with the exploratory aim of this first step of the research, to increase the robustness of the results, the data need to be expanded to include more hotels in similar destinations. Second, in this study, only content analysis was conducted. Future research could include a sentiment analysis to reveal the relationship between like/dislike and content sharing. Third, the user-generated photos analysed in this study were limited to a single source (i.e. TripAdvisor). Further research could include other social media such as Booking.com or Pinterest and explore potential differences between the sites. In addition, while this study did not consider the use of social media by hotels, it would be interesting to conduct research on how hotels manage their overall visual image online. Finally, more destinations could be considered, with different attractions, sizes and accommodation offerings.

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Corporate Identity Communication on Corporate Websites: Evidence from the Hong Kong Hotel Industry

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Abstract In today's competitive business environment, corporate identity communication has become prominent and a useful strategy for gaining competitive advantage. The role of corporate websites in communicating corporate identity has also been underscored but there have been limited empirical studies investigating the actual usage of corporate websites in communicating corporate identities of hotels. To contribute to this scarce stream of research, this study identified the core elements of corporate identity from the literature and applied them to evaluate the websites' content of 123 hotels in Hong Kong. The results indicated that, corporate identity elements relating to design such as logo and slogan were the commonly reported; but identity elements regarding corporate culture, corporate behaviour and corporate strategy were scarcely communicated by more than 60 % of the hotels. Significant differences were also found between chain-affiliated hotels and independent hotels. From a practical standpoint, these results can be used to enrich the contents of corporate websites.

Keywords Corporate identity • Corporate communication • Corporate identity presentation • Hotel websites • Corporate strategy

1 Introduction

Over the last two to three decades, the hospitality industry has become increasingly globalized (Yu et al. 2014; Littlejohn 1997) and Internet-driven (Buhalis and Law 2008; Wei et al. 2001). This development has left hotel marketers and sales professionals with a practical challenge of what information to communicate to their target customers and stakeholders so that they can recognize the attributes that differentiate one hotel from another. Efforts to overcome this challenge have brought to the fore increased interest in corporate identity definition and communication.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_46

In corporate marketing literature, corporate identity (CI) communication is broadly understood to mean the way a corporate entity expresses itself to the outside world (Balmer 1998; Van Riel and Balmer 1997). Further, the literature emphasizes that a well-managed CI communication can contribute to establish the individuality of an organisation and yield positive benefits in the form of creating competitive advantage, building customer loyalty and trust (Balmer 2008).

While the importance of CI communication has been recognized in the literature, and given a reasonable research attention in industries like banking (Bravo and Pina 2012) and education (Ozturk 2011; Opoku et al. 2006), the hotel industry has only documented studies suggesting the importance of using corporate websites to communicate CI information (Kedidi and Torfve 2005). Particularly, the limited studies in the hotel industry have indicated that communicating CI information has the advantages of minimizing unfavourable country-of-origin stereotypes (Zhou et al. 2002) and enhancing reputation of product quality (Schmitt and Pan 1994). These benefits notwithstanding, there has not been a single study in the hotel industry that specifically examines the extent to which hotels utilize their own website to communicate their identities. Yet, determining such information can be helpful to enrich the information contents of hotels' websites regarding CI. In light of this research gap, this study aimed to offer the first empirical evidence to explain how far hotels use their websites to communicate their identities. In pursuit of this agenda, this study focused on examining the website contents of hotels in Hong Kong to identify the dimensions of CI that are communicated to Internet users. By choosing the Hong Kong hotel industry, it is hoped that the findings can shed lights on other markets since the industry in Hong Kong comprises a good mix of international chains and independent hotels of world-class status.

As an exploratory and descriptive research, data for this study were gathered from the corporate websites of 123 hotels and analysed with descriptive and non-parametric statistics. The major findings are that CI elements relating to design such as logo and slogan were the commonly reported on corporate websites; however, identity elements relating to corporate structure, culture, strategy and behaviour were communicated by less than 60 % of the hotels. Furthermore, chain hotels were found to be more communicative of their identity elements than their counterpart independent hotels.

2 Theoretical Foundations and Empirical Literature

2.1 Conceptualisation of Corporate Identity and Dimensions

There is no question or doubt that every organization or corporate entity has an identity through which it can be recognized and differentiated (Bernstein 1986). In the organizational identity literature, the earliest conceptualization of identity can

be traced back to the French school of thought where identity was viewed as a set of characteristics that make an organization unique (Moingeon and Ramanantsoa 1997). Since then, there has been an outburst of other conceptualizations in many disciplines leading to no consensus on a common definition. However, in spite of the lack of agreement on a common definition, there appears to be a clear meaning of the concept of CI and the benefits its communication and management can bring to an organisation and its stakeholders. Indeed, most CI scholars are of the view that identity is based on a set of features that are relatively stable over time and embodies all the distinctive traits of an entity that project 'what an organization is', 'what it stands for', 'what it does', 'how it does it' and 'where it is going' (Melewar and Saunders 1999; Melewar 2003; Balmer 1998).

Regarding the dimensions, CI has traditionally been associated with visual elements of an organisation, the genesis of which is from the field of graphic design (Bravo and Pina 2012). However, as the notion of CI extended to other fields, it assumed a multidimensional perspective with two emergent views: practitioners' views and academics' (Melewar and Jenkins 2002). As a basic distinction, the academics' view tend to look at CI as more oriented towards structure and emphasize the various components or elements of the concept, while the practitioners' view has often been focused on the process and the tangible elements that can be manipulated (Melewar and Karaosmanoglu 2006). Integrating the practitioners' views into an earlier framework that was developed by Melewar (2003) based on academics' perspectives; Melewar and Karaosmanoglu (2006) proposed a modified framework for CI from which six dimensions are apparent. These dimensions and sub-dimensions are summarized in Table 1.

As shown in Table 1, the main dimensions of CI include corporate design, structure, strategy, culture, behaviour, and communication. Following the empirical studies of Bravo et al. (2013) as well as Bravo and Pina (2012) who have applied these dimensions to evaluate banks' websites, the concepts are defined as follows in this study. Corporate design refers to the visual and aesthetic elements that are associated with an organization. Communication refers to the aggregate of information an organization transmits to its stakeholders. Corporate culture refers to the collective values and norms shared by the members of an organization. Behaviour refers to the actions taken by an organization according to its strategy and culture. Strategy refers to the scope and directions organizations set for the long term to meet stakeholders' expectations. Structure refers to the rules guiding the day-to-day activities and includes corporate and brand structure. In terms of the sub-dimension, differentiation, it was defined as a set of meaningful statements relating to products and service that can distinguish a hotel from the others. This was identified by expressions such as "hotel with a harbour view" that seeks to emphasize specialty products or services.

Table 1 Corporate identity dimension, sub-dimensions and elements

Dimension	Sub-dimension	Elements to consider
Design	Visual	Name, slogan, logo, location, typography and colour
	Aesthetics	Architecture, office design, staff appearance, etc.
Communication	Marketing	In-house newsletters, manuals, videos, social media link, etc.
	Management	Public Relations (PR) contact, direct marketing, etc.
	Organisational	Media/press releases, etc.
Behaviour	Corporate behaviour	Annual reports, corporate social responsibility reports, etc.
	Staff behaviour	Hiring policy, statements of staff friendliness or behaviour, etc.
	Management behaviour	Management reports, profile of managers, etc.
Culture	Corporate culture	Objectives, mission, vision, values, principles, philosophies, history, founder, country of origin, self-image (imagery), etc.
Strategy	Positioning	Leader/follower, growth, product/market development, etc.
	Differentiation	Specialty products, cost leadership, etc.
Structure	Organizational structure	Organogram, standard of operating procedures, etc.
	Brand structure	Brand expression, endorsement, etc.

Source Compiled from Melewar and Karaosmanoglu (2006)

2.2 Corporate Identity in the Hotel Industry

The concept of CI is certainly not new to the hotel industry and its importance has long been recognized. Two decades ago, Schmitt and Pan (1994) highlighted the significance of CI in general and underscored the need for U.S. firms moving into the Asia-Pacific region to develop increasingly sophisticated techniques for building and managing the identity of their companies. Following that, Zhou et al. (2002) investigated how people perceive foreign hotel chains in China. The authors found that unfavourable stereotypes associated with the country of origin of a hotel could be minimized if hotels provided background information on their corporate identities especially for hotels and chains that were less known in China.

Using a case study approach, Kedidi and Torfve (2005) also examined CI management in two International Hospitality Organisations (IHOs). The findings of their study showed that corporate brand name was the most important visual identity for IHOs and that it was needful for CI communication efforts to ensure that the correct messages are consistently transmitted on different channels. In yet another study, Herstein et al. (2007) described the process of CI communication in a leading hotel management group in Israel, from conception to implementation, and offered a strategic framework for the implementation of CI in the hotel industry. In their description, the authors noted that CI communication can occur at different levels and could be communicated through formal channels such as

corporate websites. More recently, Mohammed et al. (2014) have also offered a case study of a full-services hotel in Hong Kong to suggest that the notion of CI can be used to identity competitors.

2.3 The Role of Corporate Websites in Communication

Within the broader context of hospitality and tourism, the role of the Internet in general and corporate websites to be precise has been well-documented (Buhalis and Law 2008). In the hotel industry, the singular role of corporate websites as a direct channel of distribution and a platform for hotel bookings needs to be noted. However, in addition to these functions, the role of corporate website as an important source of information and effective tool for communication appear to be overarching (Buhalis and Law 2008) and therefore has attracted a lot of research attention. Especially, the use of corporate websites as a communication channel for corporate social responsibility (CSR) activities and environmental policies has been widely investigated in the recent decade (Jenkins and Karanikola 2014; Hsieh 2012; Holcomb et al. 2007), but less so for CI information (Baloglu and Pekcan 2006).

As far as the evaluation of corporate websites for CI information is concerned, limited studies have been conducted. These limited studies have centred largely on higher institutions of learning such as mega universities (Ozturk 2011; Opoku et al. 2006) and financial institutions such as banks (Bravo et al. 2013; Bravo and Pina 2012) with no single study on hotels. The main reasons adduced for conducting the studies on financial and higher institutions of learning are that they are becoming internationalized and competitive and hence the need to pay close attention to their identities presented on their websites. Valid as these arguments are, they can equally be extended to the hotel industry to justify the need for a similar study since the industry has also become more internationalized and competitive (Yu et al. 2014; Littlejohn 1997). The closest study to this area in the hotel industry is Baloglu and Pekcan (2006). In a content analysis of the websites' information of upscale and luxury hotels in Turkey, Baloglu and Pekcan (2006) found that unlike four-star hotels in their sample, five-star hotels were the only ones displaying additional information on their CIs on their websites. However, their study fell short of indicating which components of CI were presented. In consideration of this gap, the need for an empirical investigation of CI communication on hotel websites is more solidly founded and this study seeks to fill this void.

3 Methodology

The study's main objective was to determine the extent to which hotels use their corporate websites to communicate information on their CI. Given the exploratory nature of the objective, content analysis was chosen as the appropriate method to

address this research goal. As a method, content analysis involves a systematic process of data collection and reduction that can be used in exploratory and descriptive research to identify emergent themes and categories from a huge data (Krippendorff 2004). In the field of hospitality and tourism, this method has been widely applied in similar studies involving website evaluation. For example, Murphy et al. (1996) applied it to identity features on hotel websites that make them effective. Similarly, Law and Leung (2000) applied content analysis to examine the information richness of airlines' websites.

As the first empirical study to investigate CI communication on hotel websites, this study followed a structured process to ensure validity and reliability. The process involved a thorough review of the literature to identify the core dimensions and sub-dimensions of CI, a rigorous search for corporate identity-related data on the websites of the selected hotels and a statistical analysis of the data to derive the findings. Precisely, the data collection for this study was done in Hong Kong during June 26–July 9, 2014. Similar to other websites evaluation studies in Hong Kong (e.g., Law and Wong 2010), the membership list of the Hong Kong Hotels Association (HKHA) was used as the target population. As at the date of the data collection, there were 124 members on this list but only 123 could be used because one hotel was classified as "yet-to-commence operation" (Hong Kong Hotels Association 2014). Although membership to the HKHA is voluntary, the list of its registered member is regarded as official and fairly representative of the population of hotels in Hong Kong in terms of room size (Law and Wong 2010). Besides this reason, an alternative source of relying on online search results was not preferred because a preliminary check of some the so-called hotels with the records of the Home Affairs Department of Hong Kong showed that they were officially registered as tourist Guesthouses and not hotels.

The search for corporate-identity-related information on the websites of the selected hotels was carried out independently by two researchers simultaneously following a clear-cut approach and procedure. For chain affiliated hotels, the search was done on both the hotels' own website and through a link to the corporate website if available. Prior to the commencement of the search, a system of control was instituted to ensure valid and reliable data. This control system involved briefing and debriefing, training, pilot testing to compare preliminary search results and determination of the degree of concordance between the data collectors on one hand and the pilot test and the main data on the other hand. In both cases, the concordance coefficients were above 96 % which is considered to be an acceptable level by many researchers (Perreault and Leigh 1989; Bravo et al. 2013). All cases of discordance were resolved by agreement and the involvement of a third researcher. Given the categorical nature of the data collected, limited statistical techniques could be used. Descriptive statistics and non-parametric tests were the most suitable to be applied in this study. Frequencies and percentages were used to report on the proportions of hotels communicating information on the various dimensions of CI while the non-parametric test of independent samples was used to determine if the information communicated were different and related to type of hotel operation.

4 Results and Discussion

4.1 Sample Profile

As a precursor to the main results, the profile of the hotels in terms of age, size, class, type of operation and location are presented in Fig. 1. The primary source of the data was from the hotels' owned websites and their corporate websites, where applicable, but the information on class and type of operation was obtained from Smith Travel Research (STR) database. As basis for classifying hotels, STR uses the average daily rate (ADR). Hotels that have the highest ADR are categorized as Luxury, followed by Upper Upscale, Upscale, Upper Midscale and Midscale in descending order of ADR.

As shown in Fig. 1, the sample of 123 hotels included 16 upper upscale chains (the least dominant group) and 32 midscale chains (the most dominant group). Most of the hotels (58.5 %) were in existence for more than 10 years. Approximately 43 % were independently managed while the remaining 57 % were either chain or franchised managed.

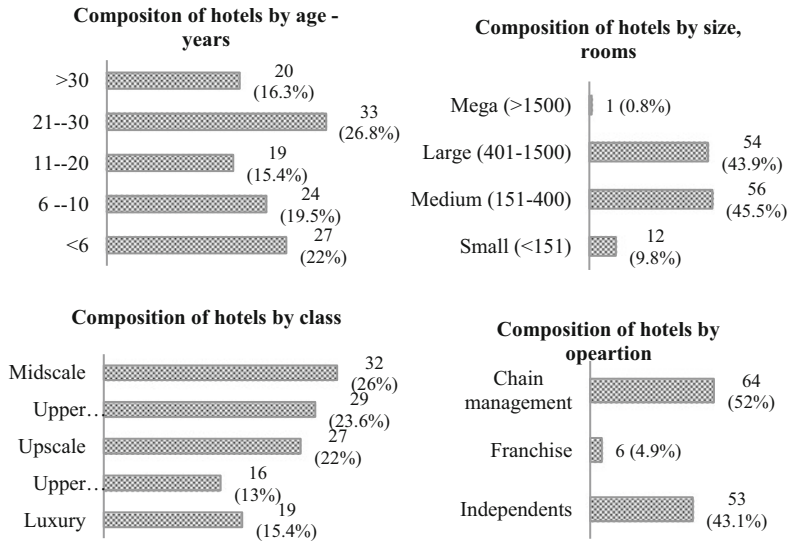

Fig. 1 Profile of hotels sampled

4.2 Corporate Identity Communication

Table 2 shows the dimensions and sub-dimensions of CI that are communicated by the selected hotels in Hong Kong. From these results, it can be noted that CI elements relating to design were the commonly communicated dimension on corporate website, with elements relating to strategy being the least communicated. Except for slogan and description of architectural design which were communicated by approximately 23 and 27 % of the hotels, the remaining visual elements of identity such as name, logo and location were communicated by all the hotels. Surprisingly, fewer hotels communicated culture-related elements such as vision (6.5 %), mission (17.9 %) and values (11.4 %). Approximately 31 % of the hotels also offered information on their founder(s) with 38.2 % indicating the country from which their hotels originated. Regarding strategy, the findings did not look different from previous studies. Similar to Bravo et al.'s (2013) study on Spanish and UK banks, approximately 22 % of the hotels in Hong Kong provided information on their strategic plan. Regarding corporate behaviour, approximately 20 % of the hotels presented management report and nearly 24 % had copies of their annual reports. CSR activities and policies were also communicated by almost 44 % of the hotels.

4.3 Differences in Corporate Identity Communication by Hotel Class and Operation

The results in Table 2 (Columns 1 and 2) further show the relationship between the communication of CI elements and hotel groups by class and type of operation. Using non-parametric tests, significant differences were found in terms of CI elements that are reported. For most of the CI elements, the findings reveal that Luxury hotels compares favourably to all other hotel classes especially Midscale and Upper Midscale hotels. For example, in terms of CSR as a sub-dimension of corporate behaviour, the proportion of Luxury hotels (13.8 %) communicating this information was statistically different and higher than Upper Upscale (4.9 %), Upper Midscale (11.4 %) and Midscale (1.6 %). Rationalizing these findings, it is thought that because Luxury hotels are in the highest category of ADR, they may be duty-bound to offer more information on their CI so that they can be distinguished from other hotels and possibly justify their higher rates.

Regarding the differences between independent hotels and chain affiliated hotels including franchise, the results were in favour of chain hotels (see Table 2, columns under "Operation"). In all cases where statistical difference existed between independent hotels and chain-affiliated, the proportion of independent hotels reporting on the CI element was significantly lower than chain and franchised hotels combined (refer to last column of Table 2). Based on these findings, it may be conjectured that being part of a chain or franchise, is somehow advantageous in

Table 2 Profile of corporate identity presentation

Corporate identity elements	% of N = 123	Class (%)					Sig. (1)	Statistical comparison	Operation (%)		Sig. (2)	Statistical comparison
		Luxury (A)	Upper upscale (B)	Upscale (C)	Upper midscale (D)	Midscale (E)			Chain (a)	Ind. (b)		
Corporate design												
Name	100.0	15.4	13.0	22.0	23.6	26.0	nc		43.1	56.9	0.00*	
Logo	100.0	15.4	13.0	22.0	23.6	26.0	nc		43.1	56.9		
Slogan	22.8	8.9	0.80	2.40	4.90	5.70	0.001*	B < A C < A	10.6	12.2	0.685	
Architecture	26.8	6.50	1.60	6.50	4.90	7.30	0.328		8.90	17.9	0.186*	
Location	100.0	15.4	13.0	22.0	23.6	26.0			43.1	56.9		
Corporate structure												
Organogram	13.8	0.80	2.40	4.90	5.70	0.00	0.029*		0.00	13.8	0.000*	
Corporate strategy												
Quality statement	25.2	8.90	2.40	8.10	5.70	0.00	0.000*		2.40	22.8	0.000*	a < b
Positioning	10.6	8.10	1.60	0.80	0.00	0.00	0.000*	B < A C < A	4.10	6.50	0.722	
Differentiation	9.80	6.50	2.40	0.00	0.80	0.00	0.000*	D < A	3.30	6.50	0.473	
A & R	60.2	13.8	9.80	16.3	13.8	6.50	0.000*	E < A E < B E < C	24.4	35.8	0.483	
Master plan	22.0	4.90	2.40	8.90	4.90	0.80	0.010*	E < A E < C	3.30	18.7	0.001*	a < b
Corporate culture												
History	41.5	12.2	7.30	9.80	6.50	5.70	0.001*	D < A E < A	5.70	35.8	0.000*	a < b
Founder(s)	30.9	9.80	4.90	8.10	5.70	2.40	0.001*	E < A	0.80	30.1	0.000*	a < b

(continued)

Table 2 (continued)

Corporate identity elements	% of N = 123	Class (%)					Sig. (1)	Statistical comparison	Operation (%)		Sig. (2)	Statistical comparison
		Luxury (A)	Upper upscale (B)	Upscale (C)	Upper midscale (D)	Midscale (E)			Chain (a)	Ind. (b)		
Origin	38.2	12.2	6.50	9.80	8.90	0.80	0.000*	E < A E < B E < C E < D	8.10	30.1	0.000*	a < b
Vision	6.50	4.10	0.00	0.00	0.00	2.40			3.30	3.30		
Mission	17.9	4.90	4.10	4.10	3.30	1.60	0.105		2.40	15.4	0.002*	a < b
Values	11.4	5.70	1.60	1.60	0.80	1.60	0.004*	D < A	1.60	9.80	0.021*	a < b
Principles	4.1	3.30	0.00	0.00	0.00	0.80	0.002*	E < A	0.80	3.30	0.287	
Philosophies	9.8	4.10	1.60	0.80	1.60	1.60	0.096		4.10	5.70	0.917	
Corporate behaviour												
Annual report	23.6	7.30	5.70	2.40	8.10	0.00	0.000*	C < A	3.30	20.3	0.000*	a < b
Management report	20.3	5.70	4.10	2.40	8.10	0.00	0.002*		3.30	17.1	0.002*	
CSR information	43.9	13.8	4.90	12.2	11.4	1.60	0.000*	B < A D < A E < A E < C E < D	11.4	32.5	0.001*	a < b
Employment policy	55.3	14.6	5.70	13.0	13.0	8.90	0.001*	B < A D < A E < A	16.3	39.0	0.001*	a < b

Corporate communication											
Media/Press	74.0	15.4	13.0	21.1	16.3	8.10	0.000*	D < C E < C E < D	26.0	48.0	0.003*	a < b
PR contact	55.3	13.0	9.80	16.3	10.6	5.70	0.000*	E < A E < B E < C	15.4	39.8	0.000*	a < b
Social media link	78.9	14.6	12.2	18.7	19.5	13.8	0.000*	E < A E < B	30.1	48.8	0.032*	a < b

Note Results are based on two-sided tests with significance level 0.05

A & R Awards and recognitions, *CSR* corporate social responsibilities, *nc* not compared because column proportions were either zero or one

*Significant

terms of providing CI information. As a matter of fact, during the data collection, it was observed that some CI information of chain affiliated hotels were traceable to their affiliated company's websites. 35 out of the 64 chain affiliated hotels had a link to their affiliated company's website through which additional CI information could be obtained.

4.4 Discussions and Implications

Generally, previous research regarding online communication of information has indicated that larger firms tend to communicate more information on their websites than smaller firms (Kechiche and Soparnot 2012). In term of the hotel industry, there have been a number of studies on websites examining the degree to which hotels communicate their CSR-related activities and environmental policies on their websites (Jenkins and Karanikola 2014; Hsieh 2012; Holcomb et al. 2007). Primarily, the findings of these prior studies have also shown that independent hotel tend to be less communicative of their policies and activities compared to their counterpart hotels that are chain affiliated. In concert with these findings, this study has also found evidence to suggest that as far the communication of CI information on corporate websites is concerned, chain affiliated hotels in Hong Kong belonging to the HKHA are more communicative than their counterpart hotels that are independent. A possible explanation that can be adduced to this finding is that perhaps being part of a chain relieves a hotel from the exigency of communicating CI information since the affiliated company may take up this responsibility. This explanation is borne out of the fact, more than half of the chain hotels had a web link to their affiliated company from which additional CI information could be obtained.

With regards to the dimensions of CI are that are mostly communicated, the findings support the conclusions of earlier studies in other industries (banking and higher institutions of learning) by Bravo and Pina (2012), Ozturk (2011) and Opoku et al. (2006) that the visual elements of CI are the most communicated. To an extent, the findings of the current study could also be interpreted as an indication of the importance of visual elements of identity as reported by Kedidi and Torfve (2005). As the first study to investigate CI communication on hotels' websites, the findings of this study add fresh empirical evidence to the avalanche of studies exploring the relationship between hotel types and the depth or richness of information communicated on their websites. These fresh insights can be used in three major respects to the benefit of the hotel industry in Hong Kong.

First, by identifying the elements of CI that are least communicated on hotels websites (e.g. annual reports, values, principles and philosophies), this information can be used to enrich the content of existing and prospective hotels' websites in Hong Kong. Second, the findings also show that significantly higher proportions of chain affiliated hotels exhibited CI information than their counterpart hotels that are independent. Thus, as suggestion to independent hotels seeking to enrich their

website content, they can refer to chain affiliated hotels' website for insights. Lastly, it can be inferred that although some chain affiliated hotels provided CI information through a link to their affiliated company, this can potentially increase the time it takes for Internet surfers to locate the needed information. Therefore, to facilitate easy search of information, it would be priceless for those hotels to display the information on their own websites directly.

5 Conclusions and Directions for Future Research

This study examined the website content of hotels in Hong Kong to identify the elements of corporate identity (CI) that are communicated to Internet users. The findings have indicated that nearly all the hotels communicate information on the design elements of their identities. However, less than 60 % of the hotels present information relating to their culture, behaviour, structure and strategy. Further analyses focussing on the relationship among CI communication and the class of hotel (Luxury, upper upscale, upscale, upper midscale and midscale) as well as type of hotel operation (independent versus chain and franchised) revealed some significant differences. Basically, a significantly higher proportion of chain-affiliated hotels were more communicative of their CI elements than their counterparts that are independent hotels. Furthermore, midscale hotels were the least communicative of their corporate identities. Based on these findings, this study concludes that the selected hotels in Hong Kong do not make full use of their corporate websites to communicate their identities, especially independent hotels and low class hotels. Nevertheless, the hotels that communicate their identities through their websites do so by commonly reporting on design element such as logo, slogan and location to the near neglect of other equally important element such as corporate culture, structure and strategy which can distinguish one hotel from another. As recommendation to hotel operators, it will be useful to enrich website content since past studies have shown the importance of communicating CI information.

Like most empirical studies, this study has some limitations which can serve as directions for future research. First, the study is a snapshot evaluation of the content of hotel websites and as such may be short of capturing any update of website content after the data collection period. Second, the study specifically examined CI communication on hotels' websites and not other known channels of CI communication. As an extension to this study, future research may investigate CI communication on other platforms such as social media and to unearth how CI is communicated during the guest's experience. In connection with this, it is also acknowledged that CI communication can occur though unplanned mechanism. Clearly, any such unplanned communication fell outside the scope of this study and could therefore be investigated in the future. Lastly, having identified which elements of CI are communicated on hotels' websites, it will be interesting to do a follow-up study on how these elements contribute to the competitive advantages of hotels.

Acknowledgements The authors will like to thank ZHANG Fan (Lorraine) and LIU Lucy for their help in the data collection and the anonymous reviewers for their constructive comments and helpful suggestions.

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How Effective Are Asian Hotels in Communicating CSR Efforts Through the Property Websites? The Case of Hong Kong

Elise Wong, Rosanna Leung, and Rob Law

Abstract Among the areas in the field of hospitality, web-based CSR communication has been rarely investigated. Prior studies have identified various CSR content provided on hotel websites, but have not evaluated web-based CSR communication performance based on usability factors and interactive elements. Moreover, existing research focused more on Western-based hospitality organizations. Prior studies on Asian hotel industry have been minimal. This study was conducted to evaluate the web-based CSR communication practice in the Hong Kong hotel industry, and proposed a modified ICTR's website evaluation model to evaluate the Hong Kong hotel industry's web-based CSR communication performance. Results show that communicating CSR effort through the property website was not a popular practice among Hong Kong hotels and that international and local hotels tend to communicate CSR efforts through social media sites rather than through hotel websites. Most hotels in Hong Kong have poor overall performance in communicating CSR efforts through the property websites, especially the "Communication function" dimension, indicating that hotels in Hong Kong were not effectively communicating CSR efforts through the property websites.

Keywords CSR communication • Hotel • Property website • Hong Kong

1 Research Background

Corporate social responsibility (CSR) is not a clear concept and it lacks a single accepted definition (Kucukusta and Chan 2013; Taneja et al. 2011; Martínez et al. 2013). At present, there is a growing interest for the concept of CSR among hospitality organizations (Dawkins 2004) because implementing CSR programs would create various benefits for the organization, such as increased customer and employee loyalty and satisfaction level, improved brand image and reputation, and

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_47

generation of long-term financial benefits (Lee and Heo 2009; Lee and Park 2009; McGehee et al. 2009). A research project conducted by Tsai et al. (2012) indicated that 70 % of the hotels in Hong Kong have implemented a CSR practice, proving that hotel organizations are increasingly becoming aware of the opportunities that implementing a CSR program presents (Jones et al. 2006; Moir 2001). However, proper action is not strong enough to generate benefits. Organizations need to speak up and communicate to the target audience. Hence, communication planning is one of the important elements of a CSR strategy.

Dahlsurd (2008) examined the existing CSR definitions and observed that basically, these definitions correspond and consistently refer to five dimensions: environmental, social, economic, stakeholder, and voluntariness. These five dimensions are popular and can be found in published reporting guidelines and CSR measure models. The most popular models adopted by researchers to measure CSR performance were coined by Carroll's (1979) "Corporate social performance model" (CSPM) and Elkington's (1999) "Triple Bottom Line" (TBL).

CSPM contains three aspects: social responsibility categories, social issues, and social responsiveness. As industries have to face different issues on certain period of time, they need to have different social issues added to the corporate performance model; and social responsibility strategies chosen by the management need to be added into the model to evaluate the corporate performance in terms of social responsibility which is called social responsiveness (Carroll 1979). TBL comprised three dimensions named people (measure the organization social responsibility, such as favourable practice regarding to labour and community), profit (measure the economic value created by organization and the economic benefit to community and society) and planet (measure the environmental responsibility such as reducing the environmental impact). This model has been widely adopted as various CSR reporting standards such as Global Reporting Initiative (GRI) and United Nations Environment Programme (UNEP).

In the past, companies communicated CSR efforts through expensive and inefficient traditional media, such as annual report, sustainability report, television advertising, and leaflets or newspapers (Wanderley et al. 2008). The invention and popularity of the Internet have provided an alternative. Compared with traditional CSR communication methods, using the Internet to communicate CSR is less expensive and more efficient. The Internet has allowed companies to present and update information for different audience regardless of time and space (Adams and Frost 2004; Frost et al. 2005; Wang and Chaudhri 2009). Given the advances in Internet technology and the growing number of Internet users, websites have become a popular medium for business organizations to communicate CSR efforts (Rikhardsson et al. 2002). Consequently, the focus of CSR communication research shifted from traditional CSR reporting to web-based CSR communication practice.

Research in the hotel industry is still in its infancy and has been developing toward the evaluation of web-based CSR communication in hotels through various approaches. Prior research had contributed to the knowledge of website evaluation, mainly from three approaches: (1) website functionality approach; (2) customer usability approach, and (3) website functionality and customer usability approach. Li and Wang (2010) claimed different approaches were required to evaluate

website because the objective of evaluation between users and owners were different. Many of the website evaluation studies related to the hospitality industry were developed from website functionality approach. Murphy et al. (1996) had conducted the first study to evaluate hotel website from functionality approach, which identified four dimensions to evaluate website performance including promotion and marketing content; service and information; interactivity and technology; and management. Morrison et al. (1999) had modified "Balanced scorecard model" (mBSC) developed by Kaplan and Norton (1992). This model comprised four perspectives which were technical, customer, marketing, and internal. Those dimensions were inter-linked and each dimension had included different critical success factors. However, the mBSC model had been developed for more than 15 years, and was lack of factors to measure the latest technologies such as Web 2.0 and multimedia. Information presented on websites need to be accurate, timely, and clear (Wang and Russo 2007), so they presented the ICTR (Information, Communication, Transaction and Relationship) model to evaluate the effectiveness of Destination Marketing System functions. Lu and Yeung (1998) claimed that the usefulness of websites was determined by the functionality or the ability to provide appropriate information; thus, without the evaluation features, the evaluation of web-based CSR communication performance is not complete. Outdated CSR information can negatively affect an organization's reputation and may cause a company to be accused of "green-washing" its image (El-Dief and Font 2010; Laufer 2003). Holcomb et al. (2007) and Nyahunzvi (2013) looked for different CSR themes discussed in the websites. Hsieh (2012) focused on environmental issues, and de Grosbois (2012) concentrated on the CSR commitment and achievement data and examined the communication methods that hotels employed in presenting CSR efforts in the websites. Moreover, from the review of existing studies, the authors have observed that the CSR themes identified from hotel websites were related to society, economy, and environment. Among these three CSR themes, Holcomb et al. (2007), Hsieh (2012), and Nyahunzvi (2013) claimed that hotels tend to provide the least amount of information on environment.

Beyond the amount of CSR information provided in the websites, de Grosbois (2012) further investigated the volume of information on CSR commitment and achievement. She found that hotels present commitment goals for various CSR activities, but seldom provide the achieved data. Furthermore, Nyahunzvi (2013) compared the CSR communication practice in annual reports, mission statements, and corporate websites among Zimbabwe hotels and indicated that website was the least effective medium in communicating CSR efforts. Apart from the basic picture of web-based CSR communication practice in hotels that has been provided, these studies have several limitations. First, studies only focused on examining the CSR content provided in corporate websites, and most evaluated the CSR communication practice from a traditional CSR reporting approach, ignoring the usability and interactive elements of a website. Second, prior studies focused only on examining the largest hotels in non-Asian countries. Consequently, the result may not be applicable to the hotels in Asia and the small- to medium-sized hotels. Finally, these studies did not examine the types of information published on the hotel websites.

In order to evaluate the CSR communication performance on hotel website from a more comprehensive approach, this study proposed a modify website evaluation model based on the work of de Grosbois (2012) to measure web-based CSR communication performance of the hotel industry. Based on the above research gap, the purpose of this study was to examine Asian hotels' web-based CSR communication performance. The objectives of this study are: (1) to examine the web-based CSR communication practice in Hong Kong hotel; (2) to evaluate the performance of Hong Kong's hotel websites in communicating CSR effort from a functionality approach, and (3) to compare website performance in communicating CSR practices among three types of hotel in Hong Kong.

2 Methodology

This study evaluated the website performance in terms of communicating CSR practices based on content analysis of the websites of Hong Kong hotels. Content analysis is a technique employed to collect and analyse text, picture, symbols, themes, or ideas communicated (Neuman 2003). This method had been used by numerous studies on CSR communication practices (de Grosbois 2012; Hsieh 2012; Holcomb et al. 2007; Kucukusta and Chan 2013; Nyahunzvi 2013). Thus, it is an appropriate method to analyse the web-based CSR communication practices among Hong Kong hotels.

2.1 Model Development

The dimension used in this study was modified from the ICTR model of Wang and Russo (2007), which comprises five dimensions, with each dimension referring to a different level of website function. The model begins with the "*Information function*," followed by "*Communication function*," "*Transaction function*," and "*Relationship function*." All dimensions were supported by a "*Technical merit*." In this model, each level of website function was clearly divided, which facilitated adoption of relevant dimensions to evaluate a hotel's performance in communicating CSR efforts through the property website. As the objectives of this study were not examined the e-business and customer relationship environment, "*Transaction*" and "*Relationship function*" were excluded.

Among the three selected dimensions, "*Information function*" comprises five CSR themes and 30 relevant CSR topics that developed by de Grosbois (2012). The CSR themes and topics of de Grosbois (2012) were adopted because they were well developed and organized with detailed description of all CSR topics under each theme. Moreover, these CSR topics and themes were drawn from popular CSR reporting standards and organizations, such as GRI, WTO, and UNEP. A sub-theme "*Information Quality*" was added to determine the quality of CSR information in terms of accuracy and timeliness to avoid the "green-washing" image. It comprises

Table 1 Modified ICTR model

Information (6 sub-dimensions, 36 items)	
Social and community action (6 items)	
Responsible products and healthy product choice	Raise awareness and involve employee/customers in CSR activity
Assistance for local/nation community	Assistance for international/global community
Protect heritage or local culture	Safe environment for the customer
Environment action (9 items)	
Minimize carbon footprint	Green building design and construction
Energy management	Green product
Waste management	Contribute to bio-diversity/eco-system
Improve air quality	Water conservation—water saving and reducing
Reduce pollution	
Employment action (7 items)	
Health and safety workplace	Career development opportunity
Fair and equitable benefit	Ensure equal opportunity
Learning and development opportunity	Work-life balance police
Employee assistance program	
Diversity and disable accessibility action (4 items)	
Increase diversity in workforce	Increase diversity among customer
Increase diversity among affiliates/ suppliers	Accessibility for job applicant, employee and customer
Economic action (4 items)	
Contribute to local/global economic	Raise affiliate/supplier awareness of CSR practices
Sustainable purchase and supply chain	Cooperate with industry or other institution
Information quality (6 items)	
Created initiative program	Presenting the goal and commitment for CSR practice
Up-to-date information	Present received CSR award or/and recognition
Present CSR achievement	Providing monitoring and tracking system
Communication (6 items)	
Online forum	Direct email campaign
Comment box	Newsletter
Online survey	Interactive communication
Technical merit (8 items)	
Search engine recognition	Graphic
Internal search function	Raid access (the 3-click rule)
Photo	Language option
Video	No error link

six attributes developed from previous literature on CSR communication on corporate websites. Additionally, technological advances, such as Web 2.0 tool and social media, were added under the communication function to ensure that the evaluation can reflect the reality.

As shown in Table 1, the "Information" dimension composed of six sub-themes, including five CSR themes and the information quality. This dimension aims to

Table 2 Hotel classification

Types of hotel	Classification
International	The hotel is operating or/and managing properties worldwide
Regional	The hotel is operating or/and managing properties in the Asia-Pacific region
Local	The hotel is operating or/and managing properties in Hong Kong

measure both the quantity and quality of CSR information on the website. This dimension aims to measure the website performance in using different methods to communicate with audience interactively. As there were 50 items in the revised model, the maximum score of the overall CSR performance was 50.

2.2 The Target Samples

The study population included 124 hotels in Hong Kong listed as members of the Hong Kong Hotels Association. To understand the web-based CSR communication performance of different hotels, the study categorized the 124 hotels into three groups—international hotels, regional hotels, and local hotels—on the basis of the number of countries they operate in. Details of hotel classification are listed in Table 2. Of the 124 hotels, 42 hotels were under international category, 32 hotels under regional category, and 50 hotels under local category.

All 124 hotels' official websites were inspected for CSR related information and documentations in March 2014. Once a website has such piece of information (the website had displayed CSR information regardless its functionality performance), the website's function for communicating with the audience would be further evaluated. Each criterion in Table 1 was scored by either 0 (criterion not found or missing) or 1 point (criterion found). As this study focused on property websites, the information listed on corporate websites were not counted. The underlying reason for the choice was the possibility that the information listed on the property websites could directly reflect the CSR practices of individual hotels and more accurate information could be collected. Moreover, the website section that hotels use to communicate CSR information was also recorded to understand the CSR communication pattern of the websites of Hong Kong hotels.

3 Finding and Discussion

3.1 CSR Communication Practices at Hong Kong Hotel Websites

From the content analysis of 124 hotel websites, this study identified three methods that hotels use to communicate CSR information, namely, individual property website, corporate or brand website, and social media (Facebook). In the individual

Table 3 CSR communication practices of the websites of 124 Hong Kong hotels

	International (N = 42)		Regional (N = 32)		Local (N = 50)		Total (N = 124)	
Location	N	%	N	%	N	%	N	%
Property website[a]	**19**	**45.2**	**8**	**25.0**	**6**	**12.0**	**33**	**26.6**
–Specific CSR section	1	2.4	1	3.1	4	4.0	4	3.2
–Hotel information section	16	38.1	3	9.4	4	8.0	23	18.5
–Award section	4	9.5	7	21.9	5	10.0	16	12.9
–Press section	7	16.7	6	18.8	1	2.0	14	11.3
–Career section	1	2.4	0	0.0	2	4.0	3	2.4
–Multi-section	13	31.0	5	15.6	6	12.0	24	19.4
Corporate website	**22**	**52.4**	**8**	**25.0**	**0**	**0.0**	**30**	**24.2**
No information	**1**	**2.4**	**16**	**50.0**	**44**	**88.0**	**61**	**49.2**
Facebook	**24**	**57.1**	**8**	**25.0**	**13**	**26.0**	**45**	**36.3**

[a]The website section that hotels use to provide CSR information

websites, hotels mainly provide CSR information in five sections or locations: specific CSR section, hotel information section, award section, press section, and career section. Most of the individual websites adopted more than one section to provide CSR information. The CSR communication practices of 124 Hong Kong hotel websites are listed in Table 3.

Communicating CSR efforts through a property website was not a popular practice among Hong Kong hotels. Sixty-one out of one hundred and twenty-four Hong Kong hotels provided no CSR information on the property websites. The observation was particularly true among regional (16 out of 32) and local (44 out of 50) hotels. The result indicates that the website was not a popular medium in communicating CSR efforts. Thus, CSR efforts could be assumed not popularly implemented in Asia. Wan and Juslin (2009) found that Asia-Pacific organizations tend to limit CSR information and provide less disclosure on CSR efforts because these organizations did not understand the reason for implementing a CSR program. Of the 124 hotels, only 33 hotels provided CSR information in their property websites. Interestingly, 45 (36.3 %) hotels utilized Facebook to provide CSR information, and those Facebook pages were all created by the individual hotels and linked to the property websites. In essence, Facebook was the more popular medium used to communicate CSR information among Hong Kong hotels with 36 % of them currently using it.

For international hotels, more than 57 % of the properties in this study have provided CSR information through Facebook primarily because the property websites were controlled and managed at the corporate level. Fig. 1 is a screen capture of the websites of two hotels in Hong Kong which is under the same brand. This indicates both hotels have adopted the same template so these websites have similar design and provided similar information. This observation proved the existence of centralized control and management of the websites. International hotels in Hong Kong tend to provide a standardized website experience to the

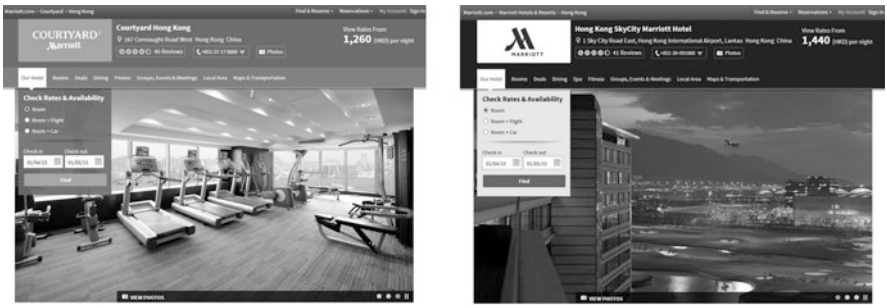

Fig. 1 Web pages of Courtyard Marriott and SkyCity Marriott Hotel [*Sources* Courtyard Marriott Hong Kong (2014), Hong Kong SkyCity Marriott Hotel (2014)]

audience. The properties have no authority to design and control the website content. However, with the emergence of social media, individual hotels have a platform to closely communicate with the target customers. Thus, most of the international and regional hotels used social media, instead of the property websites, to provide CSR information.

More than half of the local hotels provided CSR information on Facebook. Of this figure, 26 % provide CSR in Facebook and only 12 % provide CSR in the property websites. Local hotels have fewer resources at their disposal to communicate CSR through the property websites (Garay and Font 2012) and the cost required to communicate CSR efforts on Facebook is lower. Therefore, it is not surprising that most of the local hotels provide CSR effort on Facebook rather than on the property websites. In order to further understand the web-based CSR communication practices in the Hong Kong hotel industry, this study examined the website sections that hotels use to provide CSR information. Most of the hotels provided CSR information in "Hotel information section" (18.5 %) and "Award section" (12.9 %). Only four hotels (3.2 %) have a specific CSR section in their websites. The CSR information provided in the "Hotel information section" tend to present CSR information under the "about us," "rooms," "hotel features," "hotel service," and "hotel activities" sections, and the user was required to click on each section before reaching the CSR information. Moreno and Capriotti (2009) noted that information in the websites were presented in a hierarchical level and organizations tend to present important information on the first level (information was presented in the homepage level, and users reach information in just one click), followed by less important information. Therefore, most of these hotels did not treat CSR information as important.

Using the "Award section" to provide CSR information was a popular practice among regional and local hotels, which was not the case for international hotels. Generally, hotel companies present the icon of the CSR award without any description. Only 6 out of 10 hotels provided a description of the award in the press release section. A CSR award could be an indicator of best practices and serves as a third-

party verification that confirms the reliability of a CSR effort (Hsieh 2012). Hotel companies could generate benefits from presenting CSR awards only if the target audience has a basic idea of the award the hotel received. In the case of Hong Kong, however, most of the CSR awards received by regional and local hotels were issued by local organizations, which foreign audiences were not familiar with. Hence, the CSR awards presented in the property websites without basic descriptions could not confirm the reliability of the CSR efforts. As a result, these hotels cold be losing the benefit that could be gained from presenting the CSR award.

3.2 *CSR Communication Performance of Hong Kong Hotel Websites*

As shown in Table 3, out of 124 hotel websites, only 33 of them provided CSR information. Their overall performance was evaluated by the modified ICTR's website evaluation model developed by Wang and Russo (2007). To facilitate understanding and interpretation, the CSR communication performance scores were converted to a rate of 100 %, the best practice performance score for CSR communication in the Hong Kong hotel websites were converted from 50 to 100. The overall CSR communication performances of 33 Hong Kong hotel websites were demonstrated in Table 4. In general, Hong Kong hotels showed poor web-based CSR communication performance. The average score of CSR communication performance in Hong Kong hotel websites was 28.30 out of 100 with the highest score of 56 and the lowest of 12. Most of the hotel websites scored between 20 and 27 (19 out of 33 hotels), indicating that Hong Kong hotels failed to utilize their websites effectively in communicating CSR efforts.

Information Function Most of the hotel websites had poor performance in providing CSR information. The average score of "Information function" was 18.61 out of 72, and the performance among these hotel websites ranged from 4 to 44.

Table 4 The web-based CSR communication performance in Hong Kong hotel

Dimension	Average score	Range	
		Lowest	Highest
Information[a]	18.61	4	44
Communication[b]	1.82	0	4
Technical merit[c]	7.88	4	10
Overall performance[d]	28.30	12	56

[a]The maximum performance scores for Information function were 72

[b]The maximum performance scores for Communication function were 12

[c]The maximum performance scores for Technical Merit were 16

[d]Overall performance refer to the overall CSR communication performance in website = a + b + c

This dimension comprises both the quantity and quality aspects. For the quantity aspect, these hotels were providing limited CSR topics from narrowed CSR themes. They revealed the tendency to provide CSR efforts that belong to the themes of "Social and community action" (87.9 %) and "Environmental action"(81.8 %), and seldom provide efforts related to other CSR themes such as "Economic action" (33.3 %) and "Employment action." (21.2 %) Moreover, those hotels only provided limited topics under each theme. Due to the narrowed CSR theme and limited CSR topic provided in the websites, most of the Hong Kong hotels received low scores for this section.

Compared with the quantity aspect of CSR information, Hong Kong hotels showed better performance in the quality aspect. In this study, 51.5 % of the hotels received half weight or above performance score for this factor. Most of the hotels provided information regarding the CSR award and recognition (69.7 %), CSR commitment and goal (60.6 %), and CSR monitoring and tracking system (57.6 %). More than 50 % of the hotels provided up-to-date CSR information. However, only 33.3 % of the hotels provided information regarding the CSR achievement, indicating that there was still room for improvement. Hotels that did not provide information for CSR achievement in their websites could be causing a negative impact and avoid an image that undergone "green washing", because audience could not confirm the accuracy of the CSR effort. de Grosbois (2012) provided possible reasons behind this observation, namely, the hotel company did not have certain systems to collect CSR achievement data, the performance was poor, and those hotels had never implemented the commitment as stated. Hotel companies need to be wary of the accuracy of their CSR efforts and understand that the quality of the information they provide could make or break their image and affect the trust of clients.

Communication Function The result of the "Communication function" was surprisingly low. All of the sample hotels in this study received a poor performance score in this dimension with the average score of this dimension was 1.82 out of 12 and ranged from 0 to 4. A possible reason for the poor performance in communication could be the lack of knowledge in communicating CSR efforts through the property websites and awareness of the importance of interactive communication. Of the 33 hotels, 30.3 % (10 out of 33) received 0 point in this dimension, which means that 30.3 % of the hotels distrusted CSR information in the website without providing any communication tools, such as direct e-mail, newsletter, or even the share function. Without a communication tool, the audience could not directly connect with the property website, and as such, hotels could be missing out on the opportunity to collect target audience comments and opinions regarding the CSR effort, which they can use to improve the existing CSR communication practice or even the CSR strategy. The remaining 23 hotels websites provided one to two communication tools in their website. There were more than 60 % of the hotels provided interactive communication tools. The Interactive communication tools refer to social media, such as Facebook, YouTube, and Twitter through which users are allowed to share the CSR information provided in the property websites through the different social media or e-mail.

Technical Merit As mentioned previously, most of the hotels performed well in the "Technical merit" dimension. The average score of technical merit for Hong Kong hotel websites was 7.88 out of 16, and ranged from 4 to 10. Most of the hotels had good performance in website accessibility, such as search engine recognition (75.8 %), raid access (90.9 %), link without errors (78.8 %), and language option (87.9 %). Nevertheless, some of the factors under technical merit are still overlooked by hotel companies, such as internal search function, video for CSR effort, and using graphic to present CSR achievement (only 6.1 % of the hotel had provided these functions).

4 Conclusions and Future Research

Apparently, property website was not a popular medium for communicating CSR efforts in Hong Kong hotel industry. Most of the international and local hotels tend to provide CSR efforts through social media, such as Facebook. Some hotels provided information on their CSR efforts through the property websites. However, these hotels seldom present the information in a specific CSR section. Most of the hotels present their CSR efforts in the hotel information section and award section. International hotels tend to present their CSR efforts in the hotel information section, whereas regional and local hotels tend to present their CSR efforts in the award section. However, many hotels present the icon of the CSR award without any description. Other than analysing the web-based CSR communication practices in Hong Kong's hotel industry, this study evaluated the web-based CSR communication performance of Hong Kong hotels by modifying the ICTR website evaluation model (Wang and Russo 2007). Most of the hotels perform poorly on web-based CSR communication. Many hotels provided limited CSR information under narrowed CSR themes in the websites and seldom disclosed the achievement data. Moreover, many hotels performed poorly in communicating their CSR efforts, probably because they were not yet aware of the importance of interactive communication and the opportunity to build a relationship with the audience in the development of their CSR program. CSR efforts are not regarded as important information in the property websites, and the goal in providing information on CSR efforts in the website are mainly for marketing and customer approach.

Future research could include customers in evaluating the CSR communication performance in hotel websites to provide a more comprehensive knowledge in web-based CSR communication practice in the hotel industry. Moreover, the evaluation model for CSR communication performance in hotel websites needs to be modified and should take the volume of information as a consideration. Furthermore, this study only considered the CSR information in the property websites and excluded information provided in other web-based media. Parallel analysis of other web-based media used to communicate CSR efforts of hotels is suggested as a focus of future studies.

Acknowledgement This study was partly supported by a research grant funded by the Hong Kong Polytechnic University (1-ZV77).

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Part VII
Distribution Systems

Distribution Channels for Travel and Tourism: The Case of Crete

Paraskevi Fountoulaki, M. Claudia Leue, and Timothy Jung

Abstract The tourism distribution channels network is extremely complex. In particular, the emergence of technologies; the development of online social networks, online review sites as well as mobile location-based services has added additional channels of distribution. The awareness of new opportunities within the tourism distribution channels is essential for tourism professional in order to remain competitive and successful. Therefore, this study aims to update the tourism distribution channels model within the context of Crete, Greece. Twenty managers from hotels and tour operators were interviewed and the data were analysed using content analysis. Interviewees identified an increased importance of social media and mobile for today's distribution market and the future decreased importance of incoming agents. Instead, the tourism industry has to start focus on Extranet/XML.

Keywords Tourism distribution channels • Crete • Online travel agencies • Traditional tour operator

1 Introduction

Tourism distribution channels are groups of entities between tourism providers and the travellers, which act as an intermediary within the purchasing process (Kracht and Wang 2010). Advancements in technology had particularly high effects onto the way the tourism and hospitality industry operate (Kapiki 2012; Scaglione et al. 2013). The entire industry shifted from traditional computer reservation systems; to global distribution systems and finally towards the Internet age resulting in the emergence of online travel agencies (OTAs) such as booking.com (Inversini and Masiero 2014). Furthermore, the development of online social networks, online review sites as well as mobile location-based services has added additional channels of distribution, which shifted the power of booking towards the consumer (Scaglione et al. 2013). This development from traditional booking channels towards online and social intermediaries results in the distribution network being

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_48

extremely complex. Kracht and Wang (2010) conducted a theoretical study on the development of tourism distribution channels and presented an updated structure of tourism distribution channels incorporating online developments such as search engines and OTAs. However, they acknowledged that intermediaries are changing rapidly due to the fast pace in online and technological developments (Kracht and Wang 2010). For instance, Inversini and Masiero (2014) identified that tourism businesses have to engage in social media activities in order to communicate with their customers hence, improve marketing and sales activities. Kracht and Wang (2010, p. 752) acknowledged that and stated "as new technology appears, there could be other changes in tourism distribution and Scaglione et al. (2013, p. 288) suggested that "web 2.0. . .requires reengineering of marketing paradigms and changes in operational business processes".

If the trends of the past are any indicator, industry participants should be prepared for additional forms of intermediation". In particular, the paper seeks to discuss the ways to extent the channels and the influence them reflect broader aspects of tourism distribution and in an attempt to distinguish common factors from the specifics of Crete, though the range of other studies with which detailed comparisons can be made is at present extremely limited (Garin-Munoz and Perez-Amaral 2010). Given the paucity of existing work in this field, a regional focus is taken as this provides both the scope to examine a potentially a range of different channel structures and distribution issues while at the same time keeping the fieldwork logistics manageable. Crete is a particularly appropriate focus for such a study. It is one of Greece's leading tourism regions; a region dominated by coastal tourism but also one in which online tour operators and low-cost airlines have experienced significant growth in the past decade. In addition, much of their effort goes to working with traditional tour operators. In the light of the importance of dynamic packaging, more emphasis may need to be given to this segment, particularly with the growth of low cost carriers (Garin-Munoz and Perez-Amaral 2010).

Therefore, the present study aims to update the tourism distribution channel model by Kracht and Wang (2010) in order to identify additional forms of intermediations and account for technological developments within the online landscape. Furthermore, Buhalis and Law (2008) suggested that scholars should not only take a theoretical approach but should base their research on empirical data. Therefore, this study uses data from qualitative interviews with managers of tour operators (traditional and non-traditional), online booking/review agents and Cretan hoteliers in order to update the existing tourism distribution model thus, make it more applicable for today's tourism operations.

2 Literature Review

2.1 Distribution Channels Model

According to the Tourism Distribution Channels model (Kracht and Wang 2010), the distribution system consists of consumers, online travel agents, web-able corporate travel agents, web-able tour operators, Global Distribution System (GDS) incoming travel agents, switches, destination marketing organizations (DMOs), web browser, other search engines, suppliers website and meta-search engines. GDS began in tourism industry as airline computer reservation systems (CRS) as technical electronic intermediaries (Buhalis and Licata 2002). In the airline sector, traditional travel agents benefitted from intermediation as a result of business relationships with the GDSs such as Sabre, Galileo, Amadeus and Worldspan. GDS's airlines now collaborate with "GDS New Entrants," who are also known as "Global New Entrants," or "GNEs". These GNEs utilise Farelogix, G2 Switchworks, and ITA Software, which has been developed from the search technology of Orbitz, providing the services of GDSs at a lower price.

Within the tourism industry, the last decade has witnessed the emergence of the web as an increasingly important distribution channel for the tourism industry and the emergence of new travel eMediaries such as Orbitz, Expendia and Lastminute to name a few (Kalodikis and Yannakopoulos 2003). The new business models being adopted by these players are essentially a combination of a merchant model with dynamic packaging. This has effectively transformed OTAs into online tour operators thus bringing travel eMediaries in direct competition with the longer established tour operators such as TUI, MyTravel or Thomas Cook.

ITA Software provides another layer of intermediation by providing online travel agent Orbitz with meta-search engines such as Bing Travel, Fare Compare, Kayak, Side Step, GNE or Farelogix. Despite this threat, the GDSs have proven their resilience and importance within the distribution chain. Following the example of Sabre in having a stake in an online travel agency, other GDSs owners formed relationships with OTAs, just as they had with traditional agents in the past. For example, Opodo is associated with Amadeus; and Expedia is associated with World Span. With these relationships, the GDSs had re-intermediated themselves (Armstrong 2009). Furthermore, suppliers have begun to establish webpages, which connect directly with customers, therefore using the traditional retail agents' model. Moreover, traditional travel agents have been useful to hotels, the latter have also disintermediated the traditional role of travel agents by selling directly to customers via the Internet. Search engines, such as Google, first led to the intermediating role in 1998 (Flint et al. 2011). By facilitating the inception of this category of intermediaries, Internet technology set in motion a structural change that has shifted power to a new position. It can also disintermediate the developers of other web browser products, depriving them of revenues generated by searches initiated from their browsers. In this sense, the developers of web browser software

have also become intermediaries within tourism distribution channels, to whom other intermediaries have to pay revenue (Claro and Claro 2010).

From the tourism demand side, the rapid growth of travellers urges the utilisation of powerful CRSs for the administration of traffic. CRSs satisfy consumer needs for easy access and compare information on a wide variety of choices of destinations, holiday packages, travel, lodging, and leisure services. They also provide immediate confirmation and speedy documentation of reservations providing a greater degree of flexibility and enabling prospective travellers to book at "last minute" (Liao and Tseng 2008). According to Sigala (2007), there has been insufficient research in the area of incoming travel agencies using the Internet. Companies such as Kayak have been conceived by founders of OTAs such as Expedia, Orbitz, and Travelocity as well as other meta-search engines (Kayak.com 2009). Electronic intermediaries are also emerging dynamically and increasingly threaten traditional distributors. For example, Lastminute.com is now challenging the business models of Thomson and Thomas Cook, forcing them to rethink their operations and strategies. The model below illustrates the development of a complex interdependent system, which now exists due to the Internet.

2.2 Influence of ICTs on Distribution Channels

The Internet has a global reach for the marketing of tourism products. Scholars stated that the internet provides many opportunities for the tourism industry such as an increase in choice that also closes the gap between consumers and suppliers (Berne et al. 2012; Xiang and Gretzel 2010). Moreover, Law (2009) revealed that the technological revolution has allowed the emergence of several elements such as Computer Reservation Systems (CRS), Global Distribution Channels (GDC), and Destination Management Systems (DMS) to emerge to facilitate the distribution of tourism products. O'Connor (2010) concluded that the Internet and emerging technologies provide unprecedented tools for communication and interaction, bridging the gap between tourism suppliers and consumers on a global basis. However, according to Law (2009) current technologies are also providing travellers with far easier method of publically criticising the service levels within the hotel industry, and one example of this is Tripadvisor. Currently, electronic distribution systems are in frequent use for airlines and hotel rooms, and GDS have already started using the Internet. O'Connor (2010) concluded that in the past few years, the Internet has significantly changed the distribution channels of the travel industry and Law (2009) agreed that the Internet has become a virtual market which requires specific communication and distribution strategies like any other market. Berne et al. (2012) acknowledged that the tourism industry is at the forefront when it comes to the effect emerging technologies have on the structure of the industry. While early adopters for new technologies often gain market share, companies that

use traditional marketing strategies are often left behind due to a lack of customisation (Berne et al. 2012). Within the tourism industry this shift of power is particularly difficult for intermediaries as the power has increasingly shifted towards the consumer (Ford et al. 2012). Therefore, intermediaries are advised to invest into e-commerce solutions to stay on the bandwagon and remain competitive (Berne et al. 2012).

Inversini and Masiero (2014) investigated the hoteliers' perspective in regards to the effect of emerging technologies and confirmed the conflict between profitability and customer relationship management. In order to be visible in today's tourism landscape it is inevitable to be present on online intermediaries such as Booking.com, to acquire new customers as well as retain existing ones. However, high commissions decrease profit margins drastically. According to Inversini and Masiero (2014), the implementation of social media into sales strategies could tackle this problem as rooms could be directly sold via hotels' own websites, which again leads to disintermediation and an increase power of the consumer. Furthermore, Douglas and Lubbe (2014) assessed the increased importance of mobile technology for the tourism distribution channel market; identifying a higher growth rate than both, traditional on- and offline channels. After the explosive growth of all these technologies, extranet-XML is the next step of empowering tourism providers and consumers. According to Caber et al. (2013, p. 106), "extranets are Internet-based applications that allow external organizations access to a company's internal information". Overall, extranets improves tourism organisations' productivity as it allows an instant review of information (Caber et al. 2013).

3 Methods

The purpose of the present study is to identify how the emergence of technologies has affected the Cretan tourism distribution channels structure and the role of traditional tour operators. Qualitative data collection in form of semi-structured interviews was used. Interview questions were designed based on a literature review and the following questions were mentioned in this research: what has been the biggest change in tourism distribution channels over the last 4 years; and currently, who are key players in tourism distribution channels; do you think that traditional tour operators are ready for the shift towards dynamic packaging or do you think there will be some new players turning up on the stage; are there any changes between the relationship of your business and key business partners due to the new players in distribution channels; are there any players that disappeared over the last few years.

Interviews were conducted during the ITB Berlin between 5th and 9th of March 2014. To gain a deeper understanding of the subject area, participants with at least 5 years of tourism business experience were interviewed. Therefore, non-probability and purposeful judgmental sampling was employed (Buhalis and Zoge 2007). Twenty managers were interviewed representing all different types of Greek tour operators and hoteliers including Tripadvisor, HRS, Hotelbeds, Kuoni Group, TravelZoo, Hotelplan, YouTravel, Low Cost Holidays.com as well as a number of hoteliers from Crete. The aim of using this sample was to gather the opinion from a wide range of tour operators (traditional and non-traditional), online booking/review agents as well as hoteliers. The data were analysed using content analysis to identify the most prominent outcomes and concepts (Buhalis and Zoge 2007).

4 Findings

This section presents the content analysis of the interviews with Cretan tour operators and hoteliers. Table 1 present the codes, which will be used throughout the analysis.

Table 1 Profile of respondents

Code	Position	Type of company	Year of experience	Gender
BLE	Business listing executive	Social media	6	F
CM1	Contract manager	OTA	11	M
CM2	Contract manager	OTA	7	F
CM3	Contract manager	Hotel	6	M
CM4	Contract manager	Tour operator	17	M
DCM1	Development contract manager	OTA	5	M
DCM2	Development contract manager	Tour operator	12	M
RCM	Regional contract manager	OTA	9	F
HSM1	Hotel sales manager	Hotel	5	F
HSM2	Hotel sales manager	Hotel	18	M
SM1	Sales manager	OTA	6	F
SM2	Sales manager	OTA	8	M
FO	Founder	Tour operator	5	M
HGM1	Hotel general manager	Hotel	12	M
HGM2	Hotel general manager	Hotel	8	M
HGM3	Hotel general manager	Hotel	12	M
HGM4	Hotel general manager	Hotel	15	F
HRM	Hotel front office and reservation manager	Hotel	10	F
IT	IT manager	OTA	16	M

4.1 The Influence of Dynamic Packaging on Traditional Tour Operators

Technological advancements have huge impacts on the travel distribution market all over the world. However, the situation within the Cretan tourism market is different. The Crete hoteliers and the local travel agents are trying to support more the traditional tour operators. DCM1 acknowledged the connection between traditional tour operators and enhanced online capabilities by stating that "*we cannot forget that 70 percent of the sales by the traditional tour operators comes from the online systems*". The disadvantage of the island of Crete is transportation, as it does not provide the possibility for independent tourism for the Cretan tourism industry as they "*have a problem with flight. . . Crete is not a place like Spain where you can go on a round-trip as you need to travel by plane*" (HSM2). He particularly emphasised that "*tour operators such as TUI, Thomas Cook and All tours as well as Thompson own the capacity of aircrafts*". In addition, CM2, the online tour operator, agreed that nowadays the big traditional tour operators control the entire Cretan tourism market as they control the market of the charter flights. Interestingly, low-cost carriers, which are considered important carriers within Europe, have only small percentages within Crete as the majority of planes are chartered or owned by major tour operators (CM2). This example shows the immense power of tour operators exercised over the Cretan tourism market and hoteliers and displays the biggest difference to mainland destinations, which are more reliant on online travel agencies. Furthermore one online travel agent, DCM1, concluded that controlling the transport acts as insurance for traditional tour operators against online competitors. Nevertheless, HGM1 identified that the biggest change over the past 4 years has been that online reservations have grown up rapidly. On the other hand HSM2 stated: "*we cannot ignore and stop cooperate with the traditional tour operators that have been trusted and tested through the years. . .. We want good partners to fill up our beds and secure our interest*". Tour operators focus on the new trends of online bookings but at the same time try to retain existing customers. HGM1 identified that "*tour operators are afraid of the competition. . .mostly they are afraid that they will lose the traditional customers. . .this is the reason that why we still find printing brochures and catalogues that do not have anything to do with the online system and which are marketing tools that should not be produced anymore due to being outdated marketing techniques*". Furthermore CM4, working for a traditional tour operator, pointed out: "*I don't think that the traditional players such as tour operators can be transformed into dynamic players because of the mentality of the whole structure*".

4.2 The Change in Key Players over the Last 4 Years

The present study aims to update the tourism distribution channels model presented in Fig. 1 for the Cretan tourism context. In the tourism industry, the influence of the technology has affected traditional tour operators due to an increased demand for dynamic packaging. According to CM4, "*all the traditional tour operators are following the lead of the model of booking.com because now everybody is getting online platforms… as it is the way to reduce costs and go faster and increase efficiency*". Furthermore, CM3 agreed that traditional tour operators are intrigued by the new developments in online bookings stating that "*Thomas Cook has Hotels4U and TUI has Hotelbeds in an effort to get into this part of the business*". As identified above, the traditional tour operators still engage in traditional practices in order to retain existing customers however, they are trying to "*adjust their program in order to catch up the new market change*" (HGM1). CM2 identified that "*TUI and Thomas Cook already entered the other market and they control the online side of business*," which related back to the enormous power of traditional tour operators within Crete. Furthermore, the importance of online travel agents was supported by FO, the founder of an online tour operator, who stated: "*technology is the biggest chance for the distribution channel market and all the time we have new channels and have to adapt our products to new challenges that we have*". Besides, he identified that "*booking.com is considered the key player in the*

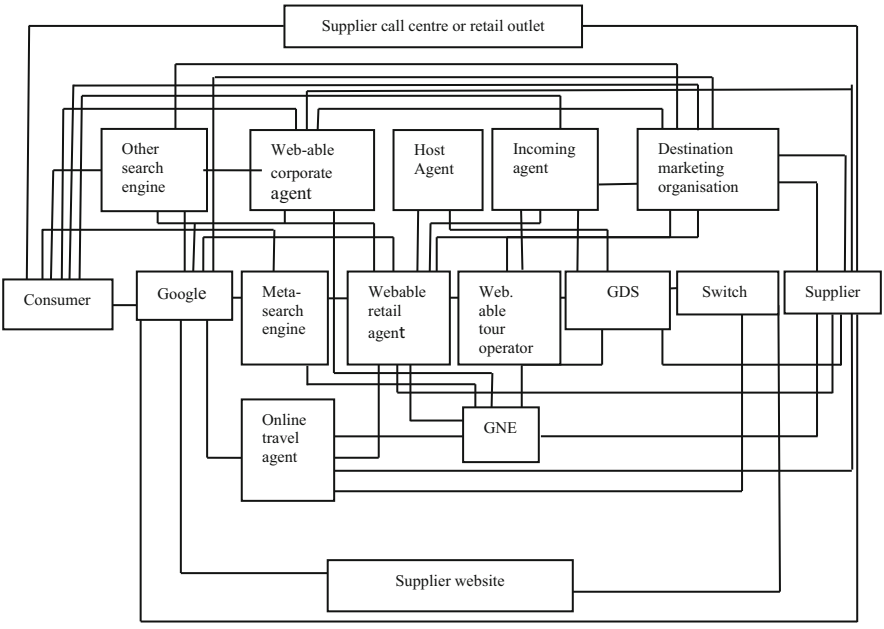

Fig. 1 Structure of tourism distribution channels (2005–2009) (Kracht and Wang 2010)

European tourism distribution channel market as sixty percent of all bookings come through booking.com".

4.3 The Change in Relationship Between Tour Operators and Hoteliers

As expected, the influence of social media has changed how travellers access and book tourism products. CM1, contract manager of one of the online booking engines, supported the importance of social media by identifying that they had to integrate their booking engines via Facebook in order to account for the increased demand on these networks. In addition, CM4 acknowledged that "*everybody goes through these channels (Facebook and Twitter) and they influence a lot of the market*". This also affects the way hotels receive bookings as customers can directly access hotels' own website from social media links which reduces commissions. However, HSM2 rejected this point of view and raised his concern saying that "*I do not think that new players in the market such as Tripadvisor or Holidaycheck can interfere their sales business of traditional online operators. . . [W]e cannot compare them with booking.com*, *Expedia*" as they do not have the influence on the reservation at the moment. SM2, sales manager of an online tour operator specialising in deals and packages, pointed out: "*the direction we are going in the future is social media and mobile phones*". This was supported by SM1 who identified that "*iPhone is growing and many customers can book their holidays through mobile devices*". It is important to mention that "*you can book a room in the morning and you can go and stay there in the evening*". CM3 acknowledged that "*you can have the client in the reception booking or you can have them in front of you five minutes after booking*". Nevertheless, this phenomenon might again be more likely on the mainland as holidays on an island are normally less spontaneous and require some planning. One hotel contracts and sales manager, HSM2, pointed out that there is a new application that TUI adopted saying "*[Y]ou can do all the business from the day you decide to go for holiday until the departure through your mobile*".

4.4 The Influence of ICTs onto the Tourism Distribution Channel Structure

Four participants (SM2, SM1, CM4, RCM) agreed that the local travel agencies would disappear. CM4 identified that there is a big problem for incoming/local travel agencies as they are being pushed out of the market in order to reduce costs. Furthermore, "*if the platform or the online tour operator has direct access to hoteliers or to the customer making the booking online then they will disappear*

or they will be only content management companies feeding their systems and be located somewhere let's say in India". RCM mentioned that TUI provides hoteliers with their own administration rights so that they are able to change rates and have direct relationship with the tour operators and the customers. RCM furthermore forecasted that the future trend would be B2C as there will be no more brokers and the customer will directly make their own reservations, book transport and excursions all on one site. Furthermore, HGM2 believes that hotels in Crete will have increased power in the future in terms of marketing strategies and bookings which changes the distribution channels model. SM1 agreed that hotels nowadays use hotel-manager software such as travelclick.com for selling their rooms. In addition, SM2 identified that hoteliers are nowadays enables to control themselves with travel window use so it makes it a "free experience" for all parties. Figure 2 presents the updated tourism distribution channels model for the Cretan tourism context from 2010 to 2014, representing how the tourism distribution channels market works at the moment. Figure 3 looks a bit further and shows the future structure of tourism distribution channels in Crete. The biggest change is the disappearance of incoming agents and the appearance of Extranet-XML, which is considered one of the biggest changes in the future Cretan tourism distribution channel market according to interviewees (CM4, RCM, HGM2, SM1, SM2).

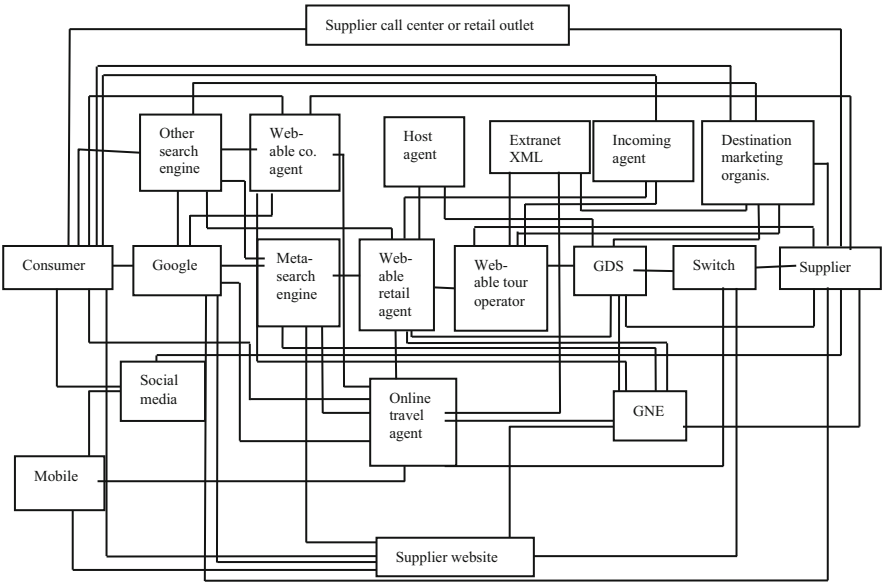

Fig. 2 Structure of tourism distribution channels (2010–2014)

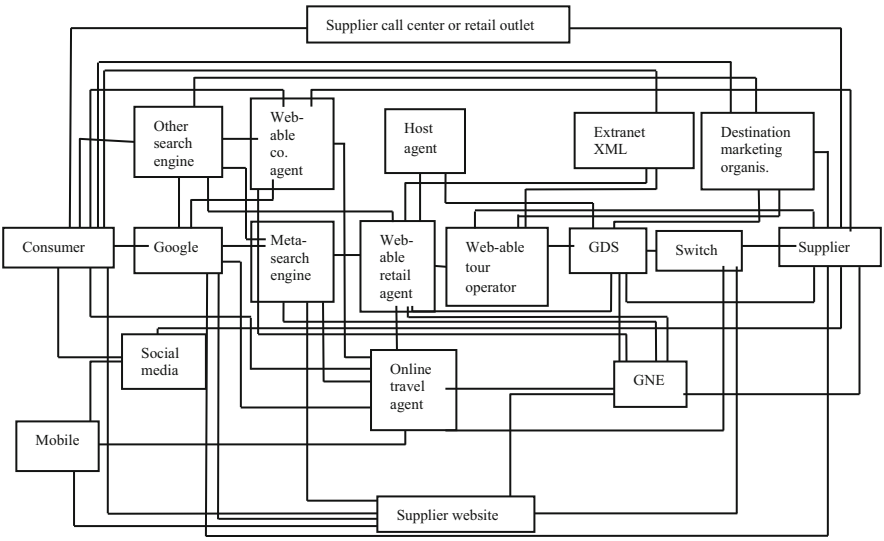

Fig. 3 Structure of tourism distribution channels in the future

5 Discussion and Conclusion

This study has shown that within the last 4 years the biggest change within the tourism distribution channels were that social media connects with the online travel agencies and the suppliers' website (Lee et al. 2013). The recent recognition of the importance of distribution as a source of competitive advantage in the marketing mix for tourism is not considered sufficient. A more strategic approach to tourism distribution is needed by Cretan hotel owners and managers. The implementation of selling technologies within the accommodation environment can enhance the dynamic characteristics and predisposition of travel agencies and tour operators towards social media (Hsu 2012; Fuchs et al. 2008; Scaglione and Schegg 2014). In addition, more and more customers use mobile applications to access tour operators and airline companies. Furthermore, hoteliers through the Extranet or Suppliers Extra can build direct relationship with their suppliers (tour operators) without the necessity for intermediaries. Hoteliers can enter into the online arena taking care of online sales as well as online communication and marketing which provides them with increasingly more power. This is particularly true as a professional, coherent and consistent presence both on online selling channels and online discussion and review channels will foster sales (Carroll and Siguaw 2003). This result suggests a different underlying perception of hoteliers towards the two online technologies, in which Hotel Management Software to be related to hotel capacity (e.g. an effective instrument for increasing the occupancy rate as much as possible) and direct relationship with the suppliers and the customers.

5.1 Theoretical and Practical Implications

Technological advancements change the tourism distribution channels on a regular basis. However, there is limited previous research, which updated the tourism distribution channels model, particularly within the Cretan context. Therefore, the proposed model, which is based on key players within the Cretan tourism context, adds to the academic pool of knowledge. Furthermore, this study identified the importance of Extranet-XML for the future of tourism distribution channels supporting Caber et al. (2013). Extranets use Internet technology to communicate between suppliers and customers. Tourism Extranet supports all business dealings with external users and partners, in particular the management of tourism contracts between tour operators and hoteliers. In addition, Cretan hoteliers are losing market share in favour of independently organised tourism facilitated using dynamic packages. At the same time, the results of interviews revealed that incoming agents would disappear. Furthermore, the importance of mobile devices and social media for platforms such as Tripadvisor was confirmed within this study.

For practitioners, the updated model as well as the future model show opportunities and areas to focus marketing strategies on which confirms previous research by Scaglione et al. (2013). Understanding the tourist behaviour is important to travel suppliers and tourism authorities for formulating effective marketing strategies and policies, in order to fully exploit the potential of new and emerging channels. This complexity presents many challenges to all those involved in marketing travel and tourism as well as to tourism researchers.

5.2 Limitations and Future Research

There are a number of limitations within the present study. The customer perspective is important to identify in the future because they provide more information than the travel professionals for the sustainability of the intermediaries. Further research in different geographical and touristic contexts is encouraged in order to support the findings and provide a wider generalisability of the results. In addition, in order to increase the reliability and enhance generalisability, future research could use a quantitative approach in order to gather data from a wider population. Furthermore, with the rapid development of technologies, it is essential to update the tourism distribution channels model on a regular basis. The emergence of wearable computing such as smart watches and Google Glass will affect the way tourism businesses operate in the future. Thus, future research might investigate their effect on tourism distribution channels.

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The Impact of Attribute Preferences on Adoption Timing of Hotel Distribution Channels: Are OTAs Winning the Customer Race?

Miriam Scaglione and Roland Schegg

Abstract The evolution of distribution channels in the hospitality industry has followed diverse paths over time depending on the technology used. Distribution channels can be clustered into three generations, starting with the pre-WWW era; the middle generation comprising Internet-based direct booking channels and the latest generation including online intermediaries. This research focuses on the comparison of rates of adoption across different generations of distribution channels in the Swiss hotel sector taking into account substitution effects. Data for the study are a series of annual surveys (2002–2013) monitoring the evolution of market shares of 15 individual distribution channels. The objective of this research is the analysis of the evolution of market shares of different generations using multi-generation diffusion methods. Results suggest that decaying traditional and web-based direct channels have low or inexistent imitation effect. This research adds the explanation of mixed effects (innovation and imitation) across generations in the adoption processes.

Keywords Hotel • Distribution • OTA • Switzerland • Norton-Bass model • Mixed effect analysis • Negative exponential

1 Introduction

In the last 50 years the distribution landscape in the hospitality industry has changed significantly. Actually the development of Computer Reservation Systems (CRS—1970s), Global Distribution Systems (GDS—1980s), and the arrival of the Internet (1990s) generated waves of changes in operational sales practices in the industry (Buhalis and Law 2008; Ip et al. 2011). In this context, the development of the information and communication technologies (ICT) and the World Wide Web in the last two decades have changed the way in which products and services in the tourism and hospitality industry are distributed at an unprecedented pace and thus

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_49

become the key tool for marketing and distribution in tourism (e.g. Buhalis and Law 2008; O'Connor and Frew 2002). Globalization of the travel industry and the ease of access to travel information and services (24*7*365) are concurrent drivers of changing travel distribution. Multi-channel, online and offline strategies in which service provider use more than one distribution channel to serve markets have grown thus rapidly (Kang et al. 2007).

Hotel managers know that the use of ICT can give added business value both at the marketing and sales level (Werthner and Klein 1999) if managed it properly and professionally. Yet, many small and medium-sized enterprises (SME) in the hotel sector are challenged by complexity of the distribution systems (Toh et al. 2011). Actually, even if the growing importance of online sales channels in travel is recognized by the actors (Li et al. 2009), many hotels still do not fully exploit their own websites (Scaglione et al. 2009; Schegg et al. 2007) as a direct selling tool and as a way to gain a competitive advantage (Law and Jogaratnam 2005) in a dynamic market place where the big players (such as Online Travel Agencies, OTAs) increasingly frame the innovation pace and market conditions.

The steadily increasing complexity with regards to managing the online distribution environment (Kracht and Wang 2010, p. 736) is a challenge for the whole travel industry, but small and medium tourism enterprises in particular struggle with the barriers and difficulties associated with adopting new distribution technologies (Scott et al. 2010). Therefore, many hotels "outsource" this process and rely increasingly on third-party websites (intermediaries such as OTAs). However, OTAs gained rapidly dominance during the development of online distribution (Runfola et al. 2013) owing among other reasons to a superior product choice to the traveler (OTAs offer multiple alternatives of hotels and room prices). One reason for hotel managers using multiple online channels is to maximize exposure and market share (Toh et al. 2011). Yet the use of OTAs, or third-party websites, comes with substantial costs.

The evolution and transformation of tourism distribution channels resulted in a high level of complexity within the distribution system with various rearrangements such as additional layers of intermediation or disintermediation when certain players bypass traditional players in the system (Kracht and Wang 2010). With the exception of the work by O'Connor and Frew (2002) and Schegg and Scaglione (2013) there is still few research looking at the future evolution of the distribution landscape in the travel sector. The aim of this research is thus to gain an understanding of the dynamics of competing sales funnels and the adoption process in the hospitality industry.

The pioneer work by Rogers (2003) yields an appropriate frame for the analysis of the perceived attributes of innovations on the one hand, and on the other hand the influence that these latter attributes have on the rate of adoption (Islam 2014; Islam and Meade 2013). Diffusion models based on multi-generations models give an estimation of the rate of adoption and timing and allow to characterize the dynamics of the adoption process. The following literature review will explain the former concepts by applying them to the successive generations of distribution channels.

2 Literature Review

2.1 Perceived Benefits of Hotel Distribution Channels

Hotels have conventionally used a number of direct and indirect distribution channels (Christodoulidou et al. 2010). Since hotel managers are challenged by the multitude of channels and distribution systems, they are constantly under pressure to choose the right distribution channel based on often lacking knowledge and understanding of the merits, booking potential, opportunities and costs associated with each channel both from a supply and a demand perspective (Horan and Frew 2005, p. 2). Direct hotel-owned sales channels included traditionally telephone, fax, walk-ins and since the development of the Internet in the 1990s also e-mail, web forms and real-time booking on the hotel website. Third-party partners (intermediaries) include traditional brick-and-mortar partners such as travel agents, tour operators or destination management organisations (DMO), affiliation partners (e.g. hotel franchises) and online intermediaries such as GDS or OTAs.

A recent review paper by Kracht and Wang (2010) examined the historical evolution and progression of direct and indirect distribution channels in the tourism sector. The conceptual study focused on the evolution of the structure over time revealing the progressively larger number of intermediation layers, in spite of concurrent disintermediation and re-intermediation activity.

- G1—Generation 1 (traditional channels): Telephone, fax, letter, travel agency, tour operator, DMO (local, regional or national), conference organizers, CRS of hotel chain or franchisee, GDS, others.
- G2—Generation 2 (online direct channels): E-mail, reservation form on website, real-time booking on the property website.
- G3—Generation 3 (new online intermediaries): OTAs, social media channel.

Whereas this analysis was dedicated to the complexity of the supply side, it is also important to focus the perspective on the perceived innovation attributes of each distribution generation from the demand side. Rogers (2003) describes the following five elements as most relevant "perceived attributes of innovations": relative advantage, compatibility, complexity, trialability and observability. Rogers claims that the perceived attributes by the receivers or adopters are the only ones having influence on the adoption rate and not those perceived by experts or change agents. "Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes", this can be materialized in terms of economic profitability, social prestige/status motivation or other benefits (Rogers 2003, p. 212). "Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experience, and needs of potential adopters" (op. cit., p. 224). Hence, compatibility reduces uncertainty. Moreover, in the mind of adopters, an innovation could be even not perceived as such given that it does not change a lot the current behavior patterns (cf. op. cit., p. 227), this is probably the case when the innovations belongs to the same technological cluster.

"Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use" (op. cit., p. 242). "Trialability is the degree to which an innovation may be experienced with on a limited basis" (op. cit., p. 243). This aspect could explain the observed facts that laggards move from the initial trial to the latest version and full generation more quickly than innovators or early adopters, namely, leapfrogger phenomenon. It is positively related with the rate of adoption (Scaglione et al. 2010). "Observability is the degree to which the results of an innovation are visible to others" (Rogers 2003, p. 244).

2.2 Rate of Adoption and Timing

The analysis of the introduction timing and the rate of adoption are two key aspects in the process of adoption of successive generations of products/services. The introduction timing is critical, at least for technological products, as a successive generation may create new potential adopters but may also push adopters of previous generation to opt for the latest one. As a result, timing aspects for multi-generations products/services' adoption require the consideration not only of substitution but also of diffusion effects (cf. Mahajan and Muller 1996, pp. 109–110).

Rate of adoption is another important issue. Rogers (2003, p. 206) defines *rate of adoption* as "the relative speed with which an innovation is adopted by members of a social system. . .[so] the rate of adoption is a numerical indicator of the steepness of the adoption curve for an innovation". The rate of adoption is positively related with four perceived attributes of innovations discussed above, the only exception is complexity, to which it is negatively related.

Rogers' theoretical work has been enriched with the Bass model (Mahajan et al. 1990) yielding in this way the rate of growth "figure" as Rogers claimed. In the Bass model (Bass 1969), t represents the random variable of the time of adoption and it postulates that the likelihood that a not adopter would adopt at time t is given by Eq. 1.

$$f(t)/(1 - F(t)) = p + qF(t) \tag{1}$$

$$F(t) = \frac{1 - \exp(-(p+q)t)}{1 + (q/p)\exp(-(p+q)t)} \tag{2}$$

$F(t)$, is the cumulative probability that a consumer would buy a product by time t having the close form of Eq. 2 and $f(t)$ is the instantaneous likelihood of purchase at time t. The innovation coefficient p captures the propensity to adopt the new product as driven by external information. The imitation coefficient q, on the contrary, represents the propensity to adopt due to interpersonal communication channels (Mahajan et al. 1990), a kind of "me too" effect. The influence of imitation is uniform through time as q is fixed throughout the adoption process. Nevertheless, (Easingwood et al. 1983) claim that there is "no theoretical rationale" supporting

that the imitation effect remains uniform during the penetration period and that the influence of imitation effect is greater in the beginning of the process.

Equation 1 also contains and generalizes two extreme cases: a *pure innovation* case when $q = 0$ and $p > 0$ (reducing the equation to a modified exponential function) and a *pure imitation* case represented by a logistic function when $p = 0$ and $q > 0$ (Meade and Islam 2006). In the case of *pure innovation* ($q = 0$), the right part of Eq. 1 is just equal to the parameter p, so the random variable of adoption time becomes a negative exponential function or modified exponential. As a result, the adopters' number will continuously decay towards the saturation level (Meade and Islam 2006) with a fix rate of change of p (Bass et al. 2000). This diffusion model only driven by innovation was introduced in a one of the pioneer research in the field by Fourt and Woodlock (1960). Finally, Eq. 1 allows the inclusion of the parameter m, the ceiling level of adopters or the final number in the Bass model by multiplying both sides of the equation by this parameter.

Sultan et al. (1990) in their meta-analysis of 213 innovations concluded that the innovation cases from European countries produce higher imitation coefficients of innovation than the US cases. As most of the innovations were first introduced in the US before Europe, the risk level was lower for the latter than for the former and innovation were generally more quickly adopted in Europe. From Rogers' point of view these examples of innovation show that trialability and observability have a positive effect on the speed of adoption.

2.3 Multi-generation Diffusion Models

The aim of multi-generation simulations is to model the diffusion/substitution effects across several generations of technologies and there are two families depending on the effect under study: diffusion or substitution effects. The family that targets diffusion has as kernel the Norton & Bass (NB) model (Norton and Bass 1987, 1992). This family of models uses as time series the evolution of sales/adopters. The second family is based on the pioneer work by Fisher and Pry (1971) which analyses substitution effects across successive generations and deals with the evolution of the market share. Nevertheless and as Norton & Bass pointed out, "[m]arket share may be derived from our model, and we explicitly and simultaneously incorporate diffusion effects and substitution effects" (Norton and Bass 1992, p. 68).

The "law of capture" (Norton and Bass 1992) refers to the manner in which the latest technological generation of a product takes over demand from earlier generations. The "Law of Capture" is characterized by four aspects:

1. For a given technology, the advent of a new technological generation will eventually drive sales of the earlier generations to approximately zero.
2. The process will repeat for all succeeding generations.

3. The peak of the early generation does not occur immediately after introduction of the later generations, the demand of the earlier generation continues to grow for a brief period before declining.
4. Finally, the parameters governing the pace of growth and substitution are constant across generations, but not always (cf. Norton and Bass 1992, p. 66).

In the subsection below the authors present the two variations of the NB model, one that considers that the parameters are constant and the second one which release this constraint. The NB models extend Bass' model to the case of multiple generations. The case of three generations is shown in Eq. 3 below, where $i = 1,2,3$

$$\begin{aligned} X_i(t) &= m_i F_i(t) \\ F_i(t-\tau_i) &= 0 \text{ for t} < \tau_i \\ X_1(t) &= F_1(t) M_1[1 - F_2(t-\tau_2)] \\ X_2(t) &= F_2(t-\tau_2)[M_2 + F_1(t) M_1][1 - F_3(t-\tau_3)] \\ X_3(t) &= F_3(t-\tau_3)\{M_3 + F_2(t-\tau_2)[M_2 + F_1(t) M_1]\} \end{aligned} \tag{3}$$

$X_i(t)$ is the number of adopters of the generation i at time t, M_i is the incremental potential number of adopters served by generation i, meaning that this adopters could not being served by any generation $j < i$. $F_i(t)$ follows Eq. 2 for generation i and τ_i the introduction time of generation i (Norton and Bass 1987).

The NB model has two different forms, the restricted and the unrestricted one, as the forth postulate of the Law of capture enounced above. The restricted NB considers that the innovation and imitation parameters will be the same across generations and five parameters have to be estimated whereas the unrestricted model releases this supposition but there are nine parameters to be estimated. The restricted model supports the strong assumption that the behavior of adopters remains constant across different generations (cf. Norton and Bass 1987, p. 1075).

3 Research Rationale

A previous research (Schegg and Scaglione 2013) analyzed Fisher & Pry substitution effects showing that the annual rate of growth for the Generation 1 is negative, in line with the fact that this generation is declining because it has been substituted by the two following ones. The rates of growth are positive for the third generation (0.27) and the second generation (0.04) but the second generation's rate is close though different from zero and less than six times smaller than the third (0.27/0.04). The limitations of this research are twofold. Firstly, Fisher & Pry consider only a single technological substitute at the time though the model has been applied to three generations. Secondly, although this model yields information about the rate of adoption and the timing, it does not give any information about the rationale of adopters across generations. The present research wants to fill this gap by simulating the diffusion process using restricted and unrestricted NB models (Norton and

Bass 1987, 1992). On the one hand, this research shows the consistent results in terms of timing compared to previous research. On the other hand, it show the possible link between different rates of adoption across generations and the respective perception of innovation from the demand point of view. Firstly, on the basis of imitation/innovation Bass' adoption drivers and secondly, from the point of view of Rogers' five perceived attributes' factors.

4 Data and Methodology

Data used for this study was gathered since 2002, on a nearly yearly basis, through online surveys addressed to the over 2,000 members of *hotelleriesuisse* (Swiss hotel association; the main trade organisation of the hospitality sector in Switzerland). The online questionnaire monitored how bookings are distributed among available direct (telephone, fax, walk-in, etc.) and indirect (tour operator, tourism office, GDS, OTA etc.) distribution channels; hoteliers specified how much each channel accounts for in percentages. Details on data collection and descriptive results are from previous publications (Schegg and Scaglione 2013). Based on the distribution channel typology of Kracht and Wang (2010), we have aggregated the individual channels in order to analyse the evolution of market shares of successive distribution channel generations (Schegg and Scaglione 2013). The time series covers 2002 to 2012 with three missing values (i.e. 2003, 2004 and 2007) when, unfortunately, the survey was not carried out.

The authors estimated these values using exponential interpolation, namely semi-log regression model of the market share based on time (t). For the parameter estimation process, 2002 was labelled as being $t = 1$. The values τ (Eq. 3) referring to the introduction years are 1979, 1995 and 2002 for the first, second and third generation, respectively. In total there are 10 exploitable observations.

In order to model the NB, the authors programmed Eq. 3 in SAS V9.2 Proc Model procedure (SAS Institute Inc., 2011) for the parameter estimation of the restricted and the unrestricted model. In order to optimize the estimation process, p and q were replaced by parameters $a = q/p$ and $b = p + q$. Proc Model of SAS Institute Inc. yields the estimates of p and q and its standard deviation.

The authors adjusted the restricted model and a limited version of the unrestricted model. The size of the sample (10 observations) does not allow adjusting the nine parameters of a fully unrestricted model, hence, a limited unrestricted model with seven parameters was chosen. The limited unrestricted model consists of a negative exponential for G1 and G2 ($p \neq 0$ and $q = 0$) and a full Bass model (Eq. 1). The authors carried out several estimation processes with different models by constraining either p or q to zero in different generations. Table 1 shows the parameter estimates of the restricted and unrestricted NB model for the three distribution channel generations. Figure 1 shows the actual market shares, the estimates and forecasted values for the three generations. As the data indicate that actual values for G1 and G2 are decreasing through time

Table 1 Estimates and t-statistics for NB parameters for restricted and unrestricted models (***p-value < 0.01, ** < 0.05, * < 0.1)

Restricted model			Unrestricted model		
Parameter	Estimate	Transform Equation/ generation	Parameter	Estimate	Transform Equation/generation
a = q/p	0.318 (0.2521)		b1 = p1	1*** (6.3E-7)	G1 = negative exp. (q1 = 0)
b = p + q	0.072*** (0.0092)		b2 = p2	0.049*** (0.0032)	G2 = negative exp. (q2 = 0)
p	0.054*** (0.0036)	b/(a + 1)	a3 = q3/p3	13.874* (6.9876)	G3 = Bass model
q	0.017 (0.0126)	b*a/(a + 1)	b3 = p3 + q3	0.223** (0.0377)	
M1	1.357*** (0.0260)	G1	p3	0.015**	p3 = b3/(a3 + 1)
M2	−0.119*** (0.0293)	G2	q3	0.208** (0.0420)	q3 = b3*a3/(a3 + 1)
M3	−0.258*** (0.0267)	G3	M1	0.991** (0.0360)	G1
			M2	0.009 (0.0961)	G2
			M3	3.53E-16 (0)	G3

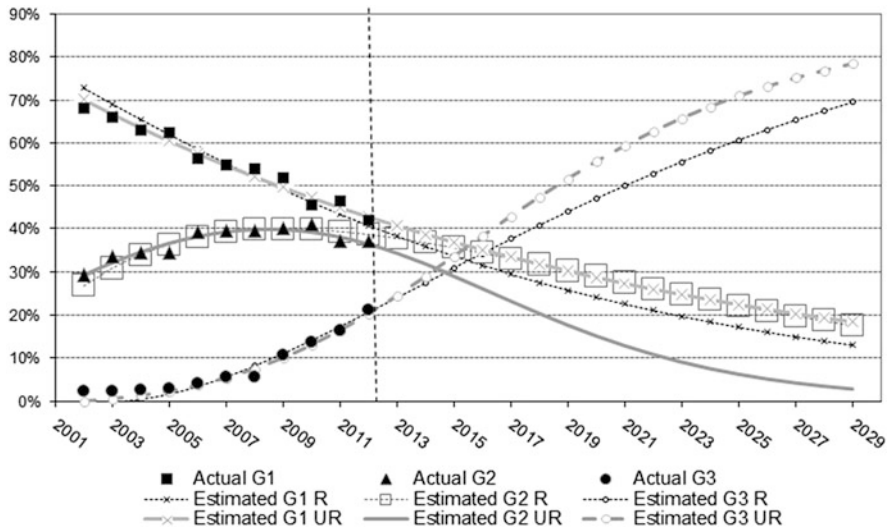

Fig. 1 Evolution of market shares for the three generations of distribution channels: observed [2002–2012 and forecasted (2013–2030)]

Table 2 Goodness of fit for restricted and unrestricted model

	Restricted model				Unrestricted model			
Equation	SSE	Root MSE	R-square	Adj R-Sq	SSE	Root MSE	R-square	Adj R-Sq
G1	0.00198	0.0141	0.9737	0.9737	0.00256	0.0159	0.9661	0.9664
G2	0.00188	0.0141	0.8514	0.8436	0.00132	0.0123	0.8952	0.8806
G3	0.00215	0.0159	0.9499	0.9411	0.00144	0.0126	0.9664	0.9632

suggesting that negative exponential could be a suitable function for estimating G1 and G2, whereas the opposite happens with G3. Under this hypothesis, the authors constrained the imitation parameters q to zero for the two first generations. All estimation processes converged in less than 65 iterations (conversion criteria 0.01).

Table 2 shows the goodness of fit to data of the model. In both models, the coefficients of determination (R2) are higher than 0.9 for the first and the third generations; whereas the second generations shows a value of 0.8 indicating that the trend of these series seems to be well captured by the models. White's test of heteroscedasticity of the residuals and the Normality test (not reported here) are not significant for every generation. The residuals normality tests (Shapiro-Wilk), not reported here for the sake of space, yield is not significant for all models and generations.

5 Results

Figure 1 illustrates the observed and simulated evolution of market shares for three distribution channel generations. In line with the goodness of fit measures in Table 2, the graph shows suitable estimation adjustment for the actual values. The third generation shows a well-defined S-shape. G3 would reach 50 % of the market share in 2018 for the NB unrestricted model and 3 years later (2021) for the NB restricted model. The former result is similar to the result of 2019 obtained by Schegg and Scaglione (2013).

In the restricted model the coefficients of innovation (p) and imitation (q) are the same through the successive generations which is a strong hypothesis. The left panel of Table 1 shows that $q = 0.017$ failed to be significant. Nevertheless, this could be the result of the covariance structure generated by the restricted model. Figure 1 illustrates the declining trends for G1 and G2, especially for G1 which is monotonically decreasing, though both are close to a negative exponential. Moreover, it is not clear whether the rate of decrease, in this case p, would be the same across G1 and G2. In order to test an alternative model the authors adjusted a limited unrestricted model allowing to have different values for parameter p across generations, forcing q (or the imitation parameter) to be zero in the case of G1 and G2 hence simulated by negative exponential functions. The decreasing rate estimates are significant for G1 and G2, ($p1 = 1$ and $p2 = 0.049$ in right panel of Table 1). Hence, as pointed out in the literature review section, the fixed percentage

change/decline of the share are 1 % for G1 and 0.05 % for G2, respectively. G3 yields significant estimates for $p = 0.01$ and the imitation parameter $q = 0.2$.

The values of final saturation of the restricted model are all significant except for G1, namely M1 (G1's full saturation level) is greater than 1 and for the two other generations negative. This kind of abnormalities is also present in other empirical research. The fact that $M1 > 1$ which means that the share will more than 100 % probably occurs by the restrictions of the model. The negative values M2 and M3 deserve the following explanation "Although it is theoretically possible for any of the $\underline{Mi}$ to be negative, one should keep in mind that the estimate for the last generation in this case is based on a small number of observation and may be not reliable" (Norton and Bass 1992, p. 71). The final saturation levels for the unrestricted model for G1 is close to reality $M1 = 99.1$ % and significant, showing that at the beginning there was only one set of booking channels, with the introduction of the subsequent generation, this share has declined. The small size of the sample, only 10 years can explain that for M2 and M3 the estimates are not significant.

6 Discussion and Conclusions

This research enlarges the results obtained by Schegg and Scaglione (2013) who focused the study on the substitution effects across successive generations of distribution channels by analyzing diffusion patterns across concurrent distribution channels. The NB models, especially the unrestricted one not only yields similar results in terms of timing compared to the work by Schegg and Scaglione (2013) based on Fisher and Pry (1971) but gives new insights into the diffusion dynamics. The present research shows that the adoption model for G1 and G2 seems to be driven only/mostly by innovation. In the case of traditional channels of the first generation, this is not surprising given that in pre-Web times final customers had no other booking alternatives. The second generation Internet-based direct channels are also mostly driven by innovation or external influence. The Bass model supposes that the effect of imitation and innovation are contemporaneous, in this sense, the innovators are not necessary the first adopters of an innovation but "the adoption due to external influence tends to be clustered at the earlier stages of the diffusion process" (Mahajan et al. 1990, p. 40). Therefore, the launch of G3 by the OTAs has probably affected the diffusion dynamics of G2 by reducing the driving effect of imitation. Probably the imitation q has not been constant during the period under study, but this aspect is not grasped by the Bass model (Easingwood et al. 1983) and a limited number of data points in the sample does not allow a complex model to measure it. Limitations: Our results should be taken with some caution because there are still few data points available. In addition, data are based on self-reported market shares provided by the hoteliers which might introduce some bias. Future research should use longer time series and as raw data not the market shares but the overnights in order to be able to apply the NB family of models.

This research also shows that the decline of the share is greater, in absolute values, for G1 ($p1 = 1$) than for G2 ($p^2 = 0.049$) and that the second generation's growth rate is less than six times smaller than the third generation (0.27/0.04). This is suggesting the presence of a leapfrogger effect (Scaglione et al. 2010): customer which used traditional channels switched to the OTA channel without having used the direct online channels. The perceived attributes of trialability and observability claimed by Rogers seem to ground this result. This opens a whole avenue for empirical research projects, namely the superiority of the third generation channels (OTAs) in the customer's perception over the second one. Rogers (2003, p. 221) said that the five most commonly attributes are relative advantage, compatibility, trialability, complexity and observability. The lack of imitation effect and the consequent poor diffusion dynamics in comparison with the third generation could also be explained by supply factors such as poor design of hotels website and lacking competencies in implementing ICT for business purposes in an optimal manner (Law and Jogaratnam 2005; Schegg et al. 2007). Final customers appreciate relative advantages of G3 channels such as 24/7/365 availability, multimedia opportunities of information provision and the price and product transparency (Card et al. 2003). These advantages accommodate travellers' information needs thus reducing perceived risk inherent in the tourism industry (Morosan and Jeong 2008). Jang, for example, states that "... [c]onsumers' online search usually involves multiple selections of suppliers, comparisons of facilities, prices, and availability, so travelers can reach optimal decisions through more sufficient information than traditional sources present" (Jang 2005, p. 43). The state-of-the-art and uniform ("global standard") booking environment provided by OTAs reduce probably also the perceived complexity, especially during multiple booking processes, when compared to the booking process and experience offered by channels of G1 and G2.

The forecasted increasingly higher market shares of OTAs in our study are a serious challenge for the lodging sector. As in parallel, mobile travel will explode with devices getting better and smarter, distribution process for hotel bookings will speed up and hotel managers have to deal with these tasks by using up-to-date technology, develop distribution and revenue management skills and invest in new business models. Only by offering a superior product and (sales) experience for their customers, hotels can stay competitive in the fierce travel sector.

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Travellers' Intended Future Trip Arrangement Strategies for Things to Do During a Trip: Implications for Travel Distribution

Niklas Eriksson

Abstract Travel distribution is in constant change and has emerged into a complex structure. The emergence of a hybrid era of three screens—computer, tablet and smartphone—is further driving the change. Many travellers are nowadays connected to the Internet in all stages of the traveller life cycle. The activity and attraction sector of the travel and tourism market sets a focus primarily on at destination distribution and therefore the emergence of intelligent and context-aware mobile services and new intermediates with a heavy focus on mobile strategies may indeed change the distribution of these types of travel services. The aim of this paper is to investigate travellers' intended future trip arrangement strategies for things to do during a trip and to discuss the implication this may have for travel distribution.

Keywords Travel distribution • Mobile services • ICT adoption and use • Traveller behaviour

1 Introduction

In the third quarter of 2013 the number of mobile subscriptions increased to 6.6 billion globally and the number is expected to grow to 9.3 billion by 2019 (Ericsson 2013). In Finland, where this study was conducted, the use of smartphones doubled between 2010 and 2011 and in 2013 61 % of the population (16–74 years) had a smartphone (Statistics Finland 2013). The smartphone is influencing peoples' everyday life and the travel experience (Wang et al. 2014). Many travellers want to be online all the time, before the trip, during the trip and after the trip (Hjalager and Jensen 2012). Recent research by the CWT Travel Management Institute (2014) shows that both travellers and travel managers expect mobile bookings to reach 25 % of online transactions by 2017. According to Thakran and Verma (2013)

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_50

online travel distribution is entering a hybrid era of three screens—computers, tablets and smartphones. Travel distribution has in fact evolved into a complex structure which is constantly changing (Kracht and Wang 2010). Pearce and Schott (2005) argued that we in travel and tourism should address distribution channels from a visitor perspective. Therefore, the main objective of this study is to better understand travellers' intended future trip arrangement strategies and to analyse the implications this may have on travel distribution. The focus will be especially on the during trip stage of the traveller life cycle and on the mobile device channel (such as the smartphone). It should also be noted that in during trip settings travellers usually arrange short daytrips to local attractions and activities and therefore these types of trip arrangements ought to be very suitable on a mobile device. The focus here is therefore on travel services of the character 'things to do during a trip' rather than on flights, hotels and travel packages that more often require pre-trip planning.

2 Literature Review

Buhalis and Laws (2001, p. 8) defined the functions of a distribution channel as: "The primary distribution functions for tourism are information, combination and travel arrangements services. Most distribution channels therefore provide *information* for prospective tourists; bundle tourism products together; and also establish mechanisms that enable consumers to make, confirm and pay for *reservations*". In distribution of attractions a clear priority is placed on at destination distribution (Schott 2007). Many attractions along with restaurants and operators of guided tours and activity providers conduct direct sales on location, including walk-ins and telephone calls, and in-direct through local travel agents. Nevertheless, also *pre-trip* distribution is conducted through direct web-sales and, depending on the target groups, different types of distribution channel mixes are executed e.g. through a wide range of middlemen (Pearce and Tan 2006). Offline information strategies used by travellers during trips are for example the use of paper brochures, hotel receptions, local tourist offices and travel agencies (Fodness and Murray 1999). We refer to this strategy as *during a trip offline*. It should also be noted that the attraction and activity sector in travel and tourism is less connected to global distribution systems (GDSs), e.g. Amadeus, than the hotel and airline industry. However, very little seems to be written about how the emergence of different digital service platforms such as smartphones and tablet devices impact the distribution of these types of travel services. The increased use of mobile devices and the mobile Internet (as described earlier) set a lot of pressure on many travel suppliers to become increasingly present also in the mobile channel. Many travel suppliers at destinations (e.g. hotels and Internet cafés) provide travellers with access to the Internet and digital services through self-service machines, computers or other types of digital devices. We refer to this strategy as *during a trip service provider device*. However, many travellers nowadays find it important to access the Internet

with their personal mobile devices during trips (Hjalager and Jensen 2012). We refer to this strategy as *during a trip personal laptop or tablet device* and *during a trip personal smartphone*.

For small and medium sized enterprises it may be costly to enter new technology-based distribution channels, and at the same time maintain existing channels. In fact, a vast majority of travel and tourism enterprises are small and medium sized enterprises (Werthner and Klein 1999), which makes the resource issue very relevant in travel distribution. On the other hand, the cloud with responsive web services provided as software as a service (SaaS) makes it easier and more cost effective for small and medium sized travel enterprises to become a player in the digital and mobile channel (Eriksson et al. 2013). Nevertheless, a digital platform with booking features and mobile optimization provided *directly* by travel suppliers is not necessarily the primary solution that a traveller will use. The fierce competition in the search engine space leads to serious challenges for destinations and travel suppliers to be presented in a coherent way to travellers (Xiang et al. 2008). Moreover, from a consumer perspective mobile searches may be quite shallow compared to conventional online searches (Church et al. 2008; Kamwar et al. 2009). Efficiency is a key component in the user experience of mobile trip arrangements (Eriksson 2012). According to Wang et al. (2014), in during trip settings, "the use of smartphones for information search seems to be much more purposeful as compared to information search in everyday context". Moreover, the importance of information sources such as social media platforms as influencers on the online travel information search process is increasing (Xiang and Gretzel 2010). Likewise meta-search engines are also powerful tools in the traveller information search process (Christodoulidou et al. 2009) and predictive mapping services focusing on location searches are evolving (e.g. Nokia Here). Therefore, travellers do not necessarily want to make complex mobile searches but would rather use mobile services that intelligently aggregate the supply of a destination or according to a nearby area in combination with traveller reviews of the supply. According to Buhalis and Foerste (2014) context-aware mobile services combined with social media features will play an essential role for travel and tourism in the near future. In fact, we see new online commercial middlemen which focus heavily on a mobile strategy entering the during trip market. For example actors like GetYourGuide and Viator are aggregating tours and activities and Bookatable and OpenTable are aggregating bookings for restaurants. These middlemen provide hybrid solutions for all three screens—computer, tablet and smartphones. Different established online travel agencies (OTAs) such as Expedia have also been fast to move into three screen solutions. Moreover, there are middlemen that focus on mobile only strategies. For example Hoteltonight.com aggregate last-minute bookings of hotel rooms only through mobile devices. Groupon relies heavily on the mobile channel to provide the best local deals for e.g. different types of travel services. All these types of hybrid or mobile only intermediates may alter *cybermediation* in during trip settings. Ease, simplicity and reputation are key factors for visitors to use intermediate channels in travel distribution (Pearce and Schott 2005).

Table 1 Investigated travellers' trip arrangement strategies for things to do during a trip (attractions and activities)

Strategies	Look strategy	Book strategy
Pre-trip	I try to do these types of information searches before the trip	I try to do these types of bookings before the trip
During a trip Off-line	I visit the hotel reception or local tourist offices I use paper brochures	I call or visit local travel suppliers' sales office I visit a local travel agent
During a trip service provider device	I use Internet services with a device provided by the hotel, Internet café etc.	I use Internet services with a device provided by the hotel, Internet café etc.
During a trip personal laptop or tablet device	I use Internet services/mobile services with my personal laptop or tablet device	I use Internet services/mobile services with my personal laptop or tablet device
During a trip personal smartphone	I use Internet services/mobile services with my personal mobile phone/smartphone	I use Internet services/mobile services with my personal mobile phone/smartphone

The example statements are translated from Finnish

When investigating travellers' online trip arrangements *travel frequency* should be taken into account. Those individuals who travel intensively find access to the Internet more important than others (Jensen 2012; Hjalager and Jensen 2012). Frequent travellers are also the frontrunners of mobile travel service adoption (Eriksson 2014). Also *Internet experience* seems to be an important component in online travel behaviour (Kah et al. 2008; Hjalager and Jensen 2012). Studies of online shopping for high- and low complexity travel products show that low- and high-skilled Internet users are distinctively different in their behaviour (Beldona et al. 2005). Moreover, Oha et al. (2009) found an indirect effect of travellers' previous ICT usage on their intentions to use mobile technologies.

Based on the discussion above we will here focus on five trip arrangement strategies for things to do during a trip; (1) Pre-trip, (2) During a trip off-line, (3) During a trip service provider device, (4) During a trip personal laptop or tablet device and (5) During a trip personal smartphone. By distinguishing between pre-trip and during trip we expect a better understand of the respondents' intentions towards true mobile trip arrangements. The purpose is also to distinguish between travellers' intended information strategies (the look approach) and reservation strategies (the book approach), as looking does not necessarily automatically lead to booking in traveller online markets (Xiang and Gretzel 2010). See Table 1 for the operationalization of the strategies in the questionnaire. It should also be noted that we in this research will regard the respondents' intentions to make trip arrangements through a mobile device during a trip either as direct mobile distribution and/or mobile cybermediation. The way our data is collected does not allow us to investigate the distinction between direct mobile booking and indirect mobile booking. The purpose here is to better understand travellers' intentions towards future trip arrangement strategies for things to do during a trip, direct or indirect,

and to analyse the implications this may have on the distribution from a travel supplier perspective. We see that a move towards traveller mobile look and book strategies through a personal mobile device will inevitably alter the way these types of travel services are distributed. The following research questions were formulated:

RQ1: What are the respondents' intended future look and book strategies for things to do during a trip?
RQ2: Are the respondents' intended future look and book strategies similar in character
RQ3: Is there a difference in the respondents' intended future look and book strategies between frequent travellers and non-frequent travellers?
RQ4: Is there a difference in the respondents' intended look and book strategies between low- and high-skilled users of the Internet?

In answering the four research questions we aim at gaining some answers to implications on future travel distribution of things to do during a trip.

3 Method: Data Collection and Questionnaire Design

A large scale quantitative survey was conducted in order to find patterns and determine differences between the investigated variables. The primary data needed was collected through a self-administered web-questionnaire, which for 3 weeks in June 2011 was linked from the website of one cooperating company within the lodging sector in Finland. Due to the online data collection method and the self-selective process, non-Internet adopters and non-users of the linked lodging company website are excluded in our sample. The sample may therefore be biased towards respondents finding digital travel services important.

In this paper we will analyse two areas of the questionnaire: the respondents' background variables and the respondents' intended future trip arrangement strategies. We asked the respondents to report (1) their intended main future *look strategy* for information regarding attractions, activities etc. during a trip and (2) their intended main future *book strategy* for attractions, activities etc. during a trip. The respondents were given five options, as identified in the literature discussion, for both their intended future look and book strategies; (1) Pre-trip, (2) During a trip off-line, (3) During a trip service provider device, (4) During a trip personal laptop or tablet device and (5) During a trip personal smartphone. The statements representing the five options are presented in Table 1. The respondents were able to select only one option for their look strategy and only one option for their book strategy, making the two variables nominal in character. In the final data analysis we included only complete answers of both variables, since the missing values are missing at random. Consequently we analysed 893 of 922 answers.

Of the 893 respondents, 24.1 % were males and 75.9 % were females. Hence, we have a clear female dominance in our sample. The youngest respondent was 18 years old and the oldest 71 years old. Of the respondents 26.1 % reported that

Table 2 Background variables

Variables	Sample N = 893	Variables	Sample N = 893
Gender		*Internet proficiency*	
Male	24.1 %	High skilled user of the Internet	75.7 %
Female	75.9 %	Low skilled user of the Internet	24.3 %
Age		*Travel frequency (business and/or leisure)*	
18–35	40.9 %	Frequent traveller	26.1 %
36–50	41.4 %	Non-frequent traveller	73.9 %
51–60	13.6 %		
>60	4.1 %		

they are frequent travellers, travel at least once per month (business and/or leisure) for a minimum duration of 1 day and 75.7 % reported that they perceive their personal Internet proficiency as good or excellent (high skilled users). In line with our research questions we will use the background variables Internet proficiency and travel frequency in our analysis (see Table 2).

4 Findings

Next we will present the findings according to the formulated research questions. Due to the nominal character of the variables we will use proportion charts, cross tabulation and Chi square tests to analyse the data.

4.1 The Intended Future Look and Book Strategies (RQ1)

In Fig. 1, we summarized the proportions of the respondents' intended future look and book strategies (RQ1). Pre-trip arrangement is the most preferred choice for both strategies (look 53.0 % and book 50.4 % of the respondents, N = 893). However, it should be noted that if we sum the proportions of a during trip personal laptop/tablet strategy and a during trip personal smartphone strategy, a during trip personal mobile device look strategy is chosen by 26.3 % and a during trip personal mobile device book strategy is chosen by 24.4 % of the respondents. These numbers clearly indicate that many travellers are in the future likely to select a during trip personal mobile device strategy not only to look for things to do during a trip but also to book things to do during a trip.

4.2 The Similarities Between the Intended Look and Book Strategies (RQ2)

We performed a cross tabulation analysis in SPSS 20 to better understand the possible similarities or differences between the respondents' intended future look

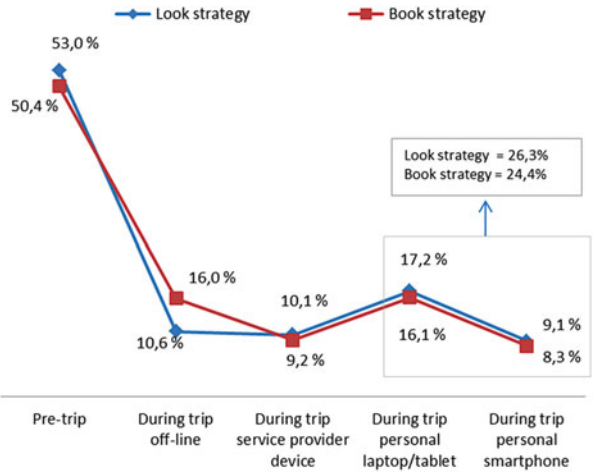

Fig. 1 The proportions of the respondents' intended future look and book strategies (N = 893)

Table 3 Cross-tabulation of the respondents' intended future look and book strategies

	Book strategy					
Look strategy	Pre-trip	During trip offline	During trip service provider device	During trip personal laptop/tablet	During trip personal smartphone	Total
Pre-trip	**340** **75.7 %**	80 55.5 %	23 28.0 %	23 16.0 %	7 9.5 %	473 53.0 %
During trip offline	43 9.6 %	**35** **24.3 %**	10 12.2 %	7 4.9 %	0 0.0 %	95 10.6 %
During trip service provider device	21 4.7 %	16 11.1 %	**39** **47.6 %**	8 5.6 %	6 8.1 %	90 10.1 %
During trip personal laptop/tablet	34 7.6 %	12 8.3 %	8 9.8 %	**95** **66.0 %**	5 6.8 %	154 17.2 %
During trip personal smartphone	11 2.4 %	1 0.7 %	2 2.4 %	11 7.6 %	**56** **75.7 %**	81 9.1 %
Total	449 100.0 %	144 100.0 %	82 100.0 %	144 100.0 %	74 100.0 %	893 100.0 %

Symmetric Measures: Cramer's V value 0.457, approx. sig. 0.000 Contingency Coefficient value 0.715, approx. sig. 0.000

and book strategies (RQ2). By summing up the bolded numbers in the diagonal line in Table 3 we calculated that in total 549 out of 893 respondents (61.5 %) have consistently responded that they intend to use the same channel for both a look and a book strategy. The contingency coefficient (value 0.715, approx. sig. 0.000) and Cramer's V (value 0.457, approx. sig. 0.000) confirm significant association between the look and book strategies. As a rule of thumb association values

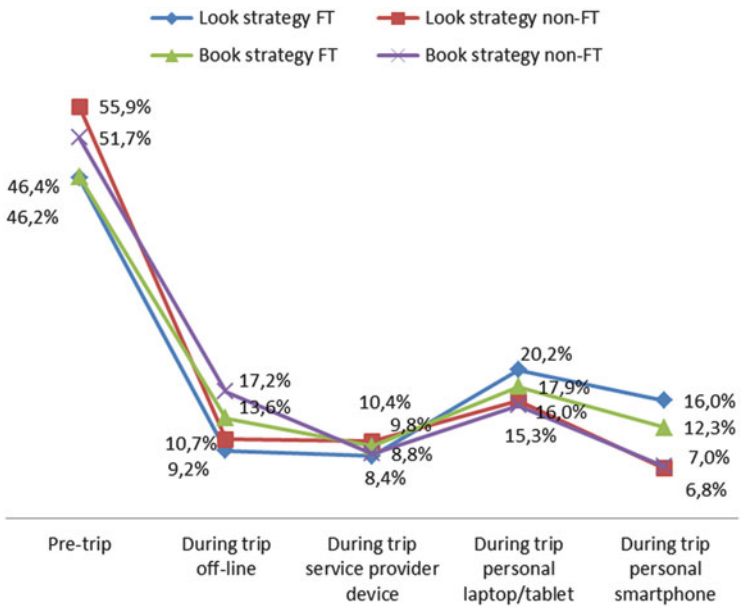

Fig. 2 Differences between frequent (N = 217) and non-frequent travellers (N = 676). FT = Frequent traveller

above 0.5 show strong relationships and values between 0.3 and 0.5 show moderate relationship between the variables. All in all we see a reasonably strong association between the two variables. There are, however, travellers who are going to prefer different look and book strategies and thereby alter a swapping behaviour. By looking at the numbers in Table 3 it seems like the primary switching intentions are from a pre-trip look strategy to an offline during trip book strategy. Other switching patterns are not apparent. Next we will analyse different types of travellers.

4.3 Travel Frequency (RQ3)

In Fig. 2 we can see that the intended future look and book strategy follow a fairly similar pattern for frequent and non-frequent travellers. However, clearly there are differences between the two groups. A Pearson Chi-square test confirms the differences between frequent and non-frequent travellers for a look strategy (chi-square/df = 21.712/0.001) and for a book strategy (chi-square/df = 12.532/0.028). A higher proportion of frequent travellers seem indeed to favour during trip strategies using their personal laptop/tablet or personal smartphone for both a look strategy and a book strategy. Especially a during trip personal smartphone strategy shows higher percentages for frequent travellers (look 16 % and book 12.3 %) than for

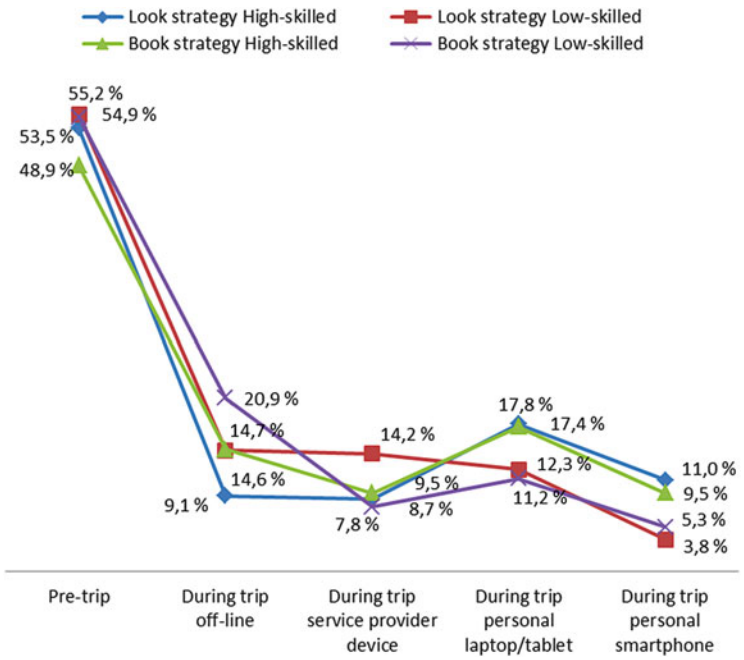

Fig. 3 Differences between high-skilled (N = 660) and low-skilled Internet users (N = 233)

non-frequent travellers (look 7 % and book 6.8 %). A larger proportion of non-frequent travellers, on the other hand, seems to prefer a pre-trip arrangement strategy. This is in line with previous research that frequent travellers are primarily the ones that are the frontrunners in the adoption and use of digital and mobile travel services.

4.4 Internet Proficiency (RQ4)

In Fig. 3 we can see that the intended future look and book strategy also follows a fairly similar pattern for high-skilled and low-skilled Internet users. However, clearly there are differences between the intended future trip arrangement strategies. Also a Pearson Chi-square test confirms the differences between the high-skilled and low-skilled Internet users for a look strategy (Chi-square/df = 24.321/0.000) and for a book strategy Chi-square/df = 11.757/0.038). A higher proportion of high-skilled Internet users indeed seem to favor during trip strategies using their personal laptop/tablet or personal smartphone for both a look strategy and a book strategy. Especially a during trip personal smartphone strategy shows higher percentages for high-skilled Internet users (look 11 % and book 9.5 %) than for low-skilled Internet users (look 5.3 % and book 3.8 %). A larger proportion of

low-skilled Internet users, on the other hand, seems to prefer a pre-trip arrangement strategy. This is in line with previous research that high-skilled Internet users are primarily the ones that are the frontrunners in the adoption and use of digital and mobile travel services.

5 Discussion and Implications

The primary aim of this study was to better understand travellers' intended future trip arrangement strategies for things to do during a trip and to analyse the potential implications for future travel distribution. The focus was especially on the during trip stage of the traveller life cycle and the mobile device channel. Based on our empirical findings we can say that the respondents' outspoken future intentions in terms of selecting a during trip personal mobile device strategy clearly indicate that attraction and activity suppliers, in order to stay competitive, should not only provide information in the mobile channel but also make certain that booking features are available, directly and/or indirectly, to travellers. It may not be enough for attraction and activity suppliers to be listed with an address in e.g. Google maps and/or have a mobile-friendly site that holds a number to dial or email to send a message to. Ultimately, as that will generate the cash flow, the conversion from look to book is the most interesting aspect from a supplier perspective. Especially many frequent travellers and skilled users of the Internet intend to rely on their personal mobile devices in during trip settings in the future. This may also suggest that when less skilled Internet users and/or non-frequent travellers become more familiar with mobile trip arrangements their propensity to move on to a mobile self-booking strategy may increase. On the other hand the respondents' outspoken future intentions clearly show that neither can the attraction and activity suppliers, at least not in the near future, abandon the conventional offline distribution of brochures, answering phones, providing walk-in services etc. at destination. Abandoning good stationary web services and other distribution mixes for effective pre-trip arrangements is not an option either. In fact, it should be highlighted that the pre-trip look and book strategy was preferred by a majority of the respondents. Also Douglas and Lubbe (2014) emphasized that the extent of traveller use of mobile devices should not be overestimated for travel related activities such as bookings.

Although it is hard to assess the transformational impact of people's future intentions on market structures it seems clear that attraction and activity suppliers are increasingly moved in the direction of online distribution also in the during trip phase of the traveller life cycle. However, as discussed earlier, many travel suppliers are small and medium sized enterprises that may have limited resources to enter new channels and at the same time maintain existing channels. In fact, small and medium sized tourism enterprises are struggling to adopt new technologies as they have limited financial and human capital to invest (Schegg et al. 2013). Furthermore, as described in the literature review, mobile search behaviour often

seems to be shallow but purposeful during trips and therefore mobile services that intelligently aggregate the supply of a destination or nearby area in combination with e.g. traveller reviews of the supply may become very important to travellers in during trip settings. New middlemen, who focus heavily on a mobile strategy or even on a mobile only strategy, are already entering the during trip market. Based on the empirical data in this study we see that there clearly is a market for these actors and their role is likely to become stronger in the distribution of travel services of the character things to do during a trip. In fact we see that hybrid and mobile intermediates provide new opportunities for proactive attraction and activity suppliers to reach new customers in during trip settings. Furthermore, the semantic web will bring intelligent services that understand large amounts of content and those travel companies that recognize this opportunity will be successful in the future (Buhalis and Foerste 2014). According to Schegg et al. (2014), who looked particularly at hotel distribution, the growth of the direct online distribution in the future is scant as OTAs have the resources to apply new technology and the market position to drive cybermediation. Therefore, we see that online middlemen who focus heavily on mobile and intelligent services may indeed be very attractive or even necessary partners for small and medium sized travel suppliers and thereby enhance cybermediation in future travel distribution also for typical during trip travel arrangements as investigated here.

To sum it up, this study indicates in terms of implications for the travel market structure that attraction and activity suppliers are increasingly moved in the direction of online distribution in the during trip phase of the traveller life cycle and that the increased use of personal mobile devices among travellers and the emergence of intelligent mobile services may enhance cybermediation rather than direct online distribution. Cybermediation may be especially true for small and medium sized travel suppliers, due to their limited resources.

5.1 Limitations

As any study this has its limitations. Due to the online data collection method and the self-selective process, the sample may be biased towards respondents finding digital travel services important. This study can also be regarded as speculative in nature as it may be hard for travellers to predict their future intentions to make trip arrangements, especially when it comes to the mobile channel which has evolved rapidly during the past 5 years. Longitudinal studies based on actual trip arrangements may hence provide a better base for predicting future market structures. Future studies could also include information and booking sources in order to capture differences between direct and indirect mobile bookings. Moreover, it has to be remembered that the travel market is highly complex in nature and the impact of information and communication technology on the market structure is hard to estimate (Rensmann and Klein 2011).

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Offline Versus Online Intermediation: A Study of Booking Behaviour of Tourists Travelling to Sardinia

Giacomo Del Chiappa and Andrea Zara

Abstract Researchers argue that the debate around the topic of disintermediation and reintermediation (both offline and online) is still open and needs further analysis. This study was therefore carried out, with a representative sample of 1,461 national and international tourists who visited Sardinia (Italy) in 2012. Its aim was to investigate how tourists book their holidays and whether significant differences exist in their channel strategy (online versus offline intermediation) based on: their socio-demographic characteristics; the type of tourism product they bought; their prior experience of travelling to the destination; the geographical distance they travelled; and the length and the time (low or high tourism season) of their stay. Findings reveal that all but four variables (gender, income, median length of stay and prior experience of travelling to the destination) are influencing their actual buying behaviour. Managerial implications are discussed and suggestions for further research are made.

Keywords Disintermediation • Cyberintermediation • Consumer characteristics • Product characteristics • Contextual factors

1 Introduction

According to Internet World Stats (2013), there are currently around 2.8 billion Internet users in the world, with significant penetration ratios in countries all over the world. Tourism has become the foremost industry in terms of online market share (Werthner and Ricci 2004) with travel planning and booking being two of the most popular online activities (Park et al. 2007). The Internet and ICT are valuable tools for NTOs (National Tourism Organizations), tourism destinations, service providers and consumers, for information dissemination, communication and online booking (Law et al. 2010; Stankov et al. 2010).

According to IPK International (2011), 55 % of all travel bookings in Europe were made online in 2011, an increase of 15 % from 2010. A study carried out by

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_51

Econsultancy (2011) on a sample of 5,000 UK travellers reported that 71 % of respondents researched online, but only 56 % booked travel products online, while a significantly lower percentage used traditional agents to search for information (20 %) or for booking (14 %). Another UK study carried out by eMarketer (2012) reported that almost 90 % of travel purchases (86 % overseas and 91 % domestic) were 'digitally influenced', even if the final purchase was made offline. Note that the same research reported that only 28 % of these UK travellers booked their accommodation using the hotel's official website, with 17% booking via online travel agencies (OTAs) and 11 % using high street travel agents (eMarketer 2012). In 2011, 12.5 million French people were reported to have booked all or part of their travel arrangements online, representing 42 % of the French people who took holidays during the year (L'Echo touristique 2012). A recent study carried out by ISNART (2013) on a sample of 1,000 Italians reported that in 2012 a relatively small percentage of respondents relied on travel agencies to organize/book their holiday when travelling in Italy (2.8 %) or abroad (9.7 %); 32.6 % of respondents reported having booked their holiday online. Some recent research has reported consumers returning to the use of traditional travel agencies. According to a study by Forrester Research (as cited in Jones 2010) the share of leisure travellers who would be interested in using a traditional travel agent versus a website had risen from 23 % in 2008 to 28 % in 2010. In a survey carried out by the American Society for Travel Agents (ASTA), 44 % of travel agents said that 'hotels' was one of the service categories with the strongest rebound in 2010 (eGlobal Travel Media 2012).

Despite this, it could be argued that the debate on the comparative power of offline and online channels in driving tourists to their selected destinations is still open and needs further analysis. Specifically, there needs to be a better understanding of whether the geographical characteristics of the final destination and the e-presence of tourism providers can or should be considered a factor in the online trip planning and buying process. With the aim of facilitating this understanding, this study was carried out on a quota sample of 1,461 national and international tourists who visited Sardinia (Italy) during the period May-October 2012, to investigate how tourists book their holidays and whether significant differences exist in their channel strategy (online vs offline intermediation) based on: their socio-demographic characteristics; the type of tourism product they bought; their prior experience of travelling to the destination; the geographical distance they travelled; and the length and time (low or high tourism season) of their stay. Hence, the main benefit of the present study is that it investigates the factors affecting actual reservation behaviour rather than reservation intentions, as is the case in most existing research (e.g. Kim and Kim 2004).

2 Literature

The development of the Internet, ICT, social media and online travel agencies has reshaped the way people plan for, buy and consume tourist products and services (Buhalis and Law 2008). The role of traditional tourism intermediaries is thus

seriously challenged (e.g. Bennet and Lai 2005; Tsai et al. 2005; Yung 1997). This explains the popularity, among both researchers and practitioners, of the disintermediation hypothesis, i.e. the idea that intermediaries will be eliminated within the distribution channels (Buhalis 1998).

The emergence of new e-intermediaries, in particular OTAs, has drawn increasing attention to what became known as reintermediation, or cybermediation (Anckar 2003). This phenomenon (which became evident with the rise of Expedia.com, Booking.com, etc.) has been defined as the utilization of ICT and Internet tools for developing new intermediaries, or for enabling existing intermediaries to re-design tourism distribution channels (Bennet and Buhalis 2003). This explains why most industries and academic experts talk about 'e-reintermediation', a term that describes a situation where OTAs are replacing 'bricks and mortar' travel agencies. It can be argued that OTAs are currently exerting a pivotal role in influencing consumers' decision-making since they intermediate a relevant amount of hotel reservations (PhoCusWright 2011). OTAs are influencing tourists' choices from the early stages of their information search: consumer decision-making is frequently influenced from an early stage by accessing these sites (the so-called billboard effect: Anderson 2009; Del Chiappa 2012). For example, Park et al. (2007) reported that the majority of online travel shoppers visit OTAs (Expedia.com, Priceline.com, etc.) but 50 % then turn to service providers (hotels, airline companies, etc.) to make their booking. In recent research carried out on a sample of 623 Italian tourists (Del Chiappa 2012), 45.6 % were found to start their research through OTAs and proceed to visit the hotel's website (55.2 %) or tourism related social networks (19.7 %); then, 69.4 % of those visiting hotel websites as the second step of their search, book via email (36.5 %) or phone (32.9 %). However, according to Grønflaten (2011) the issue of disintermediation should be analyzed both as a choice between two information sources (travel agents and service providers) and between two information channels (face-to-face and the Internet).

The main factors that have been found to influence travellers' choice of information search are personal characteristics, situational characteristics, product characteristics, travel party, prior visits to the destination, the degree of novelty of the visited destination and the presence of friends and relatives at the destination (e.g. Fodness and Murray 1999).

On the basis of their Internet usage, tourists have been classified as 'lookers', that is those who only wish to acquire information online, and 'bookers', that is those who also buy tourism services and products. According to Morrison et al. (2001), lookers differ from bookers in their socio-demographic characteristics and in their history of Internet usage (the number of years they have been using the Internet, the number of hours they surf the Internet per week, etc.). For example, it was shown that the propensity to purchase online increases with age, education level and income (e.g. Law et al. 2004). Grønflaten (2011) found younger groups to be less likely than senior groups to prefer travel agents when searching for information, and travellers over 59 years old and on an organized tour to be more likely to choose the combination of travel agents and face-to-face communication.

Online consumer behaviour also differs by travel product characteristics (e.g. Beldona et al. 2005; Card et al. 2003). For example, for high-risk products consumers use the Internet to collect and exchange information but not to purchase online, because they think they have insufficient information and that online purchasing systems are insecure (Jun et al. 2007). Tourists are more willing to buy low-involvement products than high-involvement products through the Internet (Chu 2001). People rely on traditional travel agencies when buying a complex product such as a honeymoon and when travelling for business reasons (Grønflaten 2011; Kim and Kim 2004). Finally, prior research has found that short-haul travellers perceive traditional travel agents as biased operators (because they are commission-oriented) and less able to offer a good variety of choices (Law et al. 2004). Conversely, the greater the distance travelled and the longer the period of stay, the greater the number of travellers that are using travel agencies (Del Chiappa 2013).

Prior research also found statistically significant differences in how consumers book transport to the destination, accommodation and packages, for domestic and outbound trips (Pearce and Schott 2011). Specifically, in their study on a sample of 1,000 New Zealand domestic and outbound travellers, Pearce and Schott (2011) reported that almost 67 % of transportation for domestic destinations was booked online, whereas bookings for international travel were relatively evenly shared between online and face-to-face transactions. The same study reported that almost 50 % of domestic accommodation was booked by phone, whereas a similar percentage was booked online when international accommodation was considered. Overall it can be argued that in reality consumers mix online and offline information sources when searching for information and in their booking behaviour (Ho et al. 2012). Hence, travel agencies seem to continue to play an important role in the marketing mix of a significant majority of hotels (Ku et al. 2011), at least when they need to reach customers belonging to specific segments, and who are looking for complex, high-involvement products. This seems to be in line with Stuart et al. (2005) study of the channel strategy adopted by tourism businesses in New Zealand. By adopting a regional perspective and a supply-side approach (in-depth interviews with tourism businesses), they found that hospitality marketers make greater use of inbound operators, wholesalers and retail travel agents, when they are focusing their business on serving the group segment, special interest and semi-independent travellers. Businesses catering to independent travellers tend to rely on a mix of 'en route' and 'at destination' strategies, involving information in particular from information centres, and formal or informal networks of other service providers.

Based on this strand of research, this study was carried out with a representative sample of 1,461 tourists who visited Sardinia in 2012, to investigate how they book their holidays and whether significant differences exist in their channel strategy (online versus offline intermediation).

3 Methodology

This paper discusses findings of an empirical investigation on 1,461 national and international tourists who visited Sardinia during the period May-October 2012. Data was collected using an ad hoc questionnaire administered face-to-face by 20 trained interviewers at airport and port areas (Cagliari, Olbia and Alghero/Porto Torres).

The questionnaire was divided into four parts. The first asked respondents to state their socio-demographic characteristics (age, gender, level of education, occupation and family early income, country of origin). The second part requested general information about their travel, namely: travel party; length of stay; how many times they had visited Sardinia before; type of transport used (airplane or ferries) and type of accommodation. The third part asked if they used any intermediaries to book. If they answered positively to this question, they were also asked if they had booked only transport, only accommodation or a complete package from online intermediaries (such as Expedia.com, Priceline.com, etc.) or traditional offline intermediaries. Finally, they were asked whether the main reason for being in Sardinia was sun, sand and sea tourism, active/sport tourism, ecotourism, cultural tourism, food and wine tourism, rural tourism, religious tourism or any other type of tourism.

For the purposes of this study, population was defined as all national and international tourists over 18 years of age. The sample method used was a stratified random sampling (based on data provided by the Regional Government as regard to the tourism season 2010), with strata being nationality (Italian versus international), time of tourists' stay (low season: May-June, September-October; high season: July-August) and gateway to the island (port and airport, but also standard and low-cost airlines) (Table 1).

The questionnaire was pilot-tested by travellers who were not involved in the research, in order to verify the validity of its content and the comprehensibility of the questions. No concerns were reported in the pilot tests. At the end of the data collection 1,461 complete and usable questionnaires were obtained. A series of descriptive statistics and chi-square tests were run for the purpose of this study.

Table 1 Stratified sampling

	Gateway to island		Type of flight	
	Port	Airport	Low cost	Traditional
Low season	**18 %**	**23 %**	10 %	13 %
National tourists	10 %	13 %	5 %	7 %
International tourists	8 %	11 %	5 %	6 %
High season	**43 %**	**16 %**	7 %	9 %
National tourists	25 %	10 %	4 %	6 %
International tourists	17 %	6 %	3 %	3 %
Subtotal	**60 %**	**40 %**	17 %	23 %

Bold indicates subtotal - sum of national and international tourists

4 Results and Discussion

Most respondents were male (51 %), aged 36–50 (36 %), with a university degree or PhD/Master's (49 %) and with a yearly household income between 30,000 and 60,000 € (42 %). The majority stayed in hotels and residences with hotel facilities (58 %), while 27.2 % visited friends or relatives or stayed in second homes.

Most respondents did not use any form of intermediation (64.4 %). Therefore 35.6 % of travellers were reported as relying on some form of tourism intermediary (online or offline); this percentage increases to 39.6 % if those respondents who were staying in a second home are not considered. Tourists who visit Sardinia have often previously visited (74 % at least once, 54 % more than twice).

Table 2 shows that significant differences in the way tourists use offline and online intermediaries do exist and are based on age ($X^2 = 11.040$, $p < 0.05$), level of education ($X^2 = 14.406$, $p < 0.05$) and employment status ($X^2 = 8.933$, $p < 0.05$). Older (middle-aged) and more educated people are more likely than younger people to use an offline intermediary, whereas employed respondents tend to prefer an online tourism intermediary; this confirms prior studies carried out in other countries (e.g. Lorenzo-Romero et al. 2014).

Table 3 shows that significant differences in the way tourists use offline and online intermediaries are also based on nationality ($X^2 = 10.888$, $p < 0.05$), thus confirming that cultural differences should still be taken into account when investigating online searching and booking behaviour (e.g. Del Chiappa 2013).

Significant differences do also exist based on travel party ($X^2 = 13.271$, $p < 0.05$). Quite surprisingly, the usage of an online intermediary is higher when long-haul travelling is considered (67 %), and lower as the number of people

Table 2 Offline and online intermediation by age, gender and level of education

	Offline	%	A.R[a]	Online	%	A.R[a]	X^2	Eta^2
Age								
18–24	26	51.0	0.8	25	49.0	−0.8	11.040*	0.021
25–35	50	36.8	−2.4	86	63.2	2.4		
36–50	89	45.4	−0.1	107	54.6	0.1		
51–65	50	48.1	0.6	54	51.9	−0.6		
>65	22	66.7	2.5	11	33.3	−2.5		
Level of education								
University/Master/ Ph.D.	29	70.7	3.4	12	29.3	−3.4	14.406*	0.028
High school	112	47.5	0.8	124	52.5	−0.8		
Secondary school	96	39.5	−2.6	147	60.5	2.6		
Employment								
Unemployed/retired	65	58.0	3.0	47	42.0	−3.0	8.933*	0.017
Employed	172	42.2	−3.0	236	57.8	3.0		

*Significance at 5 % level
[a]Adjusted residual

Table 3 Offline and online intermediation by nationality, geographical haul, travel party

	Offline	%	A.R[a]	Online	%	A.R[a]	X^2	Eta^2
Nationality								
Italian	161	51.4	3.3	152	48.6	−3.3	10.888*	0.021
International	76	36.7	−3.3	131	63.3	3.3		
Geographical haul								
National	161	51.3	3.2	153	48.7	−3.2	10.436*	0.020
European	72	37.1	−3.0	122	62.9	3.0		
Intercontinental	4	33.3	−0.9	8	66.7	0.9		
Travel party								
Alone	14	30.4	−2.2	32	69.6	2.2	13.271*	0.026
With partner	85	40.5	−1.9	125	59.5	1.9		
With family	110	54.7	3.3	91	45.3	−3.3		
Friends	28	44.4	−0.2	35	55.6	0.2		
Time of stay								
High season	150	51.5	3.1	−3.1	48.5	−3.1	9.493*	0.018
Low season	87	38.0	−3.1	3.1	62.0	3.1		

*Significance at 5 % level
[a]Adjusted residual

travelling with the respondent increases. People travelling with family declared a preference for offline intermediaries (54.7 %) more than all the others. One could argue that families may prefer using online tourism intermediaries because they may save money and thus cope with the higher costs of family travel. The higher complexity of the family holiday package, and related intrinsic needs (i.e. better assistance when searching for hotels with services and facilities for babies and children, the need for health assurance included in the tour package, etc.), which result in a general need for a face-to-face service, could explain why families use offline intermediaries. Finally, tourists travelling to Sardinia in the high season used offline intermediaries more than those travelling in the low season. This could be explained by the fact that tourists travelling to Sardinia in the high season are mainly travelling with families and thus, as we saw above, tend to use offline intermediaries for their booking.

No significant differences were found regarding gender, income, median length of stay, prior visitation and type of tourism experience (Table 4).

We can conclude that those variables do not statistically differentiate the extent to which respondents make use of offline and online intermediaries to buy their holiday. Our results reveal no significant differences based on gender, confirming prior studies showing that this variable usually has no influence on online behaviour (e.g. Ip et al. 2012). However, the fact that our study and prior research provide this evidence cannot preclude the fact that significant differences might exist when adopting a gender-identity based perspective (masculinity versus femininity) (Ramkissoon and Nunkoo 2012). This aspect would merit future research. Furthermore, our findings do not show any significant differences based on income, thus

Table 4 Offline and online intermediation by gender, income, length of stay, prior visitation and type of tourism experience

	Offline	%	Online	%	X^2
Gender					
Female	121	49.4	124	50.6	2.712
Male	116	42.2	159	57.8	
Income					
>60.001 €	36	40.4	53	59.6	5.192
30.001–60.000 €	95	42.0	131	58.0	
≤30.000 €	106	51.7	99	48.3	
Length of stay					
≤4	15	38.5	24	61.5	5.534
5–10	152	43.2	200	56.8	
≥10	70	54.3	59	45.7	
Prior visitation					
0	64	43.0	85	57.0	1.335
1–3	99	47.1	111	52.9	
4–8	30	42.3	41	57.7	
>8	44	48.9	46	51.1	
Type of tourism experience					
Active/sport tourism	9	39.1	14	60.9	0.555
Sun, sand and sea tourism	177	45.6	211	54.4	
Ecotourism	31	45.6	37	54.4	
Other	20	48.8	21	51.2	

contradicting prior research showing that the propensity to buy online increases with income (e.g. Law et al. 2004; Lorenzo-Romero et al. 2014) and median length of stay (Woodside and Ronkainen 1980; Del Chiappa and Balboni 2013). The mixed picture of similarities and differences between our findings and prior studies, with findings that are sometimes contradictory, could be explained by the different settings where studies have been conducted, which are obviously highly site-specific; the location of travel decision-making and distribution, the geographical characteristics of the final destination and the e-presence of tourism providers can/should be considered a moderating factor of the online trip planning and buying process (Pearce 2008).

5 Conclusion

This study analyzes the topic of disintermediation (both offline and online) by surveying a representative sample of 1,461 national and international tourists who visited Sardinia during the period May-October 2012. Overall, the present study reported a large number of tourists not using any form of intermediary (offline or

online) to book their holidays in Sardinia. Thus many tourists were buying directly from the service providers, using their official website and/or any other form of online and offline direct channels. This could be explained by the fact that visitors to Sardinia have often visited previously (74 % at least once, 54 % more than twice), so they may elect to spend their holiday in the same tourist area/accommodation, or they may rely on the information they collected during their prior visit when interacting with other tourists, tourist information centres, etc.

Our findings also showed significant differences based on age, employment, level of education, nationality, travel party, geographical haul and time of year of the stay (low versus high season), in the choice between online and offline tourism intermediaries. Specifically, findings revealed that younger people, employed people and international tourists, especially those travelling far from their country of residence, tend to rely more on online tourism intermediaries. Conversely, the usage of an offline intermediary is higher when the number of people travelling together increases, when older and more-educated people are considered and when tourists are travelling during high season. No significant differences were found with all the other variables considered in this study, i.e. gender, income, median length of stay and prior experience of travelling to the destination. These findings only partially confirm prior research. For example, contrary to usual assumptions on disintermediation, international travellers reported using online intermediaries to book. This could be explained by the fact that most of the European travellers visiting Sardinia come from countries with high Internet penetration (Germany, France, Spain, etc.) (Internet World Stats 2013). The fact that some inconsistencies exist in this study when compared to prior studies could be explained, as suggested in other studies (Williams and Lawson 2001), by the different settings in which studies have been conducted, all of which are obviously highly site-specific (in terms of socio-demographic characteristics and personality of visitors, tourism offer, retail and commercial facilities, etc.), and thus hardly generalizable.

Aside from their contribution to the overall body of knowledge on tourist intermediation, the findings of this study have a number of practical implications for marketing for tourism businesses, destination marketers and policy makers looking for a better way to promote, position and sell their services. Firstly, the fact that the majority of respondents (64.4 %) did not use any form of intermediation suggests hotel marketers should continue to invest in order to enhance a direct distribution strategy, especially through their official websites. Furthermore, our findings revealed that 45.6 % of travellers who relied on some form of tourism intermediary were using a high street travel agency. This means that offline bookers should not be ignored by the tourism industry, although using the Internet is already a well-established trend for travellers (Qi et al. 2013). With this in mind, hotel marketers could and should offer bonus loyalty points to those guests returning to stay in their accommodation by booking directly (official website, email, phone, etc.). Finally, tourism businesses and destination marketers should work with a plurality of criteria, and should adopt a promotion and distribution strategy where the mix of information channels and sources is designed to reflect the characteristics of their target consumers, and the contextual factors that arise from the specific

geographical location of their destination. So for example, hotel marketers should rely more on the Internet when targeting international tourists seeking long-haul trips. Conversely, hotel managers should keep on collaborating with high street travel agencies when targeting young and middle-aged travellers, families, and domestic tourists. However, findings strongly suggest that hospitality marketers should consider the Internet as a complementary, rather than a substitute, source for information and booking (Beritelli et al. 2007).

Finally, findings suggest that Sardinia as a whole should invest in a Destination Management System (DMS) and enhance its online visibility through SEO (Search Engine Optimization), SEM (Search Engine Marketing) and SM (Social Media marketing). This would achieve the dual aim of (a) increasing the opportunities for interaction between online tourists and tourism businesses working within the tourism destination, and (b) offering them an additional distribution channel for their multichannel strategy. Indeed, it could be argued that today it is almost impossible to be operational in the offline tourism sector if not also online (Dabs and Manaktola 2007) given how searching and/or booking behaviour by consumers influences supply. Despite this, the actual visibility and accessibility of most European tourism organizations' websites is quite low (Díaz et al. 2012).

Despite the contribution of this study, it is not without limitations, and these need to be acknowledged as they suggest potential for further research. Firstly, for the purposes of this study the sample was used to run chi-square tests on a set of socio-demographic variables that may influence travellers' behaviour when booking their holiday. From a methodological point of view, this could generate some problems; in other words, although the sample is the same in all cases, we considered each one to be different while running a chi-square analysis for each demographic variable. For this reason, it would certainly be useful for the purposes of future studies, to apply a cluster analysis to profile respondents, based on the whole list of their socio-demographic variables being considered at once. Secondly, some moderator factors which could influence the use of online and offline intermediaries were not included in this study (e.g. attitude and benefit, risk perceptions, purpose of traveling i.e. leisure versus business, etc.). Furthermore, findings are highly site-specific and cannot be applied to other tourism destinations even if a stratified sampling approach is used. Further research is needed to investigate if the variables considered in the present study are able to shed more light on tourists' preferences for online travel agencies or providers' websites, when buying tourism services. Indeed, prior research indicates that the channel mix is influenced by both the characteristics of regional supply and inbound tourism demand (Stuart et al. 2005). Therefore, future research should be carried out in other tourism destinations in order to run cross-validation. Finally, given the unavailability of time-series data to be analyzed, this study used cross-sectional survey data, despite the fact that the basic nature of the disintermediation/reintermediation process is intrinsically dynamic. Hence, in the future it could be interesting to repeat the data collection over time and on a regular basis, so that it could be possible to obtain such time-series to be utilized to investigate the topic in more depth.

Acknowledgments This work was supported by the *Regione Autonoma della Sardegna* under Grant [LR7 2011, Project F71J11000980002].

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An Investigation of Hotel Room Reservation: What Are the Diverse Pricing Strategies Among Competing Hotels?

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Abstract In the age of e-tourism, the Internet makes hotel room rates more transparent to customers. It is widely known that hotel room rates fluctuate frequently. However, no prior study has been conducted to investigate the pricing strategies of competing hotels. To address this deficiency, the current study examined this issue. Findings indicate that hotel room rates are low and steady during early reservation period (e.g., 2.5 months). However, during the last 10 days before the check-in date, hotel room rates fluctuate the most, indicating that hotels are currently adopting diverse pricing strategies. Results also show that the best reservation time period to obtain the best available rate is 30–20 days of advance purchase. Moreover, last-minute offers rarely exist among the investigated hotels. These findings can provide hotel managers with insights about effective pricing strategies and strategic management, enabling them to inform the customers about the best reservation time period to obtain optimal room rates.

Keywords Pricing strategy • Hotel • Competition • Room reservation

1 Introduction

With the rapid development of the Internet, hotels commonly sell their rooms by taking advantage of Internet platforms as popular distribution channels. Online reservation systems have been widely applied in the hospitality industry for marketing activities and transactions, making it easier for customers to obtain information about hotel rooms and make reservations from anywhere at any time with the help of the Internet (O'Connor and Frew 2004; Guo et al. 2013). However, these systems also make the competition fiercer for the hospitality industry, particularly

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_52

for hotels that are located near one another because they are usually the close and strong competitors. Therefore, apart from using an official website for marketing and sales, a number of hotels also cooperate with third-party websites to gain advantage over their competitors. For example, some hotels highlight the ranking of the hotel in third-party websites.

Several studies have pointed out that price is still one of the most influential factors that affects customers' purchase decisions for hotel rooms. Similarly, room rate fluctuations also affect customers' quantity demand (Choi and Mattila 2004; Lockyer 2005; Wong and Law 2005; Hung et al. 2010). Hence, by adopting diverse and dynamic pricing strategies (e.g., time-based, cost-based, demand-based), hotels attempt to target different segments to generate incremental revenue from the optimal segments. Hospitality companies sell hotel rooms to both price-inelastic customers at a high price and price-sensitive customers at a discounted price for effective revenue management (Hanks et al. 2002; Guo et al. 2013). On the contrary, hotels also frequently change their room rates to reflect customers' demand, seasonality, and competitors' pricing strategies (Chen et al. 2014). Jim Rozell, founder and CEO of data analytics company Hotel Compete, stated that competitor pricing is a critical factor of the pricing strategy. Rozell also highlighted the importance of knowing which hotel is truly competing with another hotel because the true competitors will follow whenever the hotel raises or lowers its room rate (Freed 2013).

Previous studies have indicated the importance of pricing strategies and the easy fluctuations of hotel room rates in this information-transparent Internet age. Nevertheless, no study has investigated the diverse pricing strategies among competing hotels. Therefore, the current study investigated the price fluctuations of six hotels located near each other by checking the hotel room rates indicated on their official websites. The following main research question is formulated: what are the diverse pricing strategies employed among competing hotels? The present study aimed to examine the room rate fluctuations of six hotels starting from 2.5 months before to the actual check-in date, to investigate the pricing strategies applied by the targeted hotels, and to compare the attractiveness of advance-purchase and last-minute offers through the targeted hotels.

2 Issues

2.1 Hotel Room Revenue Management

The maximization of revenue is of great importance for hotels because of high fixed costs and capacity. Hanks et al. (2002) provided a list of ideal conditions for hotels to implement revenue management, namely, "Low variable costs; High fixed costs; Perishable inventory; Variable demand patterns; Ability to forecast future demand; and Ability to segment customers on their varying needs, behavior, and willingness

to pay". Therefore, hotels often charge different prices for different customers to sell as many rooms as possible per night and to earn more revenue (Hanks et al. 2002; O'Connor and Murphy 2008). On the contrary, when hotels have high room capacities and can charge high average room rates, they also have a stronger motivation to cooperate with third-party websites to make the best use of their room capacity and gain more profit (Guo et al. 2013).

In general, hotels apply three approaches, namely, single rate approach, rates by room type approach, and rate fence approach. A single rate approach provides a single rate for all inventories where the room rate is time-based (e.g., seasonality, time-period, etc.). The second approach, rates by room type, has been widely applied in the hotel industry by charging different prices based on different room attributes such as view, size, floor level, etc. (Hanks et al. 2002). Most hotels employ the third approach, rate fence approach, in trying to sell 100 % of their inventory. When the demand is weak, hotels offer discounts, whereas when the demand is strong, they increase the price. Furthermore, nonrefundable advance purchase is also regarded as a rate fence (Lee and Ng 2001; Hanks et al. 2002). Traditionally, last-minute offer is considered an effectiveness revenue management policy, and customers show willingness to get good deals close to their date of stay (Carroll and Siguaw 2003).

At present, the advanced capabilities of the Internet make pricing strategies of hotels nearly transparent to customers, and the primary factor that affects customers' online purchasing decisions is price (Carroll and Siguaw 2003; Law and Hsu 2006). Hui et al. (2009) also stressed that price is always the most important factor affecting consumers' online purchase decisions compared with a number of other factors. If hotels charge only one room rate, they may have a substantial amount of unrealized revenue. However, if different types of pricing strategies are applied, unrealized potential revenue can be reduced to achieve the goal of revenue maximization (Qi et al. 2013). Hence, the current study is intended to compare hotel room rate fluctuations in the span of 2.5 months and to identify the pricing strategies of six hotels.

2.2 Hotel Room Pricing Strategy

Pan (2007) pointed out that hotel room rates and occupancy rates are the two major factors that determine the revenue of hotel rooms. Choi and Cho (2000) argued that a trade-off always exists between selling more rooms at lower prices versus selling fewer rooms at higher prices. Hotels have adopted the common practice of frequently altering their room rates based on reservation period, seasonality, and competitors' pricing strategies (Chen et al. 2014). Similarly, price and availability are the two critical factors that affect customers' willingness to pay and their final purchase decision (Schwartz 2006). Mei and Zhan (2013) pointed out that hotel customers are very sensitive to room rates. This finding was further emphasized by Yesawich et al. (2000), who stated that 60 % of leisure travelers are actively looking

for the "lowest possible price" for travel-related products. Hanks et al. (2002) added that time, place, and the purpose of a trip also affect customers' purchase decisions. This phenomenon illustrates that based on the easy accessibility of information; customers can weigh the costs and the benefits of each option easily and choose the one that is most beneficial (Schwartz 2006). However, meeting both the customer demand and the goal of revenue maximization is a challenge for hotels.

Steed and Gu (2005) provided four major hotel room pricing methods, namely, cost-based, market-based, a combination of cost- and market-based, and best practice-based pricing strategies, to achieve optimal revenue. Cost-based pricing strategy is a simple technique applied in high-fixed cost industries such as the hotel industry to achieve optimal revenue (Chung 2000). For market-based pricing strategy, taking hotel rooms for example, hotels often charge a lower rate for customers who book hotel rooms far in advance of the check-in date (e.g., 2 months), a medium rate for customers who reserve rooms in advance of the check-in date (e.g., 15 days to 2 months), and a high rate for customers (e.g., business travelers) who book rooms only 1 or 2 days before the check-in date (Guo et al. 2013). Apart from the two previous pricing strategies, another pricing strategy is taking both cost and market into consideration. Pan (2007) pointed out that to earn more profits, hotels often raise room rates during the peak season and decrease room rates in the low season to cover the variable costs. Some hotels also apply best practice-based pricing strategy. For instance, Hotel ICON, a teaching and research hotel in Hong Kong, provides a 35 % fixed discount to customers who book rooms at least 14 days before the check-in date, along with other dynamic pricing strategies (Guo et al. 2013; Hotel ICON 2014). Nagle and Holden (2002) indicated that competitor pricing is also a popular pricing strategy. Specifically, when companies cut price or make promotions, they can attract their competitor's customers or obtain new customers (Ellerbrock et al. 1984; Tepeci 1999). Customers also switch easily to competitors' products when a lower rate is provided.

However, regardless of the room rate pricing strategies applied by hotels, revenue is restrained by room capacity (Pan 2007). Therefore, making the best use of diverse pricing strategies to maximize revenue is an important lesson that hotel managers should learn. Hence, this study can be regarded as the initial investigation, identification, and comparison of diverse hotel room pricing strategies employed by competing hotels.

3 Methodology

Previous studies have employed surveys, questionnaires, and case studies to investigate hotel room rates (Rohlfs and Kimes 2007; Zong et al. 2008). In the current study, a quantitative approach was employed to examine the room rate fluctuations of six hotels to illustrate and compare their pricing strategies. The present study selected "Google" as search engine to collect information from the official websites of the six competing hotels. The reason for selecting "Google" as

Table 1 General information of six targeted hotels

Hotel name	Hotel type	Star-rating	# of rooms
Hotel ICON	Independent hotel	4-star	262
Kowloon Shangri-la	International chain hotel	4-star	688
Regal Kowloon	Domestic chain hotel	4-star	600
Hotel Nikko	International chain hotel	4.5-star	463
Royal Garden	Domestic chain hotel	4.5-star	420
Inter-continental	International chain hotel	5-star	570

Source The official websites of the six hotels

the search engine is that it occupied a majority (nearly 70 %) of the net market share in the fourth quarter of 2013 (NetMarketShare 2014). Hotel room rates were collected from the hotels' official websites only. Six hotels in Tsim Sha Tsui East, Kowloon, Hong Kong—a mixture of business, shopping and leisure destination were selected as the target hotels in this study. Table 1 provides the general information about these six hotels.

The assumed check-in date was January 16, 2014 and the check-out date was January 17, 2014. Basic room types with the lowest room rates in all hotels were selected. Data collection period was from November 1, 2013 to January 16, 2014. Specifically, data collection was conducted every night after 23:00 and before 24:00 because this time is the period when hotels are most likely to change the room rate of the day. Only the lowest room rates were investigated although other conditions such as early bird/advance purchase room rates exist simultaneously.

4 Results and Discussion

4.1 Room Rate Fluctuations Among the Six Hotels

This section will provide the detailed information of room rate fluctuations of these six competing hotels. The room rates of each hotel are indicated clockwise on the corresponding circle starting from November 1, 2013 to January 16, 2014. Figure 1 illustrates the room rate fluctuations among the six hotels.

The room rates of Hotel A fluctuated from HKD 2,000 to 2,500. We observed that 75–42 days before the check-in date, the room rate was steady and expensive. Forty-one days to ten days before the check-in date, Hotel A offered the lowest room rate. In the last 9 days before the check-in date, the room rate was the most expensive. Therefore, the period from 41 days to 10 days before the check-in date was the most appealing period for customers to obtain an attractive room rate for Hotel A. The room rates of Hotel B ranged from HKD 2,000 to 3,000. Hotel B offered the lowest room rate 75–29 days before the check-in date, after which the rate continued to increase slightly and remained steady. Therefore, 75–29 days before the check-in date was the most suitable period for customers to obtain the

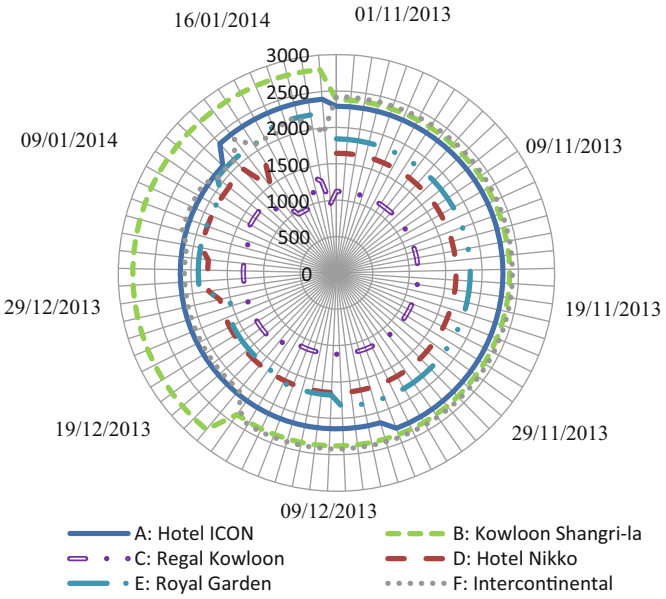

Fig. 1 Room rate fluctuations of six hotels

lowest room rate for Hotel B. The room rates of Hotel C fluctuated from HKD 1,000 to 1,500. We observed that 75–31 days before the check-in date, the room rate was low and steady. After the said period, the room rate mostly increased and decreased. The room rates of Hotel C fluctuated the most among the six hotels. Hotel C provided its lowest rate during the Christmas season (e.g., December 24, 25, and 26, 2013). Generally, the most appealing period for customers to obtain the lowest rate was 75–31 days before the check-in date, although during the Christmas holiday, Hotel C provided the lowest room rate. However, holiday pricing can hardly be regarded as a regular pricing strategy. The room rates of Hotel D ranged from HKD 1,500 to 2,000, and 75 days to 22 days before the check-in date was the period when it offered the lowest room rate. However, the room rates of Hotel D increased from 21- to 6-day advance purchases, and although it offered the lowest 1-day room rate during this time, the customers found it difficult to estimate the rates. Moreover, the fact that no room was available for reservation during the last 5 days before the check-in date was a little strange. Hence, 75–22 days before the check-in date was regarded as the best room rate period for Hotel D. The room rates of Hotel E fluctuated from HKD 1,500 to 2,500. Findings indicated that 75–39 days before the check-in date, the room rate of Hotel E was relatively expensive. The lowest room rate was observed 38–21 days before the check-in date. From 20 days before to the check-in date, the room rate increased sharply. Moreover, no hotel room was available for booking on the check-in date. For Hotel F, the room rates ranged from HKD 2,000 to 2,500. Results showed that Hotel F charged the highest room rate 75–32 days before the check-in date. However, Hotel F's room rates

started to decrease steadily 30 days before the check-in date to the actual check-in date, although it increased sharply on 1 day and decreased sharply on another. Hence, customers can acquire the best room rate 30 days before the check-in date to the actual check-in date.

Generally, three hotels charged their lowest room rates 75 days to around 30 days before the check-in date, whereas three hotels offered their lowest room rates starting from 30 days before the check-in date. Although regular full-rate customers can book a room at any time, an increasing number of price-sensitive customers prefer to obtain a lower room rate (Hanks et al. 2002). In this study, after tracking the room rate fluctuations of the six selected hotels, 30-day to 20-day advance purchase is suggested for customers to book hotel rooms to generate the lowest room rate. Moreover, we suggest searching for all these six hotels during the holiday period to identify the hotels that offer the lowest holiday room rate because results show that Hotels C and E provided the lowest rates during Christmas holiday.

4.2 Pricing Strategies of the Six Hotels

By analyzing the room rate fluctuations of the six hotels, the pricing strategies of these six hotels were identified, as shown in Table 2.

Results showed that Hotel A applied diverse pricing strategies, such as time-based, cost- and demand-based, and best practice-based pricing strategies. Hotel A took more than 1 month to estimate the customer demand, and then it lowered the room rate based on the predicted customer demand to attract more customers. However, on the last 9 days, Hotel A increased its hotel room rate again to reflect

Table 2 Different hotel room pricing strategies for the six hotels

Hotel name	Pricing strategy
Hotel A	Time-based *(*e.g., *days before arrival)*, cost and demand-based *(*e.g., *more than 1 month to forecast customer demand)*, best practice *(*e.g., *early-bird discounts, last-minute offer)*
Hotel B	Time-based *(*e.g., *days before arrival)*, demand-based *(*e.g., *1.5 months to forecast customer demand)*
Hotel C	Time-based *(*e.g., *days before arrival)*, demand-based *(*e.g., *1.5 months to forecast customer demand)*
Hotel D	Time-based (e.g., days before arrival), demand-based *(*e.g., *2 months to forecast customer demand)*, customer perceived fairness *(*e.g., *increase and decrease the room rate constantly)*
Hotel E	Time-based *(*e.g., *days before arrival)*, demand-based *(*e.g., *40 days to forecast customer demand)*
Hotel F	Time-based *(*e.g., *days before arrival)*, cost-based *(*e.g., *adjust room rate constantly)*, demand-based *(*e.g., *1.5 month to forecast customer demand)*

the change in demand and to cover the variable cost. Meanwhile, to achieve best practice, Hotel A also offered early-bird discounts and last-minute offers to customers. As indicated by Pan (2007), employing a complex pricing strategy is a good way for hotels to maximize revenue. The pricing strategies of Hotel B were quite different from those of Hotel A. What Hotel B adopted were only time-based and demand-based pricing strategies. After forecasting the customer demand 1.5 months before the check-in date, Hotel B clearly knew the customer demand. Hence, after hotel B estimated the increasing customer demand, it started to increase the room rate more than half a month before the check-in date. Similarly, 1.5 months were the time period Hotel C used to forecast the customer demand. The overall tendency was that less than 1 month before the check-in date, Hotel C started to increase the room rate. Moreover, during this 1 month, Hotel C exhibited significant fluctuations in its room rates. For example, 9 days before the check-in date, Hotel C lowered the price. However, the room rate 2 days before the last day appeared to be the highest, whereas that of the penultimate day tended to be the lowest. As such, the pricing strategies of Hotel C may be a good indication of the customer demand change. Furthermore, the room rate fluctuations on the last 9 days illustrated the competition among price, demand, and cost. A last-minute offer was made available by Hotel C. Hotel D is quite different from other hotels; it had a steady room rate for 2 months, which was known as the demand-forecasting period. Starting from 20 days before the check-in date, Hotel D increased and decreased the room rate, which reflected the customer demand change and indicated the customer perceived fairness (Choi and Mattila 2004). Compared with Hotel D, Hotel E only spent 40 days to estimate the customer demand, after which the room rate fluctuated frequently. Therefore it is assumed that Hotel E had a constant room rate adjustment after daily inventory checking and customer demand forecasting. Unlike the other hotels, Hotel F had a high and steady room rate for 1.5 months. After forecasting the customer demand, Hotel F adjusted the room rates constantly, making customers feel that it is difficult to look for a suitable time period for the lowest room rate. Hotel F still applied the traditional "last-minute sales mode" to cover the variable cost.

In summary, four out of the six hotels did not employ the traditional "last-minute sales mode", with the exception of Hotels C and F. Hotel A applied the most complex pricing strategies, whereas Hotel B employed the simplest pricing strategies. Hotel C's room rate fluctuated the most during the last 9 days before the check-in date. Nearly 9 months before the check-in date, the room rates of Hotels D and E started to fluctuate frequently. Hotel E, in particular, adjusted its room rate quite frequently by forecasting the customer demand and considering the customers' perceived fairness. On the contrary, Hotels C and F offered the lowest room rates during the holiday, unlike the other hotels. We suppose that these two hotels would like to obtain brand loyalty from customers for their future purchase to generate long-term benefits.

Table 3 Comparison between advance-purchase and last-minute offers of the six hotels

Hotel name	Advance-purchase	Last-minute offers
Hotel A	Yes (41–10 days)	No
Hotel B	Yes (75–29 days)	No
Hotel C	Yes (75–31 days)	Yes
Hotel D	Yes (75–22 days)	No
Hotel E	Yes (38–21 days)	No
Hotel F	No	Yes

4.3 Advance-Purchase Versus Last-Minute Offer

Table 3 presents the detailed information on the attractiveness of advance-purchase and last-minute offers for each hotel. Customers are recommended to book hotel rooms in advance for five out of six hotels, which did not provide last-minute offers. Table 3 also illustrates the detailed period for customers to obtain the lowest room rate. Hotel C differs from other hotels because it provided both advance-purchase and last-minute offers for customers to generate the best room rate.

From the above information, we find that the "last-minute sales mode" is not as common nowadays as it was previously. Considering the perishable nature of hotel rooms, most of the hotels used to employ the "last-minute sales mode", selling their hotel rooms at a lower rate to make up for the variable cost (Choi and Mattila 2004). In sum, early reservations are recommended for customers. Moreover, 30–20 days before the check-in date is the most appropriate period for customers to obtain the lowest rates from all targeted hotels.

5 Implications

In the theoretical context, this study investigated the room rate fluctuations of six hotels. Furthermore, the current study contributed to the literature on pricing strategy by examining the diverse pricing strategies among the six selected hotels. Furthermore, most of the hotels adopted time-based and demand-based pricing strategies, and the frequency of fluctuation of different hotels had a big difference based on the frequency of their hotel room inventory checking.

Practically, it may help hotel managers for better revenue management. By comparing the hotel room pricing strategies of six hotels, the study found that most hotels adopted simple pricing strategies such as time-based and demand-based pricing strategies. However, Hotel A was the only hotel that adopted a best practice pricing strategy, in addition to basic pricing strategies. Therefore, employing diverse pricing strategies may assist hotel managers in selling more hotel rooms and generating a large amount of unrealized revenue, as indicated by Hanks et al. (1992). Furthermore, Hotels C and F offered attractive holiday room rates, which were the lowest room rates during the investigation period. This kind of

strategy can help hotels gain competitive advantages in terms of branding and recall the customers' desire for their future purchase. Li (2010) found that during holidays, hotels charge room rates that are 50 % higher than those in usual time periods. Although hotels may sacrifice short-term benefits when providing the lowest holiday room rate, brand loyalty and long-term benefits may be generated because brand-loyal customers are less likely to select other hotels with a discount of a few dollars when perceiving some unique value offered by the hotels and are willing to pay more for a trusted brand (Tepeci 1999). However, it may not be applicable to the business destinations when holidays (e.g., Christmas) are a very low season.

The current study also provides some insights for customers. In early reservations such as 2.5 months (75-day) to more than 1 month advance purchases, hotel room rates do not fluctuate much, and customers have many choices in obtaining the lowest room rate. Moreover, 30–20 days in advance of the check-in date is the most appropriate period for customers to obtain the lowest room rate. Hotel room rates fluctuate most when the date is closer to the check-in date, such as in less than 10-day advance purchases. Although hotels may provide the lowest room rate or a last-minute offer for 1 or 2 days, limited choices are given to the customers during this period. On the contrary, although holiday room rates are often extremely high, customers can still find one or two hotels willing to provide the lowest hotel room rates to gain brand loyalty competitiveness.

6 Conclusions

The present study investigated the hotel room rate fluctuations of six hotels and their pricing strategies and compared the attractiveness of advance-purchase and last-minute offers. Findings indicate that hotels provide the lowest room rates between 30-day to 20-day advance purchases. Findings further indicate that most of the hotels applied simple pricing strategies, and only one hotel employed diverse pricing strategies. Moreover, the "last-minute sales mode" is barely noted for the six hotels, and advance purchase is more appealing for customers. The study's findings offer relevant insights for managers to apply diverse pricing strategies and provide information for customers on the best room rate reservation period.

Despite the above insights, this study has several limitations. First, the number of hotels and the room types investigated were limited. Moreover, the study period was 75 days, and included only one Christmas holiday. Additionally, this paper focused on the competing hotels that are not belonging to the same category (i.e., international chain hotel). Future studies may choose the hotels belonging to the same category, increasing the number of hotels and involve more room types. Moreover, future studies may extend the time-tracking period to half a year or longer to examine the impact of seasonality and holidays and to obtain comprehensive understanding of the diverse pricing strategies applied by hotels.

Acknowledgements The work described in this paper was supported by a grant funded by the Research Grants Council of the Hong Kong Special Administrative Region, China (GRF Project Number: 15503814, B-Q45Y). This study was also supported by research grants funded by the Hong Kong Polytechnic University (G-UB22 and G-YK91).

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Dynamic Pricing Patterns on an Internet Distribution Channel: The Case Study of Bilbao's Hotels in 2013

Noelia Oses Fernandez, Jon Kepa Gerrikagoitia, and Aurkene Alzua-Sorzabal

Abstract The price is the single, most efficient tool that hoteliers have to adjust the demand and the offer in the short term. Dynamic pricing is the practice of changing the price charged for a product based on time. Using hotel room price data collected from an Internet distribution channel, this paper presents the research carried out to investigate the dynamic pricing practices of the hotels in Bilbao. The analysis shows that these hotels favour two price-changing patterns. The first pattern refers to the practice of changing a number of prices for contiguous, future target dates on the same date. The second pattern refers to the practice of changing the price a set number of days in advance of the target date (i.e. at a specific lag-day).

Keywords Dynamic pricing • Hotel room prices • Internet distribution channel

1 Introduction

The price is the single, most efficient tool that hoteliers have to adjust the demand and the offer in the short term. Dynamic pricing is the practice of changing the price charged for a product based on time. For hotel rooms, these price changes are a function of different market conditions such as the demand, the hotel occupancy level, competitors' prices, and so on. Thus, our objective is to study the price dynamics for the hotels in Bilbao in order to understand and determine what are the current dynamic pricing practices.

Bilbao is one of the capitals of the three provinces of the Basque Country (Spain) and its largest city. Bilbao is an example of a post-industrial city that has undergone a significant renaissance of its economy by moving into the service sector. Tourism, as one of the economic sectors present in the city, used to reflect the industrial nature of the city. The accommodation infrastructure catered for visitors attending meetings and key events, such as the International Machine-Tool Exhibition, and

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_53

did not expand much until the official announcement of the construction of the Guggenheim Museum of Bilbao. That was the turning point for the type of visitors overnighting in the city, from exclusively business visitors to a combination of business and leisure. Since then, the number of rooms has been increasing steadily for the last few years, producing a very competitive sub-sector.

The Internet, and the World Wide Web in particular, have made available a whole host of data that is ready to be collected and analysed. The Internet distribution channels (IDC) that allow comparing hotel room prices and booking them are one such example. Thus, for this study, hotel room price data has been collected from the IDC *booking.com* to investigate the dynamic pricing practices of the hotels in Bilbao during 2013.

2 Theory

Revenue Management (RM) or Yield Management was first developed for the airline industry and is now a common commercial practice in many industries (Ivanov and Zhechev 2012). RM is an essential instrument for the control of demand and supply, where clients are segmented depending on their willingness-to-pay (El Haddad et al. 2008). Kimes and Wirtz (2003) define RM as the application of information systems and pricing strategies to allocate the right capacity to the right client at the right time to maximise revenue. Industries with the following characteristics are more appropriate for RM: perishable inventory, limited capacity, demand volatility, micro-segmentation of the market, advance booking availability, and high fixed costs in comparison to variable costs (Ivanov and Zhechev 2012).

In the accommodation industry, hotel rooms, similarly to airplane seats, can be considered to be perishable goods (Abrate et al. 2012) where new products are produced every morning and consumed every night. Hotels have high fixed costs, as most services must be available even when the rooms are empty. Rooms can be reserved in advance, the hotel capacity is limited, and demand is volatile. These are some of the reasons why the accommodation industry is adopting revenue management techniques (Kimes and Wirtz 2003).

Hoteliers are using different strategies to improve their revenue. They can offer different prices for similar rooms depending on how many days in advance the booking is made. A comparative analysis revealed significant differences in average prices due to the segmentation of the market as a function of the commercialisation channel (Tso and Law 2005). Dynamic pricing is a pricing policy based on time, where prices change depending on the day on which the reservation is processed. Abrate et al. (2012) used three random target dates and a selection of European destinations for their study and reached the conclusion that more than 90 % of the prices change with time depending, mostly, on the type of client (business or leisure) and the star rating. The price of the accommodation depends on the date of the overnight stay (i.e. target date), but due to the advance booking, it also depends on the date on which the booking is processed. If a hotel room is

deemed a perishable good, different overnight stay dates are different products. Therefore, prices are considered dynamic when the same product is charged at different prices depending on the day of the booking.

Customers make the decision to purchase flight tickets and hotel rooms based on various factors such as the quality of the information (Wong and Law 2005), the time/date, past experiences (Kim and Kim 2004), and the frequency (Magnini and Karande 2011). But the factor that influences the hotel choice most is the price (Lockyer 2005; Tanford et al. 2012; Tso and Law 2005). Price is one of the most effective variables that managers can manipulate to encourage or discourage demand in the short term (Bitran and Caldentey 2003; Lockyer 2005). Consequently, occupancy rate and revenue can be maximised with the use of appropriate dynamic pricing policies.

From the point of view of the consumers, dynamic pricing requires the opposite strategy. While hoteliers try to maximise their revenue, consumers try to minimise their costs. Etzioni et al. (2003) showed that customers can save money with good strategies. Furthermore, they developed a price mining method that achieved a 61.8 % saving by purchasing the services at the right time. According to Möller and Watanabe (2010), customers take more advantage of last minute sales than advance booking.

It is important for hoteliers to know the level of demand and the prices offered by competitors to define dynamic pricing policies. These factors, together with the knowledge of their own availability, are the key elements to create a good pricing strategy. Prices change constantly, so this information must be precise, trustworthy, and in real time. There exist different approaches to support pricing policies. On the one hand, official statistics institutes regularly calculate hotel pricing indices. These indices are aggregated by time and geography. They are useful for understanding the behaviour of the market, but not for supporting decision making in real time.

To fill this gap, Marketing Decision Support Systems (MDSS) were developed with the help of information technologies. These systems provide the necessary information to react to competitors' price changes and market changes quickly. In 1998, Wöber (1998) presented TourMIS, an on-line MDSS tool for tourism and accommodation management, which has been used by more than 1,000 users in 3 years (Wöber 2003). In 2009, Walchhofer et al. (2009) introduced SEMAMO, a market surveillance system. It works by combining semi-supervised techniques with semantic models (Walchhofer et al. 2009). In the tourism domain, this system has the ability to extract competitors' hotel room prices.

Currently, the Spanish company BeOnPrice has released a system called 'Analyzer', which allows a company to monitor competitors' price changes in real time. Similarly, eRevMax's RateTiger system allows monitoring and periodically reporting on own and competitors' prices in multiple channels. Additionally to the historic and real-time information, making predictions is an essential tool. In the tourism domain, Song and Li (2008) have reported on the work done in this area.

Particularly, Haensel and Koole (2011) developed an algorithm to make predictions that were updated dynamically with promising results. Some companies offer a performance prediction of commercial products. For example, Hotel Horizon reports on the quarterly demand predictions for hotels in different segments (PKF Hospitality Research 2010).

3 Procedure

Data has been collected and analysed to investigate the dynamic pricing practices of hotels on Internet distribution channels. The analytical methodology followed is based on descriptive statistics.

3.1 Data Collection Methodology

booking.com was chosen as the IDC from which to collect the data, as this is probably the largest and most popular hotel room booking website. To achieve this task, a data scrapping bot customised for *booking.com* (Roman 2012) was used. The bot collects prices offered for a single overnight stay in a 'Double or Twin room' for two adults for all Bilbao hotels available through the IDC at the time of the request. The information collected and stored regarding hotels is name, star rating, and identification number. Regarding the product type, the chosen room type for which prices are collected is 'Double or Twin Room', as this is the standard product for hotels and it is often used to study the accommodation market (Abrate et al. 2012). Hotel room prices change in real-time so information must be gathered periodically. The large number of data available has meant that sampling has been necessary. The sampling method followed to collect the prices is based on that of Abrate et al. (2012). They collected fares for hotel room reservations 1, 2, 4, 7, 15, 22, 30, 45, 60, and 90 days in advance of the date of the overnight stay (i.e. the target date). Extending this approach, the bot used collected prices 0, 1,. . ., 27, 45, 60, and 90 days in advance of the target date. The main reason to do so is to satisfy the need to study the evolution of fares during the 3 months before the target date, focusing on the last 4 weeks. Lastly, all booking.com prices include taxes.

Studying hotel room prices offered on-line is a valid practice that reflects the overall behaviour of these prices. It has been proven that on-line room prices are highly correlated with figures published by the Spanish National Statistics Institute (Roman et al. 2013).

3.2 Data

The variables collected are: hotel name, collection date (i.e. the date when the price is collected form the website), target date (i.e. the date of the overnight stay), price, and hotel's star rating. The price is a real number (in Euro) if the scrapping bot could find the hotel on the collection date, for the given target date, and there was a price for the double standard or twin room. However, the price can be missing if the bot could not find a price for this type of room for a hotel returned by the IDC.

There are 316,391 observations for 2013, 9,151 of which have the price missing. There were 31 Bilbao hotels operating on booking.com during 2013, distributed across the categories as follows: Three 1-star hotels, seven 2-star hotels, six 3-star hotels, twelve 4-star hotels, and four 5-star hotels. Target dates go from 01/01/2013 to 31/12/2013. There are 455 collection dates in the data: the 365 corresponding to 2013 and all the dates from 2012/10/03 to 2012/12/31. 2012/10/03 is the first collection date and corresponds to the prices 90 days in advance of target date 2013/01/01. The name 'lag-day' is used here to refer to the difference in days between the collection date and the target date. The proposed collection methodology states that the bot should store room prices 0, 1, . . ., 27, 45, 60, and 90 days in advance of the target date. However, the time difference with the *booking.com* server and other unexpected incidents mean that, sometimes, prices might not be collected on the predetermined dates or that they are collected on other dates, too. In this data there are 35 different lag-days: 0, 1, . . ., 27, 44, 45, 59, 60, 88, 89, and 90. There are about 10,000 data points for each of the main lag-days (−90, −60, −45, −27, −26, . . ., −1,0) in this period.

3.3 Temporal Relationships in the Data

This data contains three temporal relationships. Two of these are immediately apparent. The first temporal relationship corresponds to the target date to which each price corresponds. Prices offered by the same hotel corresponding to the same target date all refer to the same product. However, prices corresponding to the same target date but offered by different hotels are prices for competing products. The second temporal relationship corresponds to the price collection date. At any one instant in time, only prices with the same collection date are simultaneously available, both for the clients to book a room and for the hoteliers to increase or decrease the price. Lastly, the third temporal relationship is the one derived from the relationship between the first two: the difference in days between the two dates. The analysis of the data has been carried out with these temporal relationships as a key factor.

3.4 Data Visualisation

When working with data, it is always helpful to have a good visualisation. In this particular case, it is desirable for the visualisation to display the temporal relationships in the data in a clear and straightforward way. It is also customary to have time increase from left to right in plots. Therefore, the data has been arranged in a matrix in which time increases from left to right on the columns, each column corresponding to one (collection) date. The visualisation will be the image of this matrix. All prices on the same column correspond to the same collection date. All prices on the same row correspond to the same hotel and the same target date, each having been collected on the collection date corresponding to the column on which they are. The rows will be arranged by target date in a non-decreasing order. Thus, the rows corresponding to the same target date but different hotels will be all positioned contiguously forming a block. Blocks corresponding to succeeding target dates will also be positioned contiguously. This arrangement results in prices for which the difference in days between the two dates is the same (collection date—target date) being displayed in a stepwise diagonal. Therefore, the three temporal relationships correspond to rows, columns, and step-wise diagonals in the visualisation. Prices will be visualised as an image of the price matrix arranged as explained above. Price changes will be visualised by indicating whether a price has changed (increased or decreased) with respect to the previous available price in the same price series (i.e. the price series, or row, of all prices corresponding to the same target date and the same hotel). Figure 1 provides an illustration of the visualisation of the data for the first week of June, 2013.

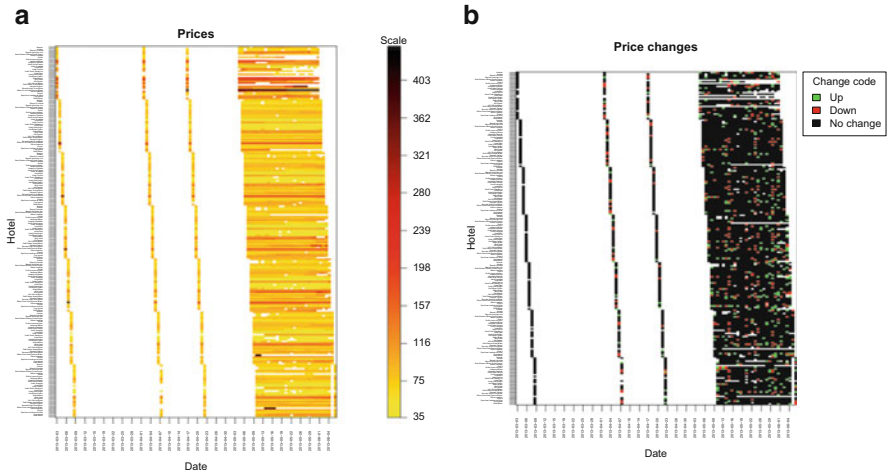

Fig. 1 Visualisation of (**a**) prices and (**b**) price changes for the first week of June, 2013

4 Results

The objective of the analysis is to explore the three temporal relationships in order to explain hotel price dynamics. The first sections (4.1–4.4) explore the characteristics of the price changes with respect to the first temporal relationship, i.e. prices for the same target date and offered by the same hotel. Recall that the prices corresponding to the same target date and the same hotel are all prices for the same product available at different points in time. Prices for the same product form a price series and are displayed in the same row in the visualisation (Fig. 1). Each of the 316,391 observations in the data belongs to one of the 11,315 rows or price series, one per hotel and day of the year (as target date). The section ends with an exploration of the relative location of price changes (Sect. 4.5). Note that, in the analysis, missing prices have not been taken into account.

4.1 Number of Price Changes per Series

75 % of the price series have 5 or less price changes and 19 is the maximum number of price changes in a single series (i.e. 61 % of the observations for a target date and hotel). 39 % of the price series have more increases than decreases, 32 % have an equal number of price increases and decreases, and only 29 % have a greater number of price decreases. The category that makes the highest number of changes within a price series is category 3-star (mean number of changes 4.3), followed by categories 4-star (mean 3.8), 5-star (mean 2.8), 2-star (mean 2.1), and 1-star (mean 0.9). Price series of hotels in categories 2-star tend to have more price decreases than increases (46 %). Conversely, price series of hotels in categories 4- and 5-star usually have more price increases than decreases (about 51 % in both cases). For 1-star hotels, 68 % of price series have an equal number of price increases and decreases. Price series for 3-star hotels are the most balanced with 40 % of the series having a greater number of price increases and 33 % of them having a greater number of price decreases.

4.2 Magnitude of Individual Changes

In the data set, there are a total of 35,797 price changes. Figure 2 shows the distributions of the magnitudes of individual changes (specifically, the natural logarithm of the absolute value of the magnitude of individual changes). Figure 2a shows the box-plots for individual price changes grouped by the sign of the change and shows that the magnitude of the price increases is slightly greater than that of price decreases. The minimum value for both increases and decreases is 0.01 euro. All other quartiles and the maximum are slightly higher for price increases. The mean price increase is 13.27 and the mean price decrease is 12.09, both in

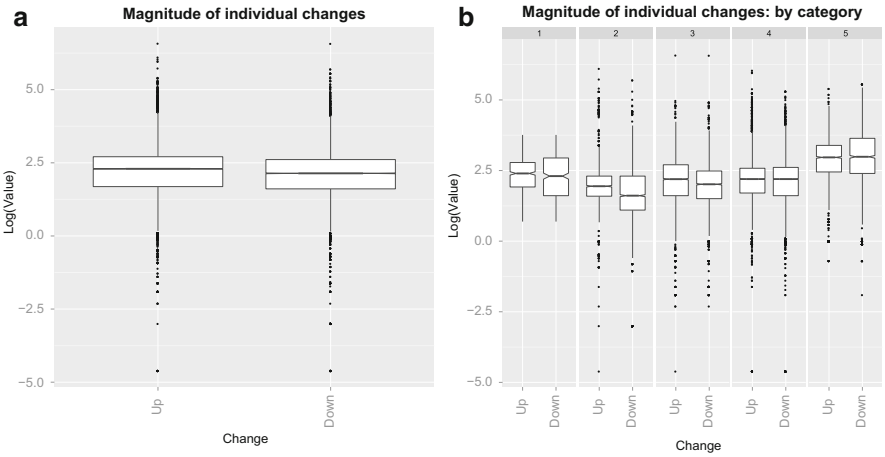

Fig. 2 Magnitude of individual changes for price increases and decreases (**a**) Overall (**b**) By category

Euro. As expected, grouping the data by category greater differences can be appreciated. Figure 2b shows the price change magnitude box-plots by category and sign of change. It is remarkable that change magnitudes for 1-star hotels are greater than those for 2-, 3-, and 4-star hotels. 5-star price change magnitudes are larger than those for all other categories, though the overall magnitude maxima are found among the 3-star changes. The untransformed price change magnitudes differ in less than 3 euro for price increase and decrease quartiles except for the third quartile for 5-star changes, for which the difference is almost 10 euro. By the weekday of the target date, the magnitude of price increases is slightly larger than that of price decreases and price changes are of slightly larger magnitude for weekends (i.e. Friday and Saturday).

4.3 Aggregate Change in Price Series

This section studies the aggregate change, i.e. the sum total of price changes per series. If this sum total is positive ('Up'), then the final price is higher than the starting price in the series. On the contrary, if the sum total is negative ('Down'), the final price is lower than the starting price. To facilitate the visual comparison between the positive and the negative, a log-transformation has been applied to the absolute value of the sum total. Figure 3 shows the distribution of the positive and negative aggregate changes. Figure 3a shows that, as the magnitude of the aggregate change increases in absolute value, it is more likely to be a positive aggregate change than a negative one. It also shows that in 2013 most of the aggregate changes were positive, particularly as the magnitude of the aggregate change increases in absolute value. Figure 3b shows the distribution of aggregate change by category. Categories 3-, 4-, and 5-star also follow the pattern of more positive aggregate changes as the

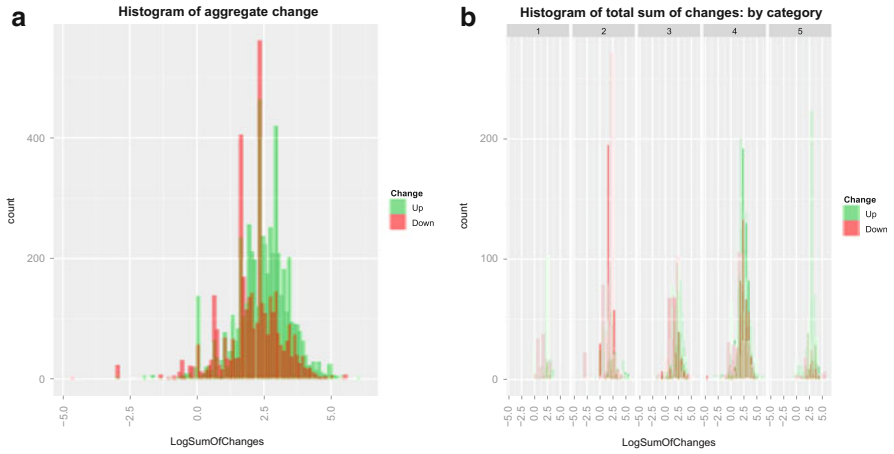

Fig. 3 Histograms of aggregate changes (**a**) Overall (**b**) By category

magnitude of the aggregate change increases in absolute value. However, this is not true for categories 1- and 2-star. Category 2-star, in particular, has a much greater amount of negative aggregate changes. The smallest aggregate change happen on Sundays and the largest on Wednesdays, followed by Saturdays.

4.4 Duration of Price Changes Within a Series

This section studies the duration of price changes within a series, that is, for each price change the number of days that elapse before the next price change occurs within the same price series. Duration of price changes could help understand the dynamics of price changes. For example, if, say, all changes lasted 7 days for a given hotel, this might indicate that this hotel only accesses its channel manager once a week and, therefore, these changes would be independent of other factors (such as competition's price changes). Generally, price decreases last longer than price increases. By category, 1-star price changes last significantly longer that price changes in other categories. This is to be expected as category 1-star has very few price changes and, therefore, they must last longer. For 2- and 5-star, price decreases last noticeably longer than price increases, especially for 2-star. 4-star price change durations are rather even for price increases and decreases. By month, price changes in December last longer than in other months and price increases last longer than decreases in August, September, and October. By day of the week, price increases last longer than decreases on Friday and Saturday and the opposite is true for the other weekdays.

4.5 *Relative Location of Price Changes*

The temporal relationships present in this data are one of its key features. The count of the number of price changes with regard to the three temporal relationships (Fig. 4{a,b,c} by target date, collection date, and lag-day, respectively) shows that the vertical and diagonal counts have peaks for price increases and decreases at certain collection dates and lag-days, whereas the horizontal counts are rather more uniform for all target dates. This means that price changes are not uniformly distributed across dates, they occur more at some collection dates and lag-days. This suggests that prices are not changed randomly, but that there are underlying causes or patterns.

In this paper, the term 'horizontally contiguous' refers to those prices corresponding to the same target date and hotel that were collected on consecutive collection dates. 'Vertically contiguous' refers to those prices corresponding to the same hotel and consecutive target dates that were collected on the same collection date. Finally, the term 'diagonally contiguous' refers to those prices corresponding to the same hotel and consecutive target dates that have the same lag-day. Price changes are said to be 'contiguous' when they are prices that are contiguous in any of the three possible directions defined here and they all represent a price change in the same direction (either a price increase or a decrease).

Figure 5 shows the histograms of the run lengths of contiguous price changes. Horizontally (Fig. 5a), 87.4 % of the changes take place in isolation, 11.1 % of the changes take place in a pair, 1.3 % of changes appear in a threesome, and 0.2 % of changes appear in foursomes. There are no price series with more than 4 horizontally contiguous changes. Vertically (Fig. 5b), only 46.28 % of the changes happen in isolation. 33.76 % of changes take place as part of a vertical run of 3 or more contiguous changes. The maximum length of a vertical run is 30 and 28.91 % of the vertically contiguous price changes are price decreases and 24.81 % price increases. Vertically contiguous runs are present in the price changes of all hotels, but mean run lengths are greater for 1- and 2-star categories. Diagonally (Fig. 5c), the most remarkable fact is that the maximum run length for contiguous price change runs is

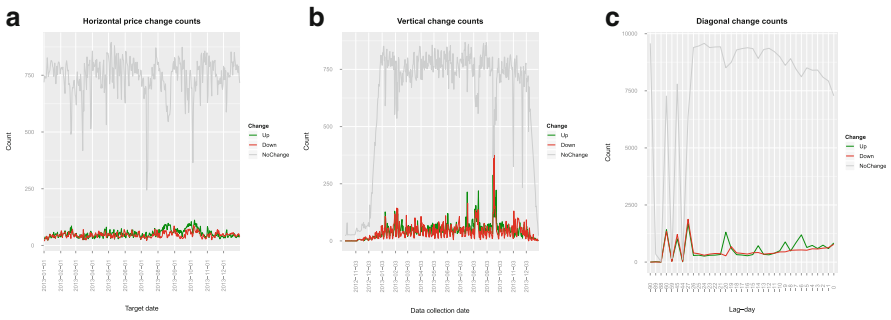

Fig. 4 Price change counts (**a**) By target date (**b**) By collection date (**c**) By lag-day

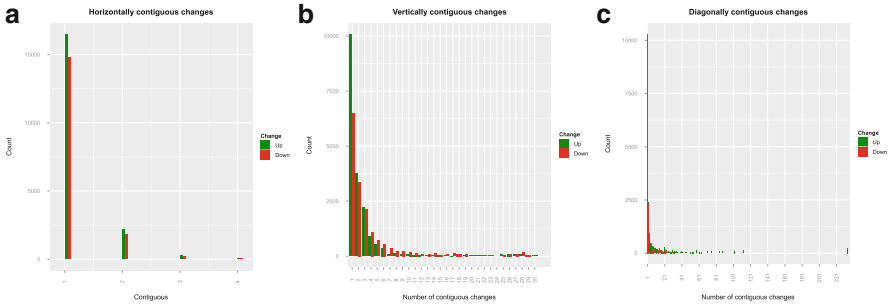

Fig. 5 Histograms of the lengths of contiguous price change runs (**a**) By target date (**b**) By collection date (**c**) By lag-day

234, i.e. one of the hotels increased its price on the same lag-day 234 out of 365 target dates (64 %) in 2013 (green diagonal line in Fig. 6b). The median for the run lengths is 1 and the third quartile is 4. Only hotels of category 3-star and above have diagonally contiguous price change runs of a length greater than 30 and all of these are price increases. 18.3 % of the diagonally contiguous price changes are price decreases and 26.51 % price increases. The lag-day with the greatest number of changes is −20, followed by −6, i.e. 3 and 1 weeks before the target date. Overall, 82.57 % of price changes appear contiguous to one or more other price changes either by target date, collection date, or lag-day. Furthermore, 80.89 % of all price changes appear contiguously to other price changes by collection date or lag-day. There are relatively few price changes in the data (35,797 out of 307,240, i.e. 11.7 %) and, thus, the fact that they appear contiguous to other price changes is significant. Therefore, it can be said that the data displays vertical and diagonal price change patterns.

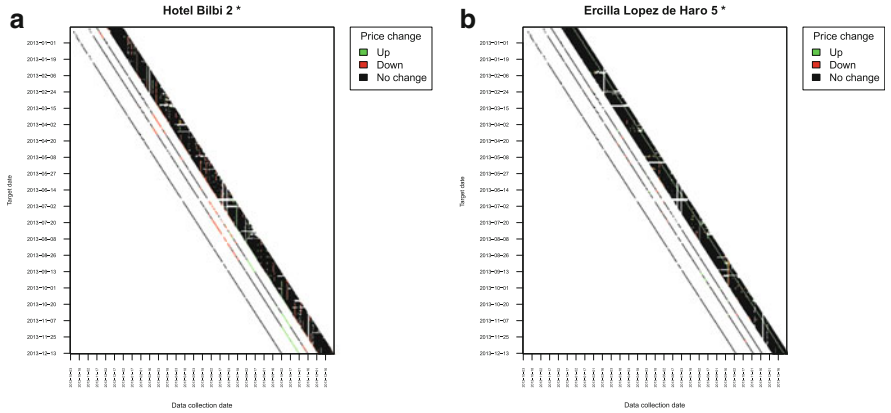

Fig. 6 Example vertical and diagonal price change patterns (**a**) Vertical patterns (**b**) Diagonal pattern

Figure 6 shows examples of vertical and diagonal change patterns: the green and red vertical lines in Fig. 6a and the green diagonal line in Fig. 6b. These visualisations are just like Fig. 1b except that each of these only shows the data for a single hotel.

5 Conclusions

The analysis has uncovered the dynamic pricing patterns that Bilbao hotels follow. It has shown that Bilbao's dynamic pricing strategy on *booking.com* is to make contiguous changes vertically and diagonally, that is, to change the prices for different products on the same collection date or on the same lag-day. These have been named vertical and diagonal dynamic pricing patterns. Vertical patterns include more price decreases than increases whereas all diagonal patterns of a significant length are price increases. Only hotels of 3-star or greater category present long diagonal patterns, but vertical patterns can be found in all categories. The working hypothesis is that diagonal patterns correspond to regular hotel dynamic pricing policies and are, mostly, independent of other hotels' actions and that vertical patterns are the direct result of external factors (factors other than hotel policy such as an increase/decrease in the competition's prices, demand, availability...).

Future work will focus on researching the causes of vertical patterns and developing a prediction model, researching the causes of changes that are not part of vertical or diagonal patterns, and analysing the meaning of missing prices and whether they are correlated with room availability.

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Using Technology to Align the Needs of Corporate Travel Managers with the Functions of Travel Management Companies

Anneli Douglas, Berendien Lubbe, and Jarmo Ritalahti

Abstract This paper investigates how technology affects the functions and role of travel management companies (TMCs). In depth interviews with corporate travel managers of organisations are used to ascertain what the role of the corporate travel manager is, how the TMC supports the travel manager in effectively managing the travel process, and the potential effects of technology on the TMC in the corporate travel process. Findings show that technology is increasingly being used in the travel management process, but that the TMC could still add value in the management of corporate travel if they continue to reinvent themselves, and use technology to their advantage.

Keywords Corporate travel • Corporate travel manager • Technology • Travel management company

1 Introduction

The increasing use and popularity of Information and Communication Technologies (ICTs) have led to significant changes in the way travel management companies (TMC) facilitate travel arrangements and gather vital travel related information. A travel management company (TMCs) is a specialised form of travel agent, and is responsible for managing the complete corporate travel portfolio of an organisation, from management information systems on travel patterns and expenditure; the monitoring of travel policy adherence; negotiating with suppliers to cost containment and budgeting. Not only did ICTs change the way in which TMCs do business, but it has also enabled corporate travel managers in large organisations

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_54

(also referred to as the corporate client) to take over some of the functions for which travel management companies (TMCs) are currently responsible. In this study the role of the TMC is explored within the context of the needs of the corporate client, represented by the corporate travel manager, and the changes in the technological environment. The relevance of the role of TMCs has been linked to the effective use of ICTs as well as to the delivery of value-added services to the corporate client, particularly those that ICTs cannot fulfil (Cochrane 2011). The continued role of TMCs in serving corporate clients is thus dependent on their ability to provide services that the clients themselves cannot undertake. A number of studies have articulated the services that organisations require in corporate travel management (Gustafson 2012; Doulas and Lubbe 2006). However, the constantly changing travel management environment and the on-going industry (Amadeus 2012) and academic (Gustafson 2012) debates about the future role of TMCs raises a number of questions relating to how corporate travel managers effectively manage the organisation's travel and what they require from their TMCs. This paper aims to answer the following research questions:

- What are the functions and responsibilities of the corporate travel manager?
- What is the role of the TMC in managing the corporate travel process?
- What are the potential effects of ICTs on the corporate travel management process?

The remainder of this paper is set out as follows: First an overview is given of the corporate travel process by highlighting the roles of the corporate travel manager, and the functions of the travel management company (TMC). Then, the impacts of technology on travel management companies are explored. Next, the methodology is explained after which findings are discussed and conclusions drawn.

2 The Corporate Travel Management Programme

Corporate travel is that part of the business travel market that can be explained as travel undertaken by the employees of a specific organisation which has a considerable travel volume and where travel arrangements are usually controlled into a centralised function. Cohen (in Douglas and Lubbe 2009) concisely defines corporate travel management as the maximisation of travel services by an organisation to its employees and the minimisation of the cost of providing those travel services. An organisation often establishes a corporate travel department responsible for managing the corporate travel function. The corporate travel manager heads the corporate travel department with his/her main responsibility being to control the organisation's travel activities and travel expenditure through centralisation and standardisation (Lubbe 2003). Gustafson (2012) identified six imperative tasks for a professional travel manager:

- *Constructing and executing a travel policy*. Constructing and executing a travel policy is a fundamental role in the travel manager's attempts to manage the organisation's travel.
- *Formulating contracts with suppliers*. A vital responsibility for the travel manager is to consult with travel suppliers to obtain discounted rates and advantageous conditions.
- *Standardising payment routines*. A travel manager must implement routines and monitor all the payments with regard to travel expenses.
- *Utilising travel statistics*. Statistics with regard to travel patterns, travel costs and travel volumes of an organisation are imperative to the travel manager's efforts to manage travel.
- *Communicating within the organisation*. Travel managers need to communicate with their travellers in order to notify them with important travel related information, travel arrangements, suppliers and the travel policy.
- *Collaborating with a TMC*. When using a chosen travel agency (now referred to as the TMC) for all the organisation's travel arrangements, it produces a consistent administrative routine and provides the travel manager access to dependable statistics on the organisation's travel costs and travel activity. The TMC may aid in executing a travel policy by recommending travellers to follow policy regulations and rules. Ensuring that travellers consistently utilise the contracted TMC is vital as the TMC will hold all relevant information about the corporate travellers' travel arrangements if unforeseen circumstances should occur. The role and functions of the TMC is described in more detail in the ensuing section.

3 The Travel Management Company

The increase in corporate travel over the last few decades has led to organisations employing full-time travel managers or apportioning significant time to the management of travel by other functionaries such as the purchasing or financial directors. Organisations have also contracted TMCs to implement efficient travel practices and manage its travel in the most cost effective way possible. The costs involved with corporate travel are substantial and according to Gustafson (2012) controlling these costs and finding ways to reduce them is a key role of the TMC. One of the most important elements of a TMC is their ability to negotiate cheaper rates for their clients and the larger a TMC gets, the more able they are to approach hotel chains and airlines in order to obtain better rates (CT Business Travel 2012). The full-time availability of TMCs to service their clients' needs has become imperative. TMCs have had to develop into organisations that operate on a 24 h and 7 days a week basis (CT Business Travel 2012). According to Ivancevich et al. (2003), additional reasons why organisations utilise TMCs are because of the comfort and security of travellers. Employees who frequently travel can be exposed to risk and stress in different forms and these factors are usually considered in travel

management. As far back as 2002, Alamdari (2002) noted that the role of travel agents has changed from reservations to the provision of advice and consultancy for corporate clients. Today, their role is to be advisors to corporate clients, assisting them in developing and enforcing travel management policies, amongst others. In a study conducted by Amadeus (2010: 30) it was suggested that in future the successful TMC's main role will be to aggregate information, while saving money and time for their customers. The data management function of the TMC provides the corporate client with an understanding of the costs involved in corporate travel. It gives information that could be used to negotiate best deals from suppliers, and to direct travellers to utilise the preferred suppliers.

4 Information Technology in Corporate Travel Management

When examining the theory of intermediation, disintermediation and re-intermediation it soon becomes clear that ICTs could be seen as a threat as well as an opportunity to travel intermediaries. Although a plethora of studies have investigated this in the context of retail travel agents (Busby and Huang 2012; Tse 2003), very little, to no research has been conducted to see whether the same rings true for TMCs. ICTs could be seen as an opportunity for the TMC when it allows the TMC to align its functions with the needs of the corporate client, but at the same time, it could be seen as a threat when it makes the TMC redundant in the process of corporate travel management. As TMCs enlarge their range of products and services to meet traveller expectations, the use of suitable technology becomes increasingly important. It is essential for TMCs to be continuously looking for improvements and updates that will add value to their product offerings (CT Business Travel 2012). To enable TMCs to do this, Cheyne et al. (2005) states that agents should take hold of the significant opportunities that information technology offers, by increasing their use of self-booking tools (SBTs) and establishing their own websites, hence enhancing their role as advisors. Amadeus (2010) explains further that the internet offers a new set of possibilities for agencies. Having access to improved agent interfaces, information and content on travel options and the ability to contact customers in new and diverse ways enable agents to deliver better quality customer service which was not possible in the past (Amadeus 2010, p. 30). Gustafson (2013) mentions that large organizations are increasingly making use of SBTs, offered by their TMCs. These tools permit travellers to facilitate their own reservations of straightforward trips online, as well as file their own expenses online, but under the watchful eye of the corporate travel manager. In the last few years there has been a substantial increase in the uptake of mobile phone technology with sales far beyond optimistic predictions. Smartphones have shown value for the mobile worker by creating convenience for a corporate traveller, for example, providing the corporate traveller an opportunity to

make or change flight arrangements in case a meeting is postponed or the meeting is running longer than expected (BCD Travel 2010). All these services a smartphone can offer will make a corporate traveller's busy lifestyle easier as it allows for convenience and immediate results. However, a corporate traveller is obligated to adhere to certain guidelines which an organisation sets out for them. These guidelines indicate the method of bookings they need to adhere to, which suppliers they can use and a centralised payment system. The TMC is responsible for enforcing these guidelines, and by managing the implementation and use of mobile phones during the corporate travel process, the TMC can prove its value and remain relevant in the process.

From the above discussion it becomes clear that the corporate travel manager has certain responsibilities to fulfil in the management of the organisation's corporate travel programme. Furthermore, the TMC needs to provide specific value-added services to the corporate client to remain relevant and to sustain their position in the corporate travel market. ICTs could either be seen as a threat or an opportunity in the relationship between the TMC and its corporate client. A number of questions could be raised relating to how corporate travel managers effectively manage the organisation's travel and what they require from their TMCs, namely: what the functions and responsibilities of the corporate travel manager are; what the role of the TMC in managing the corporate travel process is and what the potential effects of ICTs on the corporate travel management process are. The following section includes the research design and methods on how these research questions were answered.

5 Methodology

To achieve the aim of this study which is to determine what the role of the corporate travel manager is, how the TMC supports the travel manager in effectively managing the travel process, and the potential effects of technology on the TMC in the corporate travel process, corporate travel managers were interviewed to investigate their views on these questions. Corporate travel managers have been selected as target population since they are the ones making decisions on whether to use traditional TMCs, interact directly with suppliers or utilise the online environment when arranging travel for their employees. A purposive sampling technique was used, as it allowed the selection of respondents that are typical of the population, based on the judgement of the researchers, who hand-picked the respondents deemed appropriate in terms of their knowledge of the corporate travel industry, their familiarity with the operations of a TMC, the position they held within their companies, and most importantly the years of experience they have within the industry. Respondents represented a variety of industries, both nationally and internationally. The sizes of the companies for which respondents worked were also varied. A total of 14 corporate travel managers were interviewed. Table 1 provides an overview of the profile of respondents. Most of the respondents

Table 1 Profile of respondents

Industry	Nat/ international company	Approx. number of employees	Years' experience	Position in company
Education	National	5,000		Senior buyer
Pharmaceutical	International			
Financial services	International	2,275	9	Procurement manager
Engineering	International	5,001–10,000	2	Regional travel manager
Education	National	4,300	4	Travel category manager
Manufacturing	International	51–200	2½	General manger
Retail		10,001+		Occupational risk manager
Mining	International		10½	Personal assistant
Technology	International	10,001+		Travel manager: sub Saharan Africa
Financial services	International	57,000		
Cosmetics	International	51–200	9	Executive assistant to the managing director
Financial services	International	10,001+	17	Sourcing specialist (travel & accommodation)
Health care	International	30,000	6	Executive assistant to the managing director
Financial services	International	27,525	18	Chief procurement officer

mentioned that they have preferred agreements in place with one or two travel agents. One respondent mentioned that they do not have a preferred TMC and that every department is allowed to use who they wish. Another respondent stated that they have a travel desk as part of the company. The profile of the TMCs used by the respondents varied from international brands such as Carlson Wagonlit and American Express to small independently owned travel agents. Not all the agents used can be regarded as TMCs as some of them specialise in various types of travel, not only corporate travel.

Using interviews to gather data was considered appropriate since detailed perspectives were required from participants to describe the how technology could be used to align the needs of the corporate client with the functions the TMC provides. Whilst conducting the literature review, it became apparent that certain factors have an influence on this relationship and these were incorporated into the interview schedule. The factors which were included are related to the corporate client, corporate travel, technology and TMCs and relevant questions were included to represent each factor. An open coding technique was used where collected data was divided into segments and then scrutinised for commonalities that reflected themes. After the data was put into themes it was then further examined for properties which characterised each category. According to Saunders et al. (2007) the emphasis of this

coding technique is to establish an understanding of the significance of the phenomenon studied from the participants' inputs and the context in which the study takes place. Content analysis was used as data analysis technique. According to Berelson (1952), content analysis is the research method for the objective, systematic and quantitative description of the manifest content of communication. There are two types of content analysis, namely; quantitative and qualitative. In this research study qualitative content analysis is used. Qualitative content analysis is a method that focuses on the messages with the aim of discovering a deeper meaning within these messages, in a systematic way (Du Plooy 1995).

5.1 Analysis of Data

Five steps were followed to ensure that the data analysis complied with the requirements of being objective, systematic and quantitative. To explain how the data were analysed, the first research question will be used as an example, namely, "what are the current responsibilities of the corporate travel manager?"

Step 1: Listing of Respondent Statements The statements were listed in no specific order or rank. When respondents wrote a paragraph, individual statements were identified, separated and listed as in above example. For example:

1. I negotiate with suppliers
2. I ensure all bookings are done according to policy
3. I do all bookings

Step 2: Coding of Concepts Within Respondent Statements Attach a numerical code to each concept (not a value). For example:

1. I negotiate with suppliers (1)
2. I ensure all bookings are done according to policy (2)
3. I do all bookings (3)

Where 1 = Relationships; 2 = Travel Policy; and 3 = Bookings.

Step 3: Coding of Core Concepts into Further Categorisation For example:

1 = Relationships		Number of statements
1a	Between corporate client and supplier	16
1b	Between corporate client and travellers	4

Step 4: Adding Descriptors Within Each Concept Concepts were inspected to identify the descriptors within each concept. For example:

1 = Relationships	
1a[a]	relationship with their suppliers involved *negotiating* (either directly, or with the assistance of the TMC)
1a[b]	Relationship with their suppliers involved *managing contracts* with suppliers.

Step 5: Discussion of Categories All these steps were followed in analysing the responses for each research question, but for the purpose of brevity only steps 3–5 will be included in the subsequent findings.

6 Findings

Findings are discussed according to the research questions. Thereafter, in the next section, conclusions will be drawn and recommendations made. Table 2 provides an overview of the themes that transpired during the interviews, and the number of times each theme was mentioned.

- *What are the current responsibilities of the corporate travel manager?*
  Corporate travel managers have a wide range of responsibilities, but it seems that one of their main responsibilities is to maintain relationships. Maintaining the relationship with suppliers, received the most mentions, with managers pointing out that they were responsible for negotiating with suppliers (either directly, or with the assistance of the TMC) and managing contracts with suppliers. Regarding the relationship with the TMC, some travel managers saw their responsibility as managing the relationship/contract with the TMC while others viewed the relationship as more of a partnership, coming across in comments such as "... I work together with my TMC. ..." and "....I have the responsibility of engaging with the travel management company...". Looking after the relationship with the travellers, involved ensuring the safety of travellers, as well as solving their queries and complaints. Being responsible for the travel policy was also mentioned a number of times, and the responsibility varied from being responsible for the development of the policy, to ensuring that the travel consultants and the travellers abide by it. Some travel managers indicated that they were responsible for making bookings, while others only oversaw the booking processes. Other responsibilities included: enforcing change management, changing processes, improving processes, and taking responsibility for meetings within the organisation.

Table 2 Themes in interviews

Theme	Freq.	Theme	Freq.
Current responsibilities of the corporate travel manager		The future role of the TMC	
1 = Relationships		1 = Yes, under certain circumstances	
1a = With supplier	16	1a = Complicated bookings	1
1b = With TMC	6	1b = Certain percentage of bookings	1
1c = With travellers	4	1c = On the odd occasion	1
1d = In general	4	2 = Yes, because of their skills	
2 = Travel policy	10	2a = Specialised skills	3
3 = Bookings	7	2b = Quality control	1
4 = Manage travel expenditure	4	2c = We don't have the necessary skills	3
5 = Other	4	2d = Most effective	1
		2e = Value added services	2
		2f = Knowledge	2
		2 g = Centralised system	1
Future responsibilities of the corporate travel manager		Whether and how the TMCs' role should change in the future	
1 = Technology		1 = More in-line with clients' needs	3
1a = To manage the travel management process	5	2 = TRENDS	
1b = To facilitate the booking process	9	2a = Offering something different/information provider not just bookings/keep up with trends	3
2 = Responsibilities will be more strategic		3 = Technology	
2a = Change management	2	3a = Up to date/adapt to technology	4
2b = In general	3	3b = New systems for new travellers	1
2c = With regards to travel process	7	3c = Online tools	3
3 = Change in the nature of responsibilities	4	3d = Cell phone technology	1
		4 = Accurate MI	1

- *What are the future responsibilities of the corporate travel manager?*
  When asked about their future responsibilities, corporate travel managers seemed less sure. Respondents alluded to the fact that their responsibilities will change in the future as a result of technology. They expect technology to change the way in which they will manage the travel process in the future and pointed out that they need to stay up to date with technological advancements in the industry. A number of respondents foresee that technology will become all the more important to facilitate the booking process, from simply booking online, to ensuring compliance with the policy and even eliminating all domestic travel administration by using the online booking tool. Respondents felt strongly

that their responsibilities will become much more strategic in the future ranging from being more adaptable to change, to being more strategic in their approach to the actual travel process. One respondent said "I will act more as an advisor to staff", while another summarised it as follows: "You will be more strategic saying where do we want to be? Who do we want to contract with? And where will we get the best deals?" Some travel managers felt that there will be a complete change in the nature of their responsibilities in the future. One respondent felt that her role will decrease overall, while another felt that she will have to become more "hands-on". Interestingly, only one respondent was of the opinion that her main responsibilities will not change in the future.

- *What are the current roles and responsibilities of the TMC in managing the corporate travel process?*
  Respondents were first asked why they made use of a TMC and then what the responsibilities of their TMC were. There was a lot of overlap between the responses to these two questions. Many respondents referred to the TMCs responsibility for making bookings. Although some travel managers only expected their TMC to do international bookings or complex bookings, others expected them to do all the bookings. Respondents also mentioned that the TMC should not only make the bookings, they should first provide quotes, and when they do bookings, it should always be at the best possible prices, and within the guidelines of the policy. A number of travel managers mentioned that they value the knowledge of the TMC, in terms of expertise and service delivery, as well as local knowledge. They also appreciate the fact that the TMC could carry out benchmarking exercises and provide global coverage. Other travel managers were more specific and listed the following services that the TMC should deliver: foreign exchange services, visa applications, summary of trip itineraries, 24 h call centres, advising travellers, handling issues, assisting with the policy, and handling the accounting side of the travel process. Several managers referred to the data and reporting services that the TMC provide. Also transpiring strongly, was the benefit of centralisation that the TMC brings, in terms of bookings, accounting, reporting, data and so on. Respondents were honest when they admitted that they often make use of the TMC simply because they do not have the skills to operate their own agency, in terms of money, time, technology, and ensuring the safety of travellers. One respondent summarised it as follows: "for me to manage the TMC would take me out my strategic position…" Respondents were also asked whether they are happy with their TMC. Of the 11 respondents that answered the question, all agreed that they were happy.
- *What are the future roles of the TMC in managing the corporate travel process?*
  First, respondents were asked whether they would still make use of a TMC in the future. All the respondents who answered the question confirmed that they would. Some respondents said that they would only make use of a TMC under specific circumstances, for example for complex bookings. One of these respondents made her opinion clear with the following statement: "I don't know if you'll ever get rid of them…" Because of the skills of the TMC, the other respondents had more favourable opinions regarding their future need for a TMC, and felt that

the TMC possesses skills that they do not have, they are specialized in what they do, and they provide a number of value added services, all of which prove their importance. Next, respondents were probed to give their opinion on whether and how the TMCs role should change in the future. From their answers, it seemed that travel managers were uncertain on whether the TMCs role should change, with only three giving a definite yes. When asked how the TMC should change in the future, respondents were convinced that the TMCs should increase their usage of technology, because as one respondent explained: "I think in terms of technology they still have a long way to go..." They explained that TMCs should provide online tools, be up-to-date with the technology available and even provide mobile phone technology. Respondents also mentioned that the TMC should become more aligned with their clients' needs by understanding the client and aligning themselves with the client's goals.

- *What are the current and future roles of ICTs in the corporate travel management process?*
  Respondents were asked to comment specifically on the following aspects related to ICTs: whether their organisation offers self-booking tools to capture Generation Y; if self-booking tools add value to the Generation Y and how the innovation in mobile technology has affected the booking process for the Generation Y. Regarding the future of ICTs in their organisations, travel managers were asked whether they felt that booking tools will play a major role in the future and whether mobile technology should be considered in the future by the TMCs? Opinions on whether their organisations offer self-booking tools to capture Generation Y were divided with half of the respondents confirming that they did, and the other half that they did not. Of those who did not offer these tools, only one said that it is something that they are considering. Those respondents who are using self-booking tools felt that it was definitely adding value to the Generation Y, because it is easier and more efficient and convenient to use than a traditional TMC. Currently, it seems that mobile technology is not used in the booking process, but rather to enhance the corporate travel experience, for example the sending of itineraries to the travellers' phones, and enabling the traveller to download their e-tickets on their phones. When asked about the future of online booking tools, only one respondent did not see a need for it. For him, the implementation costs are too high and the relationship with his TMC too important. The remainder of respondents all agreed that online booking tools will become even more important in the future for a number of reasons, such as that enforcing travel policy compliance becomes easier and it helps an organisation to function effectively and efficiently. Last, travel managers provided their views on the future of mobile technology and whether it should be considered by TMCs. Once again, only one respondent did not see a need for it, and said that his travellers do not have the time for it. All the other respondents agreed that mobile technology should become part of the future of TMCs, with most respondents explaining that everything is moving towards mobiles, evident in statements such as "Everyone is going online with their smartphones so mobile friendly websites should definitely be considered if not already" and "that is the way everything is going..."

7 Conclusion

The purpose of this paper was to determine how technology could be used to align the needs of the corporate client with the functions of the TMC, by providing answers to research questions such as what the current and future responsibilities of the corporate travel manager are; what the current and future role of the TMC is in managing the corporate travel process and ultimately, what the current and future role of ICTs in the corporate travel management process is, and how this will influence the future of TMCs.

It seems that currently, travel managers have a wide range of responsibilities, ranging from maintaining relationships to being responsible for the travel policy and even enforcing change management. These responsibilities are aligned with the six imperative tasks for a professional travel manager as identified by Gustafson (2012), and mentioned earlier in the literature review. Interestingly, technology was hardly mentioned by respondents, as being part of their current responsibilities. When asked about their future responsibilities, technology featured much more pertinently. They expected technology to change the way in which they will manage the travel process in the future and pointed out that they need to stay up to date with technological advancements in the industry. Respondents felt strongly that their responsibilities will become much more strategic in the future ranging from being more adaptable to change, to being more strategic in their approach to the actual travel process. This supports Cochrane's (2011) viewpoint that the role of the travel manager is developing into a more strategic function, and that they are looking beyond merely making sure that day-to-day booking requirements are satisfied. In order to remain relevant, TMCs should consider how they could assist the corporate travel manager in becoming more strategic, and how technology could be used to make this transition more effective.

Regarding the current role of the TMC, many respondents referred to the TMCs responsibility for making bookings. A number of travel managers mentioned that they value the knowledge of the TMC while several managers referred to the data and reporting services that the TMC provide. Respondents admitted that they often make use of the TMC simply because they do not have the skills to operate their own agency. This is perhaps the wisest strategy according to Mike Gray, CEO of Uniglobe Travel Sub-Saharan Africa (in Cochrane 2011) who explained: "We've recently helped many corporations back from the brink of disaster who thought—or were sold—the idea that they could handle travel on their own easily and more cost effectively, only to find 6 months into the mission that this was a chimera." All the respondents agreed that they were happy with their TMC. Surprisingly, technology did not feature as being part of the current responsibilities of the TMC. All the respondents confirmed that they would still make use of a TMC in the future, for complex bookings, for their skills and because they deliver value-added services. Floyd Widener, senior Vice President: Sales and Global Programme Management of Carlson Wagonlit Travel for the EMEA region, is of the opinion that the role of TMCs is expanding, since TMCs can play a vital role in terms of consulting,

sourcing, traveller safety and security, analysis of data, and using that data to improve programmes and negotiations. He believes that TMCs have to provide value-added services to the client to keep them effective in their corporate role (Cochrane 2011). What is interesting to note, is that these are skills and services which cannot be replaced by technology. However, travel managers were also convinced that the TMCs role should change, by increasing their use of technology and becoming more aligned with the needs of their clients. Even though technology did not feature as being part of their current responsibilities, TMCs should consider how they could use technology in the future to align the needs of their corporate clients, with the functions that they provide, while at the same time, focusing on those skills and services which cannot be replaced by technology.

Finally, conclusions are drawn on the current and future role of ICTs. Self-booking tools are used by some organisations because it is easier and more efficient and convenient to use. A report by BCD Travel (2010) warns that this does not mean the role of the TMC is made redundant by online booking tools. The agent is still needed to ensure that the ticket is issued correctly, and to provide human contact when needed. The TMC is responsible for altering the tool according to the client's requirements and to provide management information. From this study it seems that mobile technology is currently not used in the booking process, but rather to enhance the corporate travel experience. Travel managers also provided their views on the future of mobile technology and whether it should be considered by TMCs. Only one respondent did not see a need for it, and said that his travellers do not have the time for it. All the other respondents agreed that mobile technology should become part of the future of TMCs. This seems to confirm international trends, according to Rose (2010) most European midmarket TMCs report limited use of mobile technology for corporate travel, but all agree that the mobile revolution is on its way. He points out that providing mobile abilities could be a competitive advantage for the TMC and could differentiate them from their competition. It could also produce added revenue if the TMC charges a fee for this service. This research study also corroborates the findings of BCD Travel (2010) reporting that travellers are not initiating bookings on their mobile devices but are rather using the devices for en-route services. They are also being used to rearrange travel plans after flight disruption or to choose an alternative at a later or earlier time if meeting plans change. By managing the use of self-booking tools and mobile technology, TMCs could align the functions that they provide with the needs of the corporate client, allowing the corporate travel manager to become more strategic in his/her approach, while at the same time providing cost savings to the corporate client. In conclusion, it would appear that the future of TMCs is not under threat, if they continue to reinvent themselves by using technology to their advantage, and delivering value-added services that cannot be replaced by technology.

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An Examination of the E-Bookers and E-Browsers in Emerging Markets: Online Browsing Behaviour in Independent Hotels in Hoi An

Hilary Catherine Murphy, Yung Dang, and Meng-Mei Chen

Abstract This paper reviews the e-browsing and e-booking behaviours and drivers in the context of a newly emerging market where much of the distribution landscape remains traditional and OTAs have yet to dominate the market. It uses a quantitative approach and the findings indicate that e-bookers and e-browsers share more commonalities than differences, except in their usage of hotel sites. Recommendations are made to retain direct online bookings, avoid commissions from agents and engage with customers directly. The managerial implications focus on improved website performance for both e-browsers and e-bookers.

Keywords Independent hotels • e-Browsers • e-Bookers • Online booking • Information sources • OTAs

1 Introduction

Online Travel Agents (OTAs) have emerged as key players in the market and have been widely adopted as preferred distribution channels (Xiang et al. 2014). Due to the fragmentation of the hospitality industry, the well-established OTAs such as Expedia, Booking.com and Priceline, etc. have developed greater bargaining power over the past decade or so impacting on the direct bookings hotels would prefer via their own website. Independent hotels have been particularly marginalised in this disintermediation process, lacking the necessary resources and investment to profit from the online market (Toh et al. 2011). To compete with third party online bookings, hotels must invest heavily in search engine optimisation to be visible to potential customers and be included in the purchase and consideration process. Moreover, the conversion of e-browsers to e-bookers on the hotels' own websites can help reduce the impact and over-reliance of small hotels on third parties (Toh et al. 2011; Anderson 2009). Over dependence on OTAs and third parties can create dependencies, increase competition, distance the customer from the hotel supplier

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_55

and incur commission charges that impact on profitability. Additionally this particular market is yet to be fully exploited by the established OTAs, though it is clear that these emerging markets offer mutual benefits for both OTAs and hotel operators. Nonetheless, the presence of hotels on OTAs, even if it is only to benefit from the "billboard effect" and on increasingly influential user-generated content sites, such as TripAdvisor, are becoming critical to inform potential hotel guests on current offerings and past ratings. While these all drive traffic to the hotel website, a significant effort is still needed to convert guests landing on the hotel page to encourage them to book directly via the hotel website, not via OTAs or traditional methods such as phone calls, emails and fax which are proven to be inefficient and expensive for both guests and hotels (Toh et al. 2011).

In Vietnam, the adoption of e-commerce and the integration of online reservation systems are still at the introduction stage. In one of the fastest growing and well-known ecological resort towns of Vietnam, Hoi An, online reservations remain in their infancy, particularly for independent hotels. This contrasts sharply with mature Western markets, where online reservation systems are well established and incorporated into the hotel's website, thus, converting browsers to bookers on the hotel's website can be facilitated. Up till now, socio-demographic characteristics of e-browsers and e-bookers and their motivations to browse and book online have yet to be investigated in emerging markets for independent hotels. Here, some of the key drivers and determinants that have been identified by previous researchers are investigated here and thus this research aims to *examine the online behaviours of e-browsers and e-bookers in the context of independent hotels in Hoi An*.

2 Theory/Issues

Independent hotels tend to have distinctive characteristics such as "managerial style, independence, ownership, having limited resources and the scale and scope of operations" (O'Dwyer et al. 2009, p. 47). Other identified characteristics of independent hotels are the centralized organizational structure, limited financial capacity, human resources restrictions and a lack of business expertise (Hills and Cairncross 2011; Moriarty et al. 2008; Gilmore et al. 2007). Within the hotels' activities, the owner/manager plays a vital role and O'Dwyer et al. (2009) state that "in general... marketing activities are driven by the owner/manager and their personalities and are defined in terms of tactics to attract new business, focusing on competitors, customers and the business environment" (p. 55). Thus the adoption of other technology related devices is slower and, according to Mathies (2010), 93.2 % of independent hotels handle bookings via email and are slow to use OTAs and social media to reach both e-browsers and e-bookers and risk disintermediation in the online market place.

2.1 E-Browsing and E-Booking Behaviour

Early research conducted at the commencement of the online booking phenomenon, i.e. Fodness and Murray's (1999), found that travellers' personal and situational circumstances affect their decision to search for information in an online environment. More recently those information sources are identified by several researchers, e.g. general search engines, suppliers' sites, online travel agencies (OTA), destination sites, general travel sites, travel search engines, travel guidebook sites, community sites, newspaper/magazine sites, consumer content generates sites, and social networking sites, (Fesenmaier et al. 2011; Xiang et al. 2014).

Law and Hsu (2006) measured the importance of hotel website dimensions in the decision to book online and separated online browsers and online bookers into two different groups when examining hotel online reservation behaviour. Following this research, the WOEG model conducted by Wu et al. (2013) also identified specific website booking behaviours in the browser and purchaser groups (Wu et al. 2013), identifying the level of income of customers as a key determinant of reservation behaviour (Wu et al. 2013), with another characteristic being the purpose of travel. There has been no general consensus in the relationship between the travel purpose and the browsing and/or booking pattern (Lo et al. 2002; Kim and Kim 2004; Wong and Law 2005). However, the characteristics which appear to be the most influential and relevant for this research in an emerging market and in the context of online hotel browsing and booking are: age, the level of education, the length of flights, the length of stay and the frequency of browsing.

Age Age has been identified by previous researchers as a factor which could determine the choice to purchase arrangements online (Weber and Roehl 1999), the decision to search information online (Fodness and Murray 1999), the differentiation between e-bookers and e-browsers (Law and Hsu 2006) and the prediction of e-browsers (Wu et al. 2013).

Level of Education Many academic perspectives support a common conclusion that the higher the level of education, the higher the potential of converting an e-browser into an e-booker. The level of education correlates with the ability to use and filter information (Bonn et al. 1998; Weber and Roehl 1999; Kim and Kim 2004; Wong and Law 2005). Wu et al. (2013) claimed that the level of education and the level of trust were found to have a direct impact on both e-browsing and e-booking behaviours (Wu et al. 2013).

Length of Flights Wong and Law (2005) suggested that long haul travellers would be more inclined to book online than short haul travellers. Their results also indicated that respondents travelling long distances would more likely use online reservations as their booking tool (Wong and Law 2005; Law and Hsu 2006). Wu et al. (2013) support this result and report that guests with a longer length of stay were usually long-haul travellers. In particular, and to reduce the uncertainties in booking their desired hotels, this group of travellers tend to book hotel rooms directly via the hotel online reservation system. Travellers with long haul trips need a more secured booking and booking online is therefore perceived to be a more

reliable method (Wu et al. 2013). Hoi An resort town is well known as a UNESCO World Heritage Site, attracting thousands of Vietnamese, 60 %, and international visitors, 40 %, (HITT n.d.), therefore, this variable may be a powerful predictor of e-booking activity.

Length of Stay The length of stay (LOS) has been reported as a predictive variable by Wu et al. (2013). They explained that the longer the length of stay, the greater the need for planning in advance and booking online (Wu et al. 2013). Wu et al. (2013) expound that those guests with a longer length of stay are usually long-haul travellers and tend to book directly on the hotel website. Hence, if a relationship exists between the length of stay and browsing and/or booking behaviours, it may impact on booking and browser behaviour.

Frequency of Browsing Activity This characteristic has been proven to have a positive relationship with online browsing behaviour (Weber and Roehl 1999; Kim and Kim 2004). The model proposed by Wu et al. (2013) confirmed that those with a "history of internet usage", also known as "frequent browsers" of hotel websites, are more likely to engage in online reservation behaviours (Wu et al. 2013). The frequency of browsing is predicted to activate and motivate the e-browsing activity and hopefully, with the aid of a favourable website experience, e-browsing will be converted into e-booking behaviour.

This research will investigate the determinants and drivers of the e-booking and e-browsing behaviours relevant to this emerging market. Of particular interest will be if this market displays the same patterns of browsing and booking that are evident in mature markets (Fig. 1).

Hypothesis 1 (H1) There is a statistically significant relationship between the socio-demographic characteristics of hotel guests and online hotel reservation behaviour. In particular this research will address the following research questions;

(a) Which socio-demographic variables differentiate e-browsers and e-bookers?
(b) Are there significant differences between e-browsers and e-bookers in the way they use online information sources?
(c) Are there significant differences between e-browsers and e-bookers in their perceptions of the important factors in choosing their booking method?

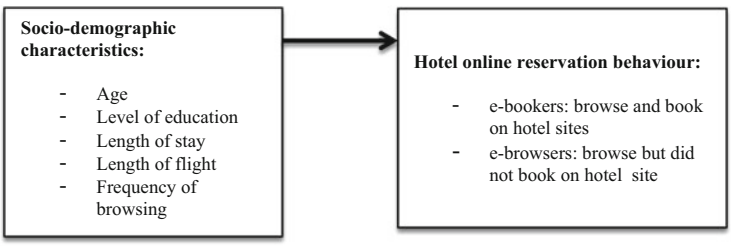

Fig. 1 Research framework—Hypothesis 1: depicts the proposed relationship between socio-demographic characteristics and hotel online reservation behaviour

3 Methods/Procedures

A quantitative approach, in the form of a questionnaire, was executed with the objective of collecting primary data to empirically validate the research questions and main hypothesis. The research design for this empirical research consists of a single cross-sectional design with a single sample of respondents from the resort town of Hoi An in Vietnam. The constructs and items measured area adapted from previous research (Lo et al. 2002; Kim and Kim 2004; Wong and Law 2005; Fesenmaier et al. 2011; Xiang et al. 2014). The data were obtained during a period from March to April 2014. The socio-demographic and behavioural questions were categorical in nature. As the study focuses on online hotel booking behaviour at independent hotels, establishing direct contact with this specific hotel guest population in Hoi An was critical to obtain accurate data from hotel guests. With help from the UNESCO in Vietnam, 17 hotels collaborated within the time period. A total of 304 surveys were completed by their guests, but only 182 surveys were validated due to missing data. Only hotels with online reservation systems were considered in this analysis. A significant p-value of 0.05 was used here (equivalent to 5 % with a confidence level of 95 %) and Pearson's chi-square test was applied to these sets of categorical data to determine the relationships between the variables. T-tests were used to compare the evaluations of important factors in selecting booking methods between e-bookers and e-browsers.

4 Results

In total, there were 182 valid questionnaires out of 304 distributed, which represent a 59.9 % response rate. 69.2 % of the respondents (n = 126) indicated they had used the hotel website to book their stays, hence they are e-bookers. The remaining 56 respondents either booked on OTAs (8.8 %), via reservation centre (8.8 %), fax or e-mail (8.8 %), or travel agents (4.9 %), hence e-browsers. Table 1 presents the demographic profiles and travel behaviours of respondents.

4.1 The Differences Between E-Bookers and E-Browsers

Age The majority of respondents were aged between the age groups of 25–36 (n = 62), and 49–60 (n = 45). This resort town appears to be more attractive to those of older age according to their participation in the questionnaire. The chi-square test result shows that there is a significant difference among age groups between e-bookers and e-browsers, X^2 (4, N = 182) =15.37, p = 0.00. This finding supports the investigations of Bonn et al. (1998), Weber and Roehl (1999), Kim and Kim (2004), that report that the older the person, the more experienced with past online

Table 1 Demographic profiles and travel behaviour of the respondents

	All respondents		Bookers ($n = 126$)		Browsers ($n = 56$)		
	Overall number	Overall %	Number	%	Number	%	χ^2
Age							15.37*
Less than 24	14	7.7	3	2.4	11	19.6	
25–36	62	34.1	45	35.7	17	30.4	
37–48	34	18.7	24	19.0	10	17.9	
49–60	45	24.7	36	28.6	9	16.1	
Above 60	27	14.8	18	14.3	9	16.1	
Education							0.55
High school and some college	62	34.1	45	35.7	17	30.4	
Bachelor degree	72	39.6	48	38.1	24	42.9	
Postgraduate degree	48	26.4	33	26.2	15	26.8	
Length of stay							7.45*
Less than 3 days	32	17.6	18	14.3	14	25.0	
Between 3 and 7 days	92	50.5	72	57.1	20	35.7	
More than 7 days	58	31.9	36	28.6	22	39.3	
Length of flight							0.15
Less than 3 h	36	19.8	24	19.0	12	21.4	
Between 3 and 6 h	39	21.4	27	21.4	12	21.4	
More than 6 h	107	58.8	75	59.5	32	57.1	
Frequency of browsing activities (Weekly)							0.98
Less than 10 times per week	33	18.1	21	16.7	12	21.4	
Between 10 and 20 times	32	17.6	24	19.0	8	14.3	
More than 20 times	117	64.3	81	64.3	36	64.3	

*$p < 0.05$

purchases people tend to be, and hence they are more likely to browse and book (Bonn et al. 1998; Weber and Roehl 1999; Kim and Kim 2004). Age is also associated with higher income and thus, ability to book (Law and Hsu 2006).

Level of Education The largest sample of respondents are found to be in the bachelor's degree group (n = 72). No significant differences were found between e-bookers and e-browsers based on education, X^2 (2, N = 182) =0.55, $p = 0.76$. This result confirms the findings from Law and Hsu (2006). Yet it does not confirm previous research which states that people with higher education are more proficient, efficient and want to save time by limiting their browsing activity and book directly on the hotel website (Wu et al. 2013).

Length of Stay Since the average length of stay remains short (2.3 days on average) in Hoi An, it was expected that the majority of those staying less than

three days would book through a booking method other than the hotel website. Yet, most of the respondents stayed more than 3 days. As shown in Table 1, 85 % of e-bookers stayed more than 3 days, compared to 75 % of e-browsers. Significant differences were found between e-bookers and e-browsers based on the length of stay, X^2 (2, N = 182) =7.45, p = 0.02. Certainly, there is a tendency for those staying between 3 and 7 days to book on the hotel's website, which confirms earlier studies by Wu et al. 2013.

Length of Flights The time period between February and May is the peak season for international visitors but is low in terms of domestic arrivals. Out of 182 respondents, 58.8 % travelled more than 6 h, 21.4 % between 3 and 6 h and 19.8 % flew less than 3 h. No significant differences were found, X^2 (2, N = 182) =0.15, p = 0.93.

Frequency of Browsing Activity Findings indicated that the majority of hotel guests, regardless of their booking method, browse 20 or more times prior to their arrival at the hotel. No significant differences were found between e-bookers and e-browsers in their frequency of browsing, X^2 (2, N = 182) =0.98, p = 0.61.

4.2 Information Sources Used by E-Browsers and E-Bookers

Respondents also indicated their usage of various information sources, including hotel site, OTA sites, search engine, travel guide, online forum, and review sites. Table 2 presents the usage of information sources from all respondents, i.e. e-bookers, and e-browsers. Search engines, OTA sites, and hotel sites receive more visits than travel guide, online forum, and review sites.

Significant Differences Between E-Bookers and E-Browsers The only significant difference was found for the usage of hotel sites between e-bookers and e-browsers, X^2 (3, N = 182) =12.58, $p = 0.01$.

No Significant Differences Between E-Bookers and E-Browsers There were no significant differences for the usage of OTAs, X^2 (3, N = 182) =5.69, $p = 0.13$; search engine, X^2 (3, N = 182) =3.61, $p = 0.31$; travel guide sites, X^2 (3, N = 182) =0.78, $p = 0.85$; and online forum, X^2 (3, N = 182) =4.29, $p = 0.23$, and review sites, X^2 (3, N = 182) =5.29, $p = 0.15$.

4.3 Important Factors for Choosing the Booking Method

Figure 2 shows the important factors for choosing the booking method. The most important reasons are; more in-depth information, more convenient, easier to book, and easier to search for information. The least important reasons are; to earn loyalty points, benefits from booking (e.g. promotions or discounts), better price option,

Table 2 Information sources used by e-browsers and e-bookers

	All		Booker		Browser		
	Number	in %	Number	in %	Number	in %	χ^2
Hotel sites							12.58*
Never	0	0.0	0	0.0	0	0.0	
1–3 time	29	15.9	12	9.5	17	30.4	
4–7 times	94	51.6	69	54.8	25	44.6	
More than 7 times	59	32.4	45	35.7	14	25.0	
OTA sites							5.69
Never	19	10.4	15	11.9	4	7.1	
1–3 time	41	22.5	21	16.7	20	35.7	
4–7 times	93	51.1	69	54.8	24	42.9	
More than 7 times	29	15.9	21	16.7	8	14.3	
Search engine							3.61
Never	5	2.7	3	2.4	2	3.6	
1–3 time	39	21.4	27	21.4	12	21.4	
4–7 times	101	55.5	72	57.1	29	51.8	
More than 7 times	37	20.3	24	19.0	13	23.2	
Travel Guide							0.78
Never	28	15.4	18	14.3	10	17.9	
1–3 time	55	30.2	36	28.6	19	33.9	
4–7 times	74	40.7	63	50.0	11	19.6	
More than 7 times	25	13.7	9	7.1	16	28.6	
Online forum							4.29
Never	40	22.0	24	19.0	16	28.6	
1–3 time	53	29.1	42	33.3	11	19.6	
4–7 times	66	36.3	51	40.5	15	26.8	
More than 7 times	23	12.6	9	7.1	14	25.0	
Review sites							5.29
Never	12	6.6	6	4.8	6	10.7	
1–3 time	37	20.3	24	19.0	13	23.2	
4–7 times	67	36.8	45	35.7	22	39.3	
More than 7 times	66	36.3	51	40.5	15	26.8	

*$p < 0.05$

and no commission. It is interesting to note that respondents placed higher importance on the information and convenience, and less importance on the financial incentives. 13 t-tests have been conducted to compare the responses between e-bookers and e-browsers, and no significant differences were found from any of the t-tests. Hence, both e-bookers and e-browsers exhibit similar determinants, which may indicate similar value systems.

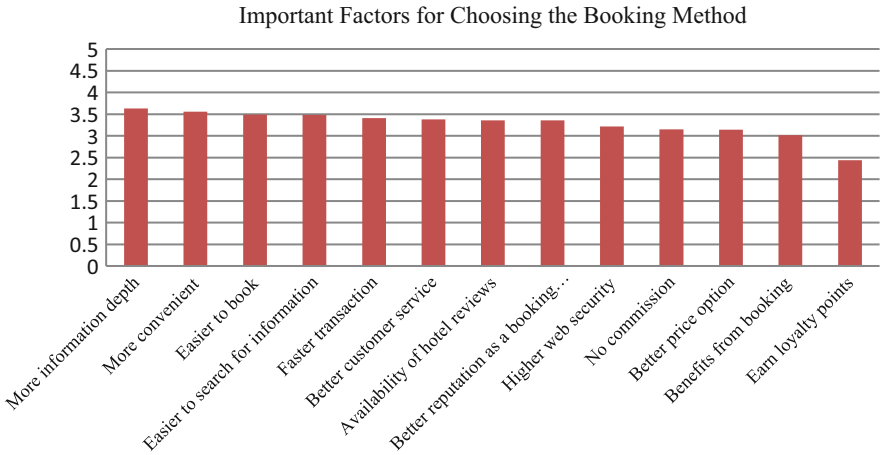

Fig. 2 Graph showing the important factors for choosing the booking method

5 Conclusions

Several conclusions can be drawn from the demographic profile of e-browsers and e-bookers. While factors such as age and the length of stay differing between e-browsers and e-bookers, other factors such as education, length of flights, and frequency of browsing show no significant differences among these groups.

Previous researchers suggested that those with a longer LOS would place more emphasis on advanced travel planning hence more likely to book via hotel website. Although the official average length of stay for Hoi An tourists is 2.3 days, the majority of these respondents reported that their LOS is more than 3 days and booked via the hotel website, though did not necessarily browse there. This may indicate that the browsing occurs elsewhere, and given the range of information sources used by these respondents, it may indicate that there is a lack of relevant information at browsing stage on the hotel website. The low average LOS in Hoi An resort town may also indicate that there is more scope to attract more online bookings the via hotel website for the short-stay travellers.

While previous research suggests that the long-haul travellers would be more inclined to book via the hotel website, this is not specifically the case for the independent hotels in Hoi An. All these travellers, short and long haul, exhibit a higher tendency to book directly on the hotel's website. Nevertheless, this may be as result of the season in which the research was conducted, i.e. more long stay visits, or that the data is not representative of the short-haul population of respondents.

Although there are no significant differences between e-bookers and e-browsers based on the reported frequency of browsing activity, more than 64.3 % of the respondents browse the internet more than 20 times per week. This high level of browsing activity requires that the information sought at browsing stage should be

closely monitored by the hotels to make sure that online information about their property is accurate, comprehensive and reflects the hotel brand and experience. These respondents, e-bookers and e-browsers, use hotel websites differently and the website should be designed for both e-browsers and e-bookers. Hotels often use their websites ineffectively and website design, content and performance impacts on both browsing and booking. From Table 1, it seems like e-bookers are more heavy users of hotel sites than e-browsers. Yet, more research is needed to investigate these differences, particularly in website performance, particularly as these results show that these respondents clearly demand a range of functionalities from the website experience (Fig. 2).

It is interesting to note that there are no significant differences for important factors in choosing the booking method identified by e-bookers and e-browsers. Both groups value information and convenience, and place less emphasis on financial incentives. This finding could be related to the specific destination (an UNESCO World Heritage site) or the sample related (more international tourists and longer length of stays) and should be further confirmed. Yet, this finding also reminds hoteliers that financial incentives are not the only way to win business and that ease of searching, availability of reviews, faster transactions and web security are all equally important for e-bookers and e-browsers. These were also critical factors when online browsing and booking was in its introductory stage for the mature markets.

This research paper applied the existing theories, established mostly by research into "western" online behaviours, in the context of the emerging market of Hoi An in order to provide local hotel managers with insights and guidance. At present, the independent hotels seems to capture direct bookings on their own websites but must be prepared for the advent of the OTAs, who are already acquiring local booking agencies and online reservation systems in these emerging markets. Additionally, the rise and influence of online forums and review sites in this research already indicate some impact on both the e-browsing and e-booking stages of consumption.

Maintaining a direct relationship with customers is vital, while avoiding all the disadvantages of disintermediation while profiting from the benefits. As this research indicates high levels of browsing activities on a wide range of information source, along with convenience sought by both e-bookers and e-browsers, independent hotels should ensure their website visibility, ease of browsing and booking, and information accuracy on all relevant external information sources.

Furthermore, not only do markets change, so do customers. Unlike other Asian markets, neither education nor length of flights is a differentiator for e-browser or e-booker. Nonetheless, as the customers mature and become more sophisticated in their online behaviour or more distant markets are targeted, these are additional factors that may impact on online browsing and booking behaviour.

The managerial implications focus on marketing and website improvements, with the objective of converting browsers to bookers on the hotel websites and thus maximising revenues. The findings of this study could, for example, help hoteliers to implement email marketing campaigns and use guests' socio-demographic characteristics to select the right target groups.

Some weaknesses and limitations are acknowledged, such as the time frame of the questionnaire, the sample size and the unequal distribution of respondents in each booking method, thus reducing the reliability and generalisation of the data.

As the market in Vietnam and Hoi An matures, further research will focus on observing if the e-booker and e-browser activity examined here mimics what has been observed in the western world, i.e. the traditional struggle that has characterised the established hotel market's turbulent relationships with the OTAs, or that they are able to assimilate and shortcut this process and have a more profitable relationship with OTAs and the other information sources in key channels?

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Part VIII
ICT and Tourism Experiences

Changing Practices/New Technologies: Photos and Videos on Vacation

Anja Dinhopl and Ulrike Gretzel

Abstract Tourists increasingly record video during their vacations. By introducing tourist videography as a distinct practice from tourist photography, this conceptual paper starts to develop the foundation for a theory of tourist videography. It contributes to the literature on visual culture in tourism by exploring the differences related to the technology as well as social practices of presentation between tourist photography and videography. The key differences are displays of visual continuity and multiple moments in time, multiplicity of cues (audio-visual), and motion as well as high-profile editing, the concept of digital distance, and emphasis on tourist practices. The paper further contributes to the literature on technology-mediated experiences by conceptualizing videography's impact on the structure of tourist experiences. The key differences in mediation are tourists' increased immersion in the experience, interaction with the screen, ongoing performativity and extension of the experience.

Keywords Mediation • Technology-mediated experience • Tourist videography • Tourist photography

1 Introduction

> Moments of media transition are so interesting because they are periods in which social practices are unsettled and renegotiated—a negotiation that concerns the materiality and embodiment of media technologies as well as the meanings arising from their use (Van Dijck 2004, p. 372).

We currently find ourselves at a time of media transition of one of tourism's core practices, photography. Both the social practices associated with tourist photography as well as the technological equipment tourists use to record images are changing. Research has emphasized concepts of connectivity and immediate sharing (Bell and Lyall 2005; Larsen 2008; Tomlinson 2007), the importance of the digital screen

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_56

inviting sociality and playful photo-taking (Haldrup and Larsen 2010). Boundaries between technology used exclusively for vacation and the everyday are being blurred, altering tourist experiences, as shown in the context of smartphones (Goggin 2006; Wang et al. 2014). Online image-sharing will become increasingly important (Lo et al. 2011). Further, video recording technology is becoming more widely available for tourists to use on vacation. GoPro, a wearable, non-handheld digital video recording camera, has become the world's best-selling camera in consumer markets, selling 2.3 million cameras in the year 2012 (Ryan 2013). The tourism industry has recognized video's potential. For example, Tourism New Zealand has become the first tourism organization to acquire drones to film tourists and provide them with short videos (NewZealand.com 2014).

Tourist videography cannot be considered a mere extension to tourist photography, because it has distinct characteristics. However, while there is extensive research on tourist photography, little is known on tourist videography. Categorizing videography simply as a technological advance to photography risks constraining future theoretical development in the field of visual media and technology in tourism. This paper conceptualizes video as a distinct media form through which tourists record and present their vacation experiences. To this end, the paper specifically focuses on 'heavyweight' use of video, that is the deliberate recording of video with specialized video equipment (Sarvas and Frohlich 2011), because 'lightweight' videos, that is short, spontaneous snapshot videos captured with, for example, smartphones elicit social practices of representation similar to digital photographs (Kindberg et al. 2005; Kirk et al. 2007). It is estimated that their relation to the mediation of tourist experiences is also similar to that of tourist photography. Such videos are used as 'living photographs' rather than film (Lehmuskallio and Sarvas 2008) and are thus for the purpose of this paper treated as belonging to tourist photography.

The paper theoretically establishes videography not simply as an extension to tourist photography, but as (a) a distinct way of recreating and representing tourist experiences and (b) a distinct technological mediator for tourist experiences. In doing so, it starts to develop a foundation for a theory on tourist videography. The paper therefore contributes to the literature in two ways: Relating to (a), the paper contributes to the literature on visual culture in tourism (Haldrup and Larsen 2010; Urry and Larsen 2011) and conceptually explores the differences in representation of tourist photography and tourist videography. Relating to (b), the paper contributes to the theory on technology-mediated experiences in tourism (Gretzel et al. 2006; Jansson 2002; Tussyadiah and Fesenmaier 2009) and conceptualizes videography's impact on the structure of tourist experiences.

2 Theoretical Development: Practices of Representation

Previous research has recognized the vital role of visual media in helping tourists (re)produce and (re)present tourist experiences (Cary 2004). Because photography and tourism are inextricably linked (Sontag 1977) and because photography has

been the dominant medium for travellers' representations of tourist experiences, most analyses have been limited to photographic images. However, vacations have also long been an important setting of consumers' visual representations and recreations in their own videos (Chalfen 1987, p. 61):

> Vacation activity is very well represented. [. . .] Picknicking, camping, and boating activity are frequently seen along with swimming, water skiing, and bicycle riding. Winter vacations include scenes of skiing and ice skating. Children regularly appear in various play activities—floating a toy sailboat, chasing a ball, climbing a tree, playing on swings, or in other activities where a lot of action and movement is involved.

While tourist videography is not new, tourism research's focus on it as a visual medium is. To date, tourist videos have overwhelmingly been treated as simply another visual medium to portray travel experiences, indiscriminately and interchangeably so with tourist photos—as a natural progression of the ongoing shift from textual to visual representations (Shaffer 2001). However, there is evidence that tourist photos and tourist videos are represented in distinctly different ways. Tussyadiah and Fesenmaier (2009) were first to point to the data-inference rich nature of tourist videos and its importance in creating travel narratives. Similarly, Marlow and Dabbish (2014) find that photos and video engage tourists differently based partly on the concept of media richness (Daft and Lengel 1986) and find that richer forms of media—such as video—result in higher levels of immersion or feelings of being at a tourist destination. While research on visual media in tourism stresses the mediation of tourism experiences through new technologies (Haldrup and Larsen 2010; Jansson 2002, 2013; Urry and Larsen 2011), the emphasis has remained on tourist photography. Tourist videography's close connection to tourist photography may be advantageous in that it can build on theoretical foundations established for tourism photography. However, the inherent differences between the two dominant forms of tourist-generated visual media need to be acknowledged.

2.1 Technological Differences Related to Practices of Representation

Photography and videography differ in media richness (Daft and Lengel 1986). They differ in what they are able to communicate and as a result, their practices of representation differ. Both media were scrutinized based on their technological differences, and how they impact tourists' representation.

Visual Continuity and Time Video allows tourists to reproduce the visual continuity of their experience, allowing the medium to tell a story (Tussyadiah and Fesenmaier 2009). Through visual continuity, video is able to communicate the passing of time. Tourist photography most often captures a specific moment in time, resulting in the presentation of simply one instant—the moment the photo was taken. Tourist photography sometimes may capture specific moments of time, which can be accomplished during the production through, for example, increasing the length of time of exposure. However, even specific moments in photographic

representation are condensed into one still picture. Photographic representation is not able to manipulate time after the fact but is only able to reproduce the exact time that was spent during the production of the photo. This means that time has to be inferred in the representation of the photo: Photographic representation can only hint at the passing of time as it was experienced in the production of the photo. Video, on the other hand, is unrestricted in representing time. Video may represent actual time or may edit it, such as slowing down or speeding up time, to draw attention to specific moments. In either case, the representation of video has more options to communicate time and is not restricted to time spent during production.

Multiplicity of Cues Video transmits multiple cues, most importantly, sounds and images, at the same time. Photography, on the other hand, is restricted to visual representation. Audio, in addition to visual cues, makes video a richer media (Daft and Lengel 1986). This changes the presentation of video and how it engages its audience (Marlow and Dabbish 2014). Video may include audio that was recorded during the tourist activity, which may increase viewers' immersion and understanding of the tourist experience. Video may also include audio that was added in the editing process, such as music, to communicate a certain mood or make the video more interesting, as well as narration of the video to provide additional information.

Motion As shown by Chalfen (1987, p. 61), activities that involve a lot of action and movement are "the focus of many vacation videos". Similar to the notion of time explained above, photographic representation is limited to showing the movement or lack thereof that happened during the production of the photograph. It has to communicate movement in one still picture. Video is able to show motion as it happened.

Table 1 summarizes the technological differences related to the practices of representation between tourist photography and tourist videography.

2.2 Differences in Social Practices of Representation

Photography and videography encourage different social practices related to their representation. Both media were scrutinized based on how their differences in social practices impact tourists' representation. The social practices of

Table 1 Differences related to technology for the representation of tourist photography and tourist videography

Photography	Videography
Singularity of image	Visual continuity
Singularity of moment	Multiple moments
Singularity of cue (visual)	Multiplicity of cues (audio-visual)
Stillness	Motion

representation may become more differentiated as the potential audience becomes larger and more dispersed (Lo et al. 2011). Largely due to the technological differences explained in Sect. 2.1, tourists may soon perceive video as a more accurate representation of reality than photography. The popular slogan "pics or it didn't happen" has been amended to "video or it didn't happen". The slogan can be found on consumer-created social media accounts and on camera manufacturer's websites (e.g., "Remember, video it or it didn't happen. Otherwise it's just a story. . .", http://pointofviewcameras.com/video-or-it-didnt-happen-tee.html). Its acronym (VOIDH) is also increasingly used as a hashtag (#) to denote consumer-generated videos on social media or as a greeting by tourists' hobby or amateur productions.

High-Profile Editing Editing was long regarded as a necessary, but undesirable and solitary process in video-making (Chalfen 1987). Through Web 2.0, editing could change to incorporate the social qualities Chalfen had identified as missing: Camera manufacturers provide webinars on better editing and maintain message boards for amateur filmmakers to share their favourite editing features and software programs, and users are encouraged to have conversations about which effects work best. Videography requires more editing effort than photography to make it representable (Chalfen 1987). In contrast, there is an expectation of 'truth' or reality in photos, and those who edit photos too much are considered as misrepresenting the reality the photos were meant to capture. Too much manipulation could be considered an example of breaking the 'authentic link' (Steward 1993). For example, the website www.instagram.com is a social network for photo-sharing. While it was designed to facilitate photo-editing, one of its most popular hashtags is "#nofilter", letting users celebrate the 'realness' of photos that do 'not need' a filter. Video not only allows more possibilities for editing, but is meant to be edited before being presented to an audience (Chalfen 1987). The editing process is expected, accepted and made visible in tourist videography, often bringing more joy to tourists than the actual experience itself (Dinhopl and Gretzel 2014).

Digital Distance Such perspective of editing processes for videos challenges the concept of digital immediacy (Bell and Lyall 2005). Digital immediacy argues that people share images with other people in or shortly after the experience to convey the emotions associated with it: "not just, 'I was here'; but 'I am here, right now, having this experience in real time, and here is the evidence that this is the case.'" (Bell and Lyall 2005, p. 136). From that perspective, an image is considered to lose its worth over time, because it does not convey an experience accurately anymore. Such immediacy is linked to the concept of intimate visual co-presence (Ito 2005) and the wish to remain connected to those who are not there (Germann Molz 2012; Germann Molz and Paris 2013). Communicating immediacy is key for some types of videos, such as videos of a sports event, concerts or the ALS Ice Bucket Challenge that went viral in mid-2014. However, for most tourist videos, presenting a video in a more polished form through editing may be more important. Digital distance may mean that the value tourists attach to videos may increase through the editing process—for video, distance thus refers not only to how much time passes

Table 2 Differences in social practices of representation between tourist photography and tourist videography

Photography	Videography
Low-profile editing	High-profile editing
Digital immediacy	Digital distance
Importance of place	Importance of practice

between the tourist experience and the sharing of the "pixilated evidence" (Bell and Lyall 2005, p. 135). It also refers to how much the video has changed throughout the editing process. In other words, the distance between the edited and the unedited media product will intentionally be larger for videos than for photos.

Importance of Practices Photography has privileged tourist settings (Crouch and Lübbren 2003; Lübbren 2001; Shields 1991) over tourist activities or practices in its representations. When trying to represent a tourist activity, photography is limited to a static representation due to the technology's limits of singularity of image. For video, tourist activities or practices are privileged over tourist settings. How tourists engage in an experience becomes more relevant, because the experience is not distilled to a single, static moment. Table 2 summarizes the differences in social practices of representation between tourist photography and tourist videography.

3 Theoretical Development: Mediation of Tourist Experiences

Tourist experiences are facilitated or mediated by a range of factors (Jennings and Weiler 2006) and previous research in recent years has paid particular attention to how technologies mediate and influence tourist experiences during different phases of the tourist experience (Gretzel et al. 2006). In addition to analysing how technologies improve communication through traditional mediators [for an example and review, see Buhalis and Law (2008)], research has turned to conceptualizing technology as a mediator of tourist experiences in its own right. Examples include travel videos (Tussyadiah and Fesenmaier 2009), smart phones (Wang et al. 2012, 2014), or embodied technologies such as Google Glass (Tussyadiah 2014). Research has further focused on concepts as mediators that have emerged because of technological advances, such as connectivity (Gretzel 2010; Germann Molz 2012; Pearce and Gretzel 2012; White and White 2007), mobility (Jansson 2007; Larsen et al. 2007; Hannam et al. 2014), or creativity (Gretzel and Jamal 2009).

Previous studies concerned with the mediation of tourist experiences through photography have focused on the acts or rituals involved in taking a picture. Research has focused on photography's mediating role for concepts such as authenticity (MacCannell 1973), conventions in behaviour between hosts and tourists (Chalfen 1979), manifestation of space in tourists' minds (Crang 1997; Osborne 2000), as well as performativity and expression of social relations between tourists (Larsen 2005). Cameras from that perspective are mostly seen as catalysts that

mediate a social experience as well as symbols separating tourists and their destination (Urry 1990), to the point where "it seems positively unnatural to travel for pleasure without taking a camera along" (Sontag 1977, p. 9). Recent research on digital photography has focused on the shorter life of digital images (Bell and Lyall 2005) and the differences between future (analogue) and immediate (digital) audiences (Larsen 2008; Lash and Urry 1994; Tomlinson 2007).

Fewer research studies have focused on the role of technological aspects for the mediation of tourist experiences. Comparing digital and analogue photography, research has emphasized the role of different modes of photographic production for tourists' understanding of a picture as authentic or legitimate (Steward 1993; Urry 2003). Others have found that digital cameras enable tourists to take more pictures, potentially increasing photography's relevance for tourism (Haldrup and Larsen 2010; Robinson and Picard 2009). Further, digital photography is also considered a more social, flexible, and fun event that invites "experimentation, creativity, and play [. . .] it seems to be the case that digital cameras are pushing photography in a more playful direction: they are great toys, a pleasure to play with" (Haldrup and Larsen 2010, p. 141). In digital photography and its relation to the mediation of tourist experiences, several key concepts are different to tourist videography.

3.1 Immersion in Experience and Interaction with the Digital Screen

The intention behind taking a photo is that it is consciously chosen to depict a specific, often staged instant (Larsen 2005). This is related to what Haldrup and Larsen (2010) term the ritualistic examination of the screen in an act of both production, where tourists check if the photo accurately captured the moment, as well as in an act of consumption or play, where tourists gather around the screen socially to celebrate the picture. In either case, taking of the photo as well as the examination of the screen after taking a photo results in a disruption of the experience the tourist sought to capture in the first place. New digital videography however, specifically unobtrusive equipment-mounted or wearable vide-recording technology, may enable tourists to forget about it during an experience and may result in increased immersion during the experience. Additionally, such technological advances do not require tourists to have their experience mediated through a screen. Instead of looking through the digital screen to see what they want to capture during the tourist experience, tourists may look at the screen and interact with it.

3.2 Ongoing Performativity

Tourist photography may mean that tourists engage in performativity, such as posing at specific moments in specific ways, to communicate, for example, intimacy with family members (Haldrup and Larsen 2010). Tourist photography

Table 3 Differences in the mediation of tourist experiences between tourist photography and tourist videography

Photography	Videography
Disruption of experience	Immersion in experience
Mediation through screen	Interaction with screen
Act of performativity	Active performativity
Length of experience unchanged	Experience circular/extended

disrupts the experience (Sect. 3.1) through acts of performativity. Video, on the other hand, may always be on, because something worth recording might happen, and if the camera is on, it will capture it. Shows like "America's Funniest Home Videos" are fuelled by this pattern for example. The editing possibilities for video (Sect. 2.2) also contribute to this method of recording. Because people act differently when they are being photographed or recorded (Haldrup and Larsen 2005), it may mean that the entire tourist experience would result in ongoing performativity.

3.3 Extension of Tourist Experience

In tourist photography, the concept of digital immediacy (Bell and Lyall 2005) refers to the immediate sharing of photos of the experience in which one just participated (explained in Sect. 2.2). This concept is also relevant for the mediation of tourist experiences. Digital immediacy posits that photos are shared immediately and lose value after the tourist experience. As such, with digital photography, the tourist experience remains linear, and the tourist experience is not extended. However, Stylianou-Lambert (2012) argues that tourists see themselves as both media producers as well as media consumers. With videography, tourists may see themselves closer to being media producers. They may think about how best to prepare for a tourist experience that will be captured on video, they may engage in ongoing performativity during the experience, and they may spend more time after the experience on editing the video. As such, the tourist experience becomes extended and the boundaries between the different stages of a tourist experience become blurred. Table 3 summarizes the differences in mediation of tourist experiences between tourist photography and tourist videography.

4 Discussion

4.1 Theoretical Implications

The paper shows how tourist videography and photography differ in practices of presentation, both in technological and in social practices, as well as the ways in which they mediate the tourist experience. For practices of presentation, this paper

contributed to discussions on tourism photography and visual culture (Bell and Lyall 2005; Haldrup and Larsen 2010; Larsen 2008), showing how videography and photography differ. It explained the concepts most relevant to the differences, ranging from those related to technological affordances (visual continuity, multiple moments, multiplicity of cues, and motion) to those related to social practices (high-profile editing, digital distance, and importance of tourist practices). The differing practices of presentation facilitate and necessitate a changing understanding of how videography mediates tourist experiences (Tussyadiah 2014; Tussyadiah and Fesenmaier 2009). The paper explains how videography and photography mediate tourist experiences in different ways: Immersion in the tourist experience, interaction with the digital screen, active performativity, and extension of the tourist experience are all characteristics of tourist videography. In summary, the paper highlighted the reasons why research needs to discriminate between videography and photography, rather than conflate the two forms of tourist media. As such, the paper has started to develop the foundation for a theory of tourist videography.

4.2 Practical Implications

Increased access to video production technology by tourists is not only theoretically interesting. Mansson (2011) has pointed to the growing importance of consumer-generated visual media in creating spaces. However, currently a lot of tourist videos lack information about the destination they are describing. Destination marketers can counteract this tendency by providing high-quality video that highlights a destination for tourists to use in their videos—it is exceedingly simple for tourists to include these clips in their own videos through editing processes, acting as destination ambassadors. Further, destinations can be proactive in not only providing content, but in helping tourists produce it, as in the example of Tourism New Zealand's acquisition of drones to film tourists in their ski destinations. This way, marketers become part of the conversation. Companies are currently developing follow-technology for drones, that is, enabling drones to follow the objects they are filming. This development will make filming even easier.

4.3 Future Research

This paper conceptualized several key differences in practices of presentation and mediation of the tourist experience between photography and videography. Empirical research is needed to test these research propositions. With new technologies, researchers will have to learn new tools of analysis for videos as well as new tools for communicating research results. Videos, in much different ways than photos, showcase which experiences tourists prioritize in their travels. Specifically the

editing process and how it enables to tourists to present their tourist experience is an area in need of investigation. New technologies also may bring with them a changed understanding of how tourists see themselves. Stylianou-Lambert (2012) differentiates between tourists who see themselves as media producers and those who see themselves as media consumers. Bell and Lyall (2005) show that camera phones and the possibility to send pictures changed how tourists behave during a tourist experience in that they see themselves more as media producers. Future research should look into these perceptions as they may be even more pronounced in tourist videography. Further, research is needed on the consequences of an increase in video recording on vacation, specifically in line with the introduced concept of active performativity to understand what it means for engaging in high-risk activities—will tourists endanger themselves in order to capture a video?

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Technology as a Catalyst of Change: Enablers and Barriers of the Tourist Experience and Their Consequences

Barbara Neuhofer, Dimitrios Buhalis, and Adele Ladkin

Abstract Information and communication technologies (ICTs) have had a major impact on the way people experience travel. Tourism research and management have been increasingly interested in exploring the role of ICTs as a potential catalyst of change that enhances tourist experiences. While generic technology adoption barriers are known, there is little knowledge about the specific technological enablers and barriers that determine the potential enhancement of tourist experiences. This paper thus addresses a timely matter as it identifies the key enablers and barriers as well as their implied consequences that shape the enhancement of tourist experiences. Through an exploratory qualitative approach, this study contributes by developing a two-factor model of experience enablers and barriers. Theoretical implications are discussed and strategic implications for tourism management and policy are provided on what actions need to be taken to convert existing ICTs insufficiencies into potential experience enablers.

Keywords Tourist experience • ICTs • Enablers • Barriers • Experience management and policy

1 Introduction

In recent years ICTs have caused a massive impact by changing not only consumer society and various industries, but also by transforming the nature of travel and tourist experiences. For businesses it has become a central endeavour to exploit the potential of technology and instrumentalise it for the creation of meaningful tourist experiences (McCabe et al. 2012; Wang et al. 2012). With the proliferation of ICTs, social platforms, mobile devices, the opportunities of supporting tourist activities, providing and exchanging information and solving need situations have become amplified. A large body of work has drawn attention to the impact, role and value of

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_57

ICTs in the tourist experience (Kim and Tussyadiah 2013; Neuhofer et al. 2013; Tussyadiah 2014). Most recently, studies have advanced knowledge about the adoption and role of smartphones in the tourist experience (Wang et al. 2014a) and the use of smartphones in relation to everyday life (Wang et al. 2014b). As a common tenet, studies recognise numerous benefits of ICTs, as to enrich communications, gather information, share, co-construct and augmented experiences (Tussyadiah and Fesenmaier 2009; Wang et al. 2012; Yovcheva et al. 2013). What however appears to receive less attention are the existing ICTs insufficiencies that can provide potential barriers limiting the creation and enhancement of tourist experiences. Such barriers can include restrictions in telecommunication bandwidth, Internet accessibility, hardware and software functionality, equipment, usage and connection costs as well as privacy, security and legal concerns (Buhalis and Jun 2011; Eriksson 2014). Within technology adoption literature, barriers to the adoption of mobile technologies have been widely discussed (Pagani 2004; Pihlström 2008). For instance, Eriksson (2014) investigated barriers to mobile travel services and identified entry and usage costs as the factors that significantly affect usage behaviour. While these studies have uncovered barriers of mobile technologies in tourism, an exploration of specific enablers and barriers within the tourist experience is however missing. This paper thus bridges the gap and identifies the technological *enablers* that drive and foster, and *barriers* that limit the creation of tourist experiences. It also reveals the consequences caused by barriers. The paper first reviews the recent advances of ICTs in tourism and the tourist experience. The exploratory qualitative in-depth enquiry is outlined, before revealing findings and presenting the main contribution to knowledge, the two-factor experience enabler and barrier model. Last, theoretical, managerial and wider policy implications are discussed.

2 Theoretical Background

2.1 Technology as a Catalyst of Change in Tourism

In the twenty-first century society has undergone a number of fundamental changes. One of the most far-reaching transformations has been fostered by the proliferation of ICTs in everyday life and travel (Wang et al. 2014b). ICTs have long constituted a major driver for change that has altered operations, processes and structures of tourism organisations and become a central instrument for innovation (Buhalis and Law 2008; Hjalager 2010; Stamboulis and Skayannis 2003). Beyond transforming the structural dimensions of tourism, ICTs have been crucial to foster an increasing independence of consumers (Buhalis and Jun 2011), by empowering them to access and gather information, book as well as dynamically share and interact through social media online (Fotis et al. 2011; Sigala 2012; Xiang 2011; Xiang and Gretzel 2010). The recent advances in the mobile sector have brought an additional shift towards the mobility of services, people and the mobility of technology (Gretzel

and Jamal 2009). This shift has fostered a change from static retrieval to dynamic access to information and services in the tourist experience on the move (Tussyadiah and Zach 2011; Wang et al. 2012).

2.2 The Implementation of ICTs in the Tourist Experiences

Several studies have portrayed ICTs as central tools to connect and enable tourist experiences (Neuhofer et al. 2012; Tussyadiah and Fesenmaier 2009), promote increased social engagement and involve consumers to co-create experiences (McCabe et al. 2012; Sfandla and Björk 2013; Sigala 2012). Mobile technologies have been explored as key instruments amplifying these opportunities on the move (Wang et al. 2014a, b). Recent work has underlined the value of smartphone applications to gather information, enrich and construct experiences (Wang et al. 2012) and the use of social networks to support and share on-trip experiences (Kim and Tussyadiah 2013). Moreover, several studies have been leading the knowledge frontier in exploring how augmented reality applications (Yovcheva et al. 2013) and wearable computing devices through Google Glass (Tussyadiah 2014) can augment the physical surroundings and enhance tourist experiences. Despite these opportunities, several underlying issues of new technologies in the effective delivery of tourist experiences have been recognised (Eriksson 2014; Linaza et al. 2012). For instance, Yovcheva et al. (2013) highlight that the use of mobile applications can result in a positive or negative experience change, while Lamsfus et al. (2013) report that context in smartphone applications continues to be a challenging task that is yet to be addressed. As technologies are developing fast, issues in terms of content, design, functionality and usability represent main concerns (Yovcheva et al. 2013). It is therefore critical to capture and address existing issues that, at present, might hinder tourists' abilities to fully exploit the advantages of ICTs within the creation of their experiences.

3 Methodology

3.1 Data Collection

To identify the technological enablers, barriers and consequences of the tourist experience, an exploratory qualitative enquiry was employed by means of semi-structured in-depth interviews. The interviews were guided by an instrument that included a set of pre-defined questions, while allowing for the necessary flexibility to account for participant narratives individually. To extract the consumer perspective on the issue under investigation, a range of questions were asked, as outlined in Table 1. A purposive sampling approach was used, which represents an effective

Table 1 Sample questions experience enablers and barriers

What types of ICTs do you use in the three stages of travel for your experience?
What are the kind activities and situations for which you adopt ICTs in your tourist experience?
If any, what are the main advantages of using ICTs for your tourist experience?
If any, what are the main disadvantages of ICTs for your tourist experience?
Compared to tourist experiences without ICTs, can you describe how technology has positively changed/enhanced your experience?
Besides ICTs improving your experience, have you experienced any cases of ICTs negatively affecting/diminishing your experience?

method when a specific set of pre-defined criteria for selecting participants is required (Bryman 2008). Participants having used ICTs for tourist experiences had to be identified, as only technology users are able to report such experiences (Pihlström 2008). Two criteria were defined accordingly, including (a) technology-savvy consumers (daily social media users and smartphone owners) and (b) ICTs use for travel within the last 12 months to ensure the recollection of experiences. To allow for a profound exploration of narratives, a total of 15 in-depth interviews were conducted in May 2013 in the UK. All interviews were voice-recorded and manually transcribed verbatim to guarantee a rigorous coding and analysis process (Rubin and Rubin 2004). The interviews lasted an average of 1.5 h, leading to a total of 20.96 h of audio-recordings and 286 pages of qualitative transcription.

3.2 Data Analysis and Sample Profile

For the data analysis, Miles and Huberman (1994) approach of qualitative thematic analysis was adopted and supported by the analysis software QSR NVivo 10 for subsequent coding. A six-stage coding process was performed, encompassing a-priori framework coding (1), coding-on and hierarchy development (2), distilling, sorting and meta-coding coding (3), clustering and theme development (4), refining and validating themes (5) and theory building at last (6). By doing so, a rigorous coding procedure was followed, which allowed not only for reflexivity and prolonged engagement with the data, but also ensured a transparent and replicable approach to enhance the reliability of the research (Denzin and Lincoln 1994). Following the assumptions embedded within a qualitative paradigm, the study does not make claims of generalisability to the wider population, but rather seeks for transferability to similar contexts of the study (Holloway and Brown 2012). Table 2 presents the socio-demographic sample profile, which reflects a broad range of demographic factors for a balance of gender, age, education levels and nationalities.

Table 2 Socio-demographic sample profile

Nr.	Pseudonym	Gender	Nationality	Education	Age	Smartphone
1	Laura	Female	Dutch	A-Levels	20–29	Samsung
2	Jane	Female	German	Postgraduate	20–29	iPhone
3	Martha	Female	German	Undergraduate	20–29	iPod/iPhone
4	Veronica	Female	Chinese	Postgraduate	40–49	iPhone
5	Sam	Male	British	A-Levels	20–29	Samsung
6	Paul	Male	British	Postgraduate	60–69	iPhone
7	John	Male	Indonesian	Postgraduate	30–39	Blackberry
8	Sandra	Female	Greek	Postgraduate	20–39	HTC
9	Teresa	Female	Indonesian	Undergraduate	20–39	HTC
10	Andrew	Male	Pakistan	Postgraduate	30–39	Samsung
11	Dan	Male	Greek	Postgraduate	40–49	Blackberry
12	Aaron	Male	Italian	Postgraduate	30–39	iPhone
13	Steve	Male	Belarus	Postgraduate	30–39	Samsung
14	Rachel	Female	German	Postgraduate	20–29	Blackberry
15	Hanna	Female	Vietnamese	Postgraduate	30–39	iPhone

4 Findings

In exploring the possibilities and boundaries of enhancing tourist experiences through ICTs, understanding the underlying technological enablers and barriers is critical. The findings of the study are divided into three main sections. First, the technological *enablers* are presented, highlighting the key features of ICTs, which, when provided, foster and enable tourists to enhance their tourist experiences. The second part turns to revealing the technological barriers that currently represent a major concern in hindering the enhancement of tourist experiences. The third part highlights the consequences of these barriers, before synthesising the findings and developing the main contribution of the study, a two-factor experience enabler and barrier model.

4.1 Technological Enablers of the Tourist Experience

The findings reveal three main enablers, which can be divided into (1) *software*, (2) *telecommunication and infrastructure* and (3) *usage and usability* enablers.

Software Enablers This factor determines the functionalities of applications critical for experience facilitation. Tourists report the need for software to allow for accessing, gathering and managing a range of tourist-related information. Participants highlight that experiences significantly improve if applications allow for push information (automatically sent to the user without having to look for it)

and the personalisable information (filtered based on pre-defined preferences), such as interests, activities and points of interests. The value of push information is that it not only leads to seemingly more effortless but also to unplanned, but personally meaningful experiences:

> "NOW the information finds me... instead of you looking for the information the information is looking for you." (Dan); "Something that is interesting there and I didn't know that and I didn't get it from the map. Maybe for example if there is a drum shop, like I like music, and I can't get that from the map." (Sam)

With respect to content, tourists require a wide range of information based on their specific context and needs. A commonly mentioned enabler regards the functionality to access a variety of information in one place. Rather than using multiple devices, participants value gathering information from one device. Applications need to provide consumer reviews, directions, in-depth and location-relevant information on sights or places, or push and pull information based on current needs. The findings also indicate intelligent learning as a key feature to enable hassle-free and pleasant experiences. Participants report that the learning of personal preferences and the recognition of consumption patterns are highly useful to ease travel. Tourists welcome relevant suggestions that are automatically generated based on their current location and context. Moreover participants underline the importance of speed and one-click availability. Often tourists encounter situations, in which they need to have fast access to information. Thereby, speedy task completion was noted as a crucial feature to avoid distractions in the experience and address instantaneous needs on the go. One participant recalls how such a functionality has enhanced her experience:

> I can open the application and do one click and I'm in my flight because through this application I'm already checked in so with one click I can find out about my flight whereas with my computer I need to first start, then I need to start the internet explorer and then I need to find the website, then I need to log in, so it is so much longer. (Martha)

Telecommunication and Infrastructure Enablers The second factor regards the *telecommunication industry and infrastructure provision* as an essential prerequisite, that not only has a major impact on the potential enhancement, but most importantly, on the enablement of a range of tourist experiences. In fact, tourists report that the availability of 3G and 4G coverage, affordable and speedy Internet access, affordable roaming abroad and the anticipated elimination of roaming are key determinants that shape to what extent technology-enhanced experiences become possible. Moreover, the availability of Wi-Fi hotspots and free Wi-Fi provided by the tourism service providers (restaurants, bars, hotels, public transport), play a crucial role in shaping ICTs use, requiring Internet access, on the move. Only if these features are provided, tourists can undertake specific activities, such as connecting to networks, sharing experiences in real-time, getting directions and accessing information. One participant exemplifies the value of Wi-Fi and the implied ease of gathering information:

> For example if I'm in London and it is extremely good covered... so I jump from one bar to another to try to connect to the Cloud to try to find information. (Aaron)

Usage and Usability Enablers The third experience enabler regards *usage*, *ease of use*, *usability and usefulness*, highlighted as critical for tourists to use ICTs during travel. Participants express the need for ease of access to information, the ease of connecting to and participating in social networks, the ease of use of applications and devices as well as the pleasure and joy of using them. Easy usability was thereby reported as a critical factor to allow tourists a speedy and logical task performance, without investing extensive time during travel to figure out how travel applications work. The usefulness of applications has additionally been reported as essential to positively enhance the tourist experience. In fact, if ICTs applications convey high usefulness, they change the tourist experience by replacing traditional offline resources.

> Technology is more convenient because I click, I type and I will get the information instantly. So this is still my first choice, but of course I can still ask the people, stranger A, stranger B or just to go to ask friends, you know call for example. But it will be a lots of trouble. (Veronica)

4.2 Technological Barriers to the Tourist Experience

Technological barriers can be divided into four main factors, including (1) *hardware*, (2) *software*, (3) *telecommunication and infrastructure* and (4) *usage difficulties*.

Hardware Barriers This barrier describes the hardware issues that keep tourists from using devices during travel. The most dominant issues reported regard the availability of appropriate devices, the use of out-dated technology, battery deficiencies and battery-consuming travel applications. Moreover, the device and screen size has been noted as problematic on both, the lower (too small screens to read information) and the higher end (too large screens and devices to carry around during travel) of the spectrum. For tourists on the move, it has been reported as exhaustive to carry large and heavy smartphones, tablets together with cameras needed for travel. Participants thus emphasise the need for all-in-one devices with a range of functionalities to use during travel. Participants report that battery issues moreover limit their possibilities to use the applications for a long duration, which has been described as particularly problematic when exploring a destination for a whole day or going camping, in which cases tourists have to refrain from using applications to maintain battery life:

> "I like the phone and the possibility because it is very light but the problem is that I don't like really typing on the screen." (Steve); "It's an older phone, which means it is slow... I can download apps but... then my phone won't last even for a day." (Laura)

Software Barriers Software limitations represent a further key barrier factor that can significantly limit tourist experiences. Participants report that applications are often too slow, have incorrect and inconsistent functionalities or pose information

and content problems. Narratives indicate that tourists need to find information when walking through unknown places or visiting a place for the first time. The accurate functionality of maps is thereby essential to get tourists from point A to B. Frequently applications however fail to do so, which causes tourists to abandon ICTs and go back to traditional resources (asking people, road signs, paper maps). Additionally, tourists desire to use applications to gather information, but are commonly confronted with content hurdles. These are the overrepresentation of supplier-produced information (rather than user content and local insights), the problematic display of information (confusing, illogical content structures) and exaggerated frequencies of push notifications transmitted to the user. These software issues represent a major reason for tourists to stop using ICTs and rely on traditional resources instead.

> "An error and saying "oh no your location is actually not available". This is really distracting and then I shut down all the technology and go back to the roots." (Jane); "When you download a lot, sometimes it is so messy, so I also carry that book in case, like to find a list of restaurants." (Hannah)

Telecommunication and Infrastructure Barriers Issues in the telecommunication infrastructure represent a third main barrier, which relates to the lack of Internet connection abroad (international travel), lack of network (rural contexts, camping) and limitations of infrastructure in developing countries (network coverage, Internet availability). Additionally, the common lack of free Wi-Fi provision by tourism service providers (destinations, public transport, airports, hotels) are considerably limiting the opportunities to connect, access real-time information and share experience online. Participants also point to the significant financial burden associated with the need to purchase mobile Internet packages, pay for roaming abroad or acquire Wi-Fi access, which further restricts the extent to which tourists use ICTs during travel. The following two narratives provide insights into such scenarios:

> "There is the Eiffel Tower and then from the Louvre to Notre Dam, and then plan the route in the city. As there are roaming costs we didn't use it." (Jane); "I load it beforehand and then I just have to take it out. And I know where I have to go, so it is kind of just loading the map with the streets, in case I get lost." (Rachel)

Usage Barriers The fourth barrier identified concerns general *usage difficulties* of ICTs during travel. These primarily relate to the inefficiency of applications, slow speed of the system and difficulty of use, which can be problematic for tourists if support is needed from their devices. Participants also report limited usefulness of travel applications, due to the lack of offline availability (critical when Internet is unavailable), range of functionalities and reliable navigation. Usage issues also arise through the extensive use of mobile devices during travel, which can become obtrusive in activities. The physical effort required using ICTs has also been frequently mentioned as a major interference with the experience of places. For instance, carrying around multiple devices whilst on the move and pointing with technology imply usage barriers that limit the pleasure of adopting ICTs for tourist experience creation, as the following narratives underline:

> "There hasn't been something that I found that is EASY carry-able that I can take around with me to use." (Sam); "I mean with the mobile phone and you need to augment it. Holding in my hand, yeah that is annoying." (John)

Having identified four barriers, it appears that the creation of tourist experiences through ICTs is (still) characterised by major technological issues that have a significant effect on the extent to which ICTs can be effectively used for travel. The next section outlines the consequences caused by such experience barriers.

4.3 Barriers of the Tourist Experience and Their Consequences

Four consequences were identified, which are (1) *emotional responses*, (2) *missed opportunities and limitations*, (3) *behavioural consequences* and (4) *monetary burden*.

Emotional Responses The findings reveal that technological issues cause tourists to experience several adverse feelings, such as anger, disappointment and dissatisfaction as well as feelings of uncertainty and agitation. Anger is reported as a common response, which is manifested not only in annoyance and frustration with technology itself, but also in feeling upset because of the additional problems ICTs cause rather than resolve. Participants also report disappointment due to ICTs issues, including sadness (not being able to complete a specific task), emptiness (when ICTs are unavailable) and regret (not having access to information that could have been useful). Moreover, tourists feel dissatisfaction when accepting the state of the technological limitations (not having Internet, not being able to connect) boredom (wanting but unable to use ICTs) and unfulfilled expectations (having expected to be able to use ICTs). Additionally, a high level of uncertainty is reported, including the feeling of being in a crisis, feeling lost and scared, when not having technology as a backup in need situation and withdrawal, when ICTs or Internet access are not available to use. Two participants provide narratives capturing this consequence:

> "I was so upset when I was in China and I couldn't post any news because it was banned, IS banned, because it still is banned. I really want to 'I'm in China'." (John); "It's knowledge. The knowledge behind the history, diversity and the building of the city and the meaning of the city and the buildings. Yeah, so now we just don't know it, which is a pity I think." (Jane)

Missed Opportunities and Limitations The second consequence concerns the impacts ICTs cause on the tourist experience, primarily due to the lack of hardware availability and Internet connection. These include not being able to location-check-in online, share posts in real-time and being cut-off from conversations on social networking sites. The idea that ICTs limitations lead to potential missed opportunities constitutes one of the tourists' biggest concerns. Participants state that ICTs issues can cause missing chances of random social encounters (Facebook/Foursquare location check-ins), knowledge about the surroundings (points of

interests, small local hidden places), live offers and deals (real-time restaurants offers), and real time information (train/bus/flight delays and changes). The lack of ICTs thus not only implies limited opportunities for enhancement, but can effectively change the nature of experiences. One participant narrates a missed opportunity to meet people due to the lack of Wi-Fi.

> My friend was telling me that she was in the same restaurant but I was already at home. I had to check in at home because they told me that they don't give wifi to customers. (Martha)

Behavioural Consequences With technological barriers present, tourists not only show emotional responses but several emerge behavioural consequences. One of these is that tourists decrease their ICTs usage or stop it altogether by shifting to traditional sources. Participants state that if ICTs are restricted or absent, several alternatives come into play. These can include the use of desktop sources (instead of mobile technologies), reliance on free Wi-Fi hotspots (instead of mobile Internet access) and traditional offline information sources, such as asking locals, using guidebooks and paper maps (instead of mobile applications). Another behavioural outcome is complaint behaviour and non-visitation. The lack of Internet or free Wi-Fi forces tourists not only to complain, but also to avoid booking or even go as far as changing existing reservations. These findings provide evidence that ICTs barriers do not only negatively impact on the tourist experience, but also induce major consequences for tourism service providers if they fail to meet the desired technological standards. Recurring participant comments, reflecting such actions, were the following:

> "I'm a little bit concerned with roaming and how much it costs, so I will try to reduce how much I use data, so data-hungry applications, I wouldn't watch a video, unless I know that I'm in a wifi kind of situation." (Dan); "I would almost be inclined to swap hotels. I mean I feel that strongly about it. I think that it is now, a prerequisite really and I always check when I'm looking for a hotel, I always check that they have wifi, FREE wifi." (Paul)

Monetary Burden The final tangible consequence represents increased monetary implications caused by ICTs insufficiencies. These are primarily triggered by the lack of Internet availability provided, which results in roaming charges abroad, additional payments and the costly usage of alternative sources (buying a guidebook instead of using free travel applications). The frequently reported lack of Wi-Fi in public spaces, such as transport facilities, moreover causes an unavailability of real-time information access. This issue has been described as an indirect main cause for high costs as train or flight connections could be missed. Several participants highlight such issues:

> "They don't have free wifi at the airport and you have to pay for that so I'm not using that, so I can't use it YET." (Martha); "The only thing that is stopping me from using the iPhone a lot more abroad is the roaming charge. So it is the cost of it." (Paul)

Having examined the technological experience enablers, barriers and consequences, Fig. 1 provides a two-factor experience enabler-barrier model as the main theoretical contribution of this study. It conceptualises the identified enablers and barriers and their consequences on a horizontal and vertical axis. The horizontal

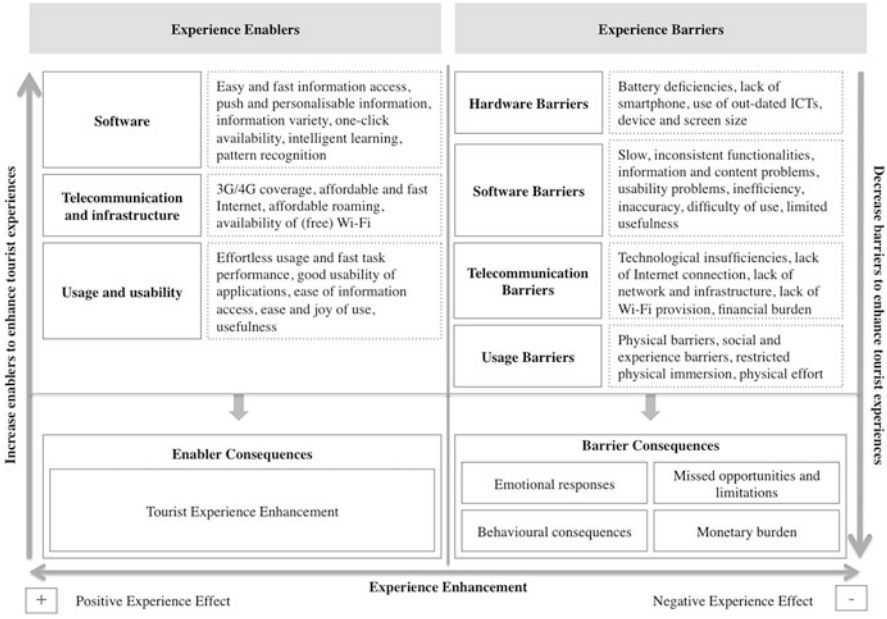

Fig. 1 Tourist experience enabler-barrier model

axis depicts potential experience enhancement, ranging from a ***positive experience effect*** (left side) due to enablers to a ***negative experience effect*** (right side) due to barriers. The vertical axis represents the actions needed to ***increase experience enablers*** and ***decrease experience barriers*** for experience enhancement respectively.

5 Conclusions and Implications

5.1 Theoretical Implications and Further Research

A large number of tourists use ICTs to ease travel, address need situations and enhance their overall experiences. The extent to which this process can occur is however primarily dependent on the possibilities that technology provides. While the impact of ICTs, as a catalyst of change, on the tourist experience has been widely acknowledged (Tussyadiah and Fesenmaier 2009; Wang et al. 2012), an understanding of the specific technological enablers and barriers has remained scarce. On theoretical grounds, this study thus makes a contribution to tourist experience and ICTs literature (Neuhofer et al. 2012; Tussyadiah and Fesenmaier 2009; Wang et al. 2014a, b), in that it has (a) identified the technological enablers, barriers and consequences of the tourist experience and (b) conceptualised these in an experience-barrier model for (c) a better understanding of how these factors

relate to experience enhancement respectively. Several limitations need to be acknowledged of this qualitative research, which has been carried out in the frame of a bigger study. Beyond uncovering the consumer perspective, a wider scope would be needed to assess supplier and stakeholder views to allow for a more holistic picture of how ICTs enablers and barriers are interdependent and can be conjointly managed from a multi-stakeholder perspective. Due to the qualitative nature and purposive sampling approach of this research, further quantitative research could build on this study. It could not only verify the findings and the developed model on a larger scale, but also test the correlation between specific enablers, barrier and consequence factors.

5.2 Managerial and Policy Implications

The findings offer several strategic implications for tourism management and policy. To better support tourists in the creation of their experiences, the facilitation of technological resources is critical on multiple levels. One of the primary roles of tourism providers is to build the '*experience resource environment*' that offers the necessary technological prerequisites that tourists need during the pre/during/post travel process. While tourists might use their own devices, it is the service providers who need to ensure that the technological capacities, through accessible services, applications and infrastructure are provided. If these prerequisites are fulfilled, important implications can unfold, as consumers can more effectively connect, engage, share and enjoy their experiences. By being interconnected through a plethora of platforms and devices, tourists can co-create their experiences, not only with their private social networks but also with service providers at large.

From a wider policy perspective, resource facilitation will be a key issue to be addressed in services contexts over the years to come. Services providers are only partially able to facilitate tourist experiences, but most importantly rely on the cooperation with a wider policy framework to provide the necessary macro-environments, infrastructural resources and facilities to allow for technology facilitation. For instance, while hoteliers and restaurants might provide eConcierges, social platforms and mobile solutions on a micro service-encounter level, DMOs are needed to provide Internet and Wi-Fi in public places and transport on a wider regional level. On a wider governmental scale, decision makers can influence the necessary laws, policies and regulations that determine the availability of technology networks and infrastructure. In fact, with recent considerations to regulate data roaming prices in the European Union, the use of mobile applications for travel can be predicted to increase in coming years (Eriksson 2014). Highlighting roaming issues, international phone and data charges and the consequent monetary burden as a core barrier of experience enhancement, one of the currently most critical issues regards the abolishment of these charges. This is a pressing concern that particularly affects international tourists who need and want to use their devices and applications abroad. It is thus the collaboration between multiple stakeholders

that plays a decisive role in a stronger facilitation of experiences on a service, destination and wider policy level.

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Disconnected and Unplugged: Experiences of Technology Induced Anxieties and Tensions While Traveling

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Abstract The purpose of this study is to explore the experience of being disconnected while traveling for technologically savvy travelers. This paper will explore how new technologies 'separate' travelers from the physical and embodied travel experience, and how experiences and tensions caused by being disconnected or unplugged are negotiated. For this study, travelers' experiences were elicited through a series of online interviews conducted primarily through email and Facebook. Pearce and Gretzel's (Int J Tourism Sci 12(2):1–20, 2012) technology-induced tensions and recent literature on internet/technology addiction provide a conceptual framework for the analysis.

Keywords Mobile technology • Tourist experience • Smartphone • Technological involvement • Spillover

1 Introduction

The developments in mobile networks, broadband, and Wi-Fi internet access, mobile devices and apps, cloud computing, and online communities have altered the travel and tourism landscape (Hannam et al. 2014; Paris 2011). Traditional binaries of tourism research (home/away, work/leisure, presences/absence, etc.)

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_58

have blurred as we become more 'involved' with our smart devices, social media (Hannam et al. 2014), and other recent advances in information and communication technologies. Recent research has also started to examine the impact of being 'constantly connected' on mental health, family, work, and other aspects of daily life (Harwood et al. 2014).

We are witnessing a hybridization and virtualization of physical and virtual spaces (Paris 2009, 2012a), as well as a blending of 'home' and 'travel' space and time, which has been referred to as 'digital elasticity' (Pearce 2011; Pearce and Gretzel 2012). Individual's everyday use of technology frames their use while traveling (Wang et al. 2014). While these innovations and the conceptualization of the 'tourist' experiences have received considerable recent attention in the academic literature, there has been relatively less attention focused on how individuals negotiate this constant (and expected) connectivity and the pervasive use of devices while traveling. Further research is needed into how travelers manage challenges and threats to their connected and technologically mediated lifestyles and how they address the tensions and anxieties that they experience when they are disconnected or 'unplugged' while traveling (Germann Molz and Paris 2013).

The close virtual proximity (Paris 2011), constant connectivity, intimacy afforded (Germann Molz and Paris 2013), and smartphone involvement/dependency (Wang et al. 2014) can all distract individual's attention from their physical experiences. Constant connectivity enhances the sense of obligation for travelers to maintain a normative level of presence, attention, and intimacy with their friends and family (Larsen et al. 2007). Pearce and Gretzel noted that 'the experience of being unplugged involves several strong sensory elements or more precisely the absence of highly familiar sensory inputs' (2012: 39). For some of the hypermobile elite and an expanding number of individuals managing complexity caused by the mobilites of the contemporary networked society, being 'unplugged' is upsetting and produces feelings of distress and anxiety (O'Regan 2008). As individuals navigate their increasingly complex work, social, personal, family lives in both the 'real' world and the virtual world, there is a clear expectation and perceived necessity to be constantly connected.

On the other hand, some tourists are now choosing to be 'unplugged' while traveling, seeking an escape from 'connectedness' and, in a sense, therapeutic rehabilitation. The distress, anxiety, or even 'rehabilitation' of these connected travelers parallels recent literature that articulates and conceptualizes excessive, disruptive, and/or risky technology usage and connectivity using terminology from the study and treatment of addiction (Young 1998; Byun et al. 2009; Harwood et al. 2014). Turel et al. (2011a, b) noted that individuals have been shown to have difficulty controlling their use of technology in particular cases, which they attributed in part to social commitments, expectations, and to addictive dispositions tied to the technology itself.

The purpose of this paper is to explore the tensions and anxieties of being disconnected while travelling through the narratives and experiences of 'technologically savvy travelers' (who are defined by their self-identified high level of social media and mobile smart device use).

2 Literature Review

2.1 Travelling in Dead Zones

The perception of being disconnected, unplugged, and/or travelling through a 'dead zone' is quite different nowadays for travelers. While previously, this perception would be based on physical isolation, today it is also based upon a perceived virtual isolation, as travelers juxtapose their 'disconnected' and 'connected' experiences. While dead zones have been defined as sparsely populated, remote destinations that lack Internet connectivity (Pearce and Gretzel 2012), the same concept can be applied when individuals are unable to connect while traveling even in heavily populated locations. Service disruptions, lost smart-phones, inability to find a 'free Wi-Fi hotspot', or insufficient bandwidth can all result in a 'dead zone' experience for travelers.

The dead zone, whether expected or unexpected, can create a sense of anxiety or tension for travelers used to the affordances of connected travel (Germann Molz and Paris 2013) and daily life so common today. Pearce and Gretzel (2012) conceptualized several technology induced tensions resulting from traveling in technological dead zones. These include social communication, work communication, security escape, and the immediacy connectedness tensions.

2.2 Social Tensions

Social tensions highlight the confrontation of the expectations of constant connectivity (Pearce and Gretzel 2012). These tensions can be exacerbated for individuals that have high levels of use and involvement with their social technologies. Increased use of a smart-device while traveling can be disruptive to an individual's experience and to people in close physical proximity to them. Additionally, a high level of involvement with the smart-device and other social technologies could indicate, in some cases, a potentially problematic and anxiety creating habit.

Increased levels of 'Smart-device involvement' have been found to influence/predict feelings of depression and stress (Harwood et al. 2014). Walsh et al. (2010) noted that individual's mobile phone involvement had both cognitive and behavioral dimensions. The cognitive component of involvement includes thinking about the phone, the need to check to see if anything has 'happened', feelings of depression or social isolation when separated from the phone, and the keeping the phone in close physical proximity. Behaviorally, smart-device involvement can result in the preoccupation and compulsive checking of the device for updates, messages, or other 'rewards', which can become automatically triggered behaviors that can lead to the formation of habits or addiction (Harwood et al. 2014).

These habitual behaviors can spill over during travel, as Wang et al. (2014) found that many of their respondents attributed a large part of smartphone use

during travel to habits, norms, and obligations originating in their 'daily lives'. While the checking of a smart-device can provide individuals with interesting updates, events and lots of utility (especially during travel), they also are used to alleviate boredom and cope with everyday situations that do not provide stimuli (Oulasvirta et al. 2011) or from which they want to escape (sitting next to a stranger on a bus) (Wang et al. 2014). However, many of these 'updates' are full of 'trivial information', another aspect of the social tensions highlighted by Pearce and Gretzel (2012). They allow a proliferation and sharing of the most mundane aspects of daily life or the travel experience (Hannam et al. 2014), which may actually motivate people to 'escape' and disconnect by choice while on vacation.

2.3 *Security-Escape Tensions*

Another main technology induced tension suggested by Pearce and Gretzel (2012) is the 'security escape tension': the perceived issues of increased risk regarding personal safety and health, concern with notifying others of personal wellbeing and the worry caused to others. Nowadays individuals are followed through a 'surveilling gaze' that allows their personal networks to unobtrusively monitor or track them as they travel (Germann Molz and Paris 2013). Often this monitoring in the background allows individuals to feel at ease, knowing that their 'safety net' is in close virtual proximity.

However, when disconnected, particularly unexpectedly, tension and anxiety can arise for both the individual and their network (Paris and Rubin 2013). On the other hand, this close virtual proximity, expectation of connection, and high level of virtual intimacy can create feelings of discomfort and claustrophobia (Crawford 2009) driving people to disconnect. Of course, in cases of planned or expected disconnection, any anxiety (both personal and for an individual's social network) can be mitigated with some planning ahead.

2.4 *Immediacy Connectedness Tensions*

The immediacy connectedness tension can create an introspective environment where the traveler is focused on the present. In these reflective experiences dormant skills can be stimulated, for example using a paper map, and individuals may evaluate the necessity and level of existing connectedness outside of the 'dead zone' experience (Pearce and Gretzel 2012). This tension can be seen as a manifestation of a society of connected individuals who are becoming increasingly embedded in their technologically mediated personal, social, and professional lives.

Recent advances in technology have removed barriers of physical presence and geographic distance to allow for immediate connection and interaction anyplace and anytime. This can result in an individual being both virtually 'at home' even

while being 'away' physically (White and White 2007). It is becoming more common for there to be an expectation for immediate connectivity and response both at work and among personal relationships. For the travel experience, this can often distract individuals from their immediate surroundings and experiences, as well as isolate travelers from social interactions with other travelers and individuals in host communities (Paris 2012b). How those tourists or workers mitigate that conflict or tension may be determined by their initial travel intent and the level of perceived necessity for staying connected.

2.5 Work Communication Tensions

Work communication tension negatively creates a sense of missed opportunities, perceived work overload, compromises assumed availability, and limits micromanagement (Pearce and Gretzel 2012). For some travelers, being disconnected (even unexpectedly) can be beneficial or perceived positively as the often overused excuse "I can't be reached" is actually true. For others though, the violation of the assumed availability caused by being disconnected can cause work related anxieties. This anxiety can be dependent upon whether the traveler was implicitly intending to work while traveling, and thus the motivation for the trip is an important consideration. However for many individuals their work, travel, and virtual connectivity are all interconnected. Regardless of the capacity or work to travel ratio, greater importance has to be placed on delineating between the example of working-holiday tourist and the tourist stuck working (Clarke 2010; Uriely 2001).

As mobile devices are often used for both personal and work related communications, there is the potential for tensions to arise and be exacerbated (Berger and Paris 2014). These devices are liberating users from the confines of work 'spaces' creating and extending physically antisocial behaviors into home spaces and other non-work environments (Turel et al. 2011a, b). While being constantly connected does allow individuals a certain level of perceived control over their work based communications and activities (Middleton 2009), unexpected disconnection can violate this perceived sense of control. A respondent of Middleton's study went so far as to explain, that the connection (through a Blackberry) can be treated as a "pet" that can be coddled and attended to regardless of location. Turel et al. (2011a, b) suggest that organizationally pervasive technologies can result in technological addiction, even though they can increase productivity. Other recent studies have suggested that social networking technologies are 'addiction prone' (Tarafdar et al. 2013; Turel and Serenko 2012), and a large number of adults consider themselves 'addicted' to smart-devices (Ofcom Report 2011).

2.6 Technology Addiction

Clinicians, researchers, media, and the wider public have given more attention to non-substance addictions including those to the internet, videogames, mobile devices, etc. (Karim and Chaudhri 2012). Research on the legitimacy of technology and Internet addiction began in the mid-1990s (Griffiths 1996). The technology and Internet addiction literature has focused on classification (e.g. Widyanto et al. 2011), how individuals can become disengaged from reality, the similarity of symptoms to other types of addiction, and estimations of the addiction's prevalence (Young 1998). Internet Addiction Disorder (IAD) interchangeably referenced as Problematic Internet Use has been an area of academic interest since the term was coined in 1996 by Ivan Goldberg. One early attempt at classifying the behaviors related to IAD was provided by Young's (1998) criteria, included in Table 1. While attempts like Young's have resulted in mixed results and have received criticism within the psychology literature, they are still quite useful as an exploratory framework for the analysis of technology use.

Recently, Dodes' (2009) examination of the psychology of addiction suggests that an individual's anxieties can provoke feelings of helplessness or powerlessness, leading to a perceived threat to the person's self-esteem and ultimately a compulsive behavior that displaces those feelings. Within the context of our paper, this could suggest that control over 'being disconnected' would play a strong role in the anxieties and tensions that arise for travelers. Research by Middleton (2007) on BlackBerry users explored the relationship between user perception of balance and control over their devices, and the practicalities that resulted from their device's always-on and always-connected nature. Middleton's findings suggested that the constant connectivity and mobility of the device influences the individual's ability to disconnect as both user reliance increases and corresponding expectations of social and professional responsiveness increase. Even in cases where individuals were shown to make clear distinctions between work and non-work times, the introduction of the BlackBerry encouraged that time be spent disproportionately on work-related activities.

In an early study on mobile social networking, Humphreys (2008) built upon existing research that showed that in addition to aiding the maintenance of existing social connections, mobile phones can contribute to 'atomization and privatization' which hinders in-person interactions. Humphrey's research suggests that even when individuals temporarily disconnect from the network, it is difficult to disengage because updates are readily available and archived once their connection is re-enabled.

Germann Molz (2006) argued that these technologies are playing an increasingly important role in shaping the way we relate to and engage with our peers socially within a travel context. Turel et al. (2011a, b) note that tourists have been shown to have difficulty controlling their use of technology due to social obligations, norms, and expectations as well as to the addictive behaviors tied to the technology itself, which was also a key spillover effect of smartphone use in everyday life on travel in

Table 1 Respondent quotes, technology-induced tensions, and technology addiction criteria

Young's criteria		Respondent quote	Likely tension if in a dead zone
Pre-occupation	Constantly thinking about past/future use	*. . .I'm sure technology constantly distracts me from travel experiences because I'm obsessed with it and it's in my face every day* *. . .Every time your smartphone beeps, buzzes, or vibrates when you're trying to absorb yourself in another culture or place, you're losing something in the experience*	Immediacy connectedness
Increased use	More and more time required to reach satisfaction	*. . .For the first 3 days of the trip to Greece (before my phone was lost/stolen), I was constantly checking it and using it as a way to fill time. I would play saved games on it versus getting to know the people around me or exploring my surroundings. I also felt more distracted, as I was responding to e-mails and texts from people on an almost real-time basis*	Immediacy connectedness Security escape tension
Inability to stop	Cannot reduce/halt use of internet services	*. . .I don't know what "unplugging by choice" would mean—being in a place with Wi-Fi signal and not using it? For the last 5 years I haven't travelled without either my laptop, or my iphone or both I chose places to visit or stay based on whether they're good or not, not on whether or not they have Wi-Fi*	Social communication
Withdrawal symptoms	Noticeable impact on mood and state of mind	*. . .The only times I have real 'Internet Withdrawal' symptoms are when there is *supposed* to be Internet access but it doesn't work properly*	Social communication
Lost sense of time	Regularly lose track of time and important deadlines	*. . .Focusing too much attention online with social media sometimes causes me to forget the special moments of travel, worrying more about posting things online than enjoying the occasion. Most of the time my girlfriend, now my wife, sets me straight*	Immediacy Connectedness
Risky behaviors	Jeopardizes key professional or personal relationships	*. . .Technology has presented a challenge at times to relationships. I remember sitting across the table in a cafe in Siberia with my girlfriend last winter (who was kind enough to come with me to Siberia in winter). I was well engrossed in social media at the expense of what could have been a great real life conversation. In hindsight it was downright rude*	Immediacy connectedness Social communication

(continued)

Table 1 (continued)

Young's criteria		Respondent quote	Likely tension if in a dead zone
Escapism	Excessive use of internet to avoid real-life problems	*. . .When I'm traveling in an area with Wi-Fi, the temptation is always there to check email and Facebook, post to Instagram, and so on. When you're in a place (disconnected), the temptation is removed and it's one of the most refreshing things ever*	Social communication Immediacy connectedness

research by Wang et al. (2014). With this brief review of literature on the impacts of recent technological devices on the travel experience and the potentiality of tensions and anxieties to form for travelers when they are disconnected, this study examines the short narratives of tech savvy' travelers. Through these shared experiences of disconnection, this study contributes an exploratory glimpse into an important dimension of the technologically mediated travel experience.

3 Methods

For this study, travelers own experiences were elicited through a series of online interviews conducted primarily through email and Facebook in August 2013. Three prompts were used: (1) Share a story or experience about how technology (mobile or social media) has disrupted or separated you from the 'travel experience', (2) Share a story or experience from traveling in a 'technology dead zone' where you were disconnected from your online social networks, (3) Have you ever 'unplugged' by choice while traveling? Why? Please share a story.

A snowball sampling technique was employed via Facebook and email in August 2013, during which self identified 'heavy users' of social media and mobile devices were asked to respond to the three prompts. The respondents included 13 men and 12 women and a range of ages (eleven 21–30, eight 31–40, two 41–50, and four 51+ years old). The sample was composed of individuals from North America (16), Europe (5), Australia (2), and Latin America (2), and about half earned some sort of income through their blogs based upon their own personal travels. Travel bloggers were specifically targeted in order to gain insights for individuals that were (at least partially) financial dependent on being connected and traveling.

Analysis of responses was conducted using a multi-stage process of coding/thematic analysis. During the first stage two of the researchers independently coded a sample of data using 'a priori' categories (presented in column 4 of Table 1) based on Pearce and Gretzel's conceptual framework 'Technology-induced tensions in

dead zone tourism' (2012). During this initial coding both researchers recognized the prevalent use of 'addiction' terminology used by the respondents. Therefore an additional set of 'a priori' categories (presented in column 1 of Table 1) were established based on Young's (1998) criteria on 'technology addiction', and all of the data was then coded by the same two researchers using both sets of 'a priori' categories. The two researchers agreed on the definitions of the 'a priori' categories, based on the explanation of these categories in the previous applications. It was important that a shared understanding of the categories was established, as the calculation of inter-coder reliability is not appropriate for this situation as the coders both agreed that the 'a priori' categories do not fulfill the assumption that they are independent, mutually exclusive and exhaustive (Cohen 1960).

4 Discussion of Findings

In Table 1, illustrative quotes are organized according to Young's (1998) criteria for Internet Addiction. Additionally, for each criteria, one or more of the 'technology induced tensions' (Pearce and Gretzel 2012) are included. In our study, we found that the travelers' reliance and expectations associated with social and mobile technologies often corresponded with negative experiences that they shared. An example of this is clearly illustrated by the 'Siberian café' story in Table 1. Several respondents gave examples of how technology distracted them from their travel experiences, often unconsciously at the time, as they were preoccupied with their social and mobile technologies. Respondents conveyed a feeling of being "programmed" to fill downtime with technology vs. real world experiences, a similar response to findings in Wang et al.'s (2014) recent study on smartphone use during travel.

Pearce and Gretzel (2012) noted that technology induced tensions often cause both positive and negative feelings for travelers when they are disconnected, and that the intensity of the tension is related to the unexpectedness of being disconnected/unable to connect virtually. This mélange of feelings is evident in some of the selected quotations presented in Table 1. Additionally, how those tourists mitigate and deal with the tension is influenced by their initial intent of trip, the perceived necessity of staying connected, and the perceived level of control/choice over the disconnection.

In our study, many of the 'travel bloggers' noted that they experienced high levels of work communication tension when they were going into a dead zone, but if they had advanced warning they would employ strategies, such as scheduling posts for when they were 'away', in order to minimize the impact of being disconnected. Conversely, several also noted occasions where they had very negative responses or anxieties due to an unexpected disconnection. Dead zones create a space for introspection that is warranted, yet unwelcomed, for some whereas it is desired and demanded by others. Individual responses to these tensions often were expressed using metaphoric addiction language (Table 1).

Pearce and Gretzel (2012) noted several positive outcomes from the technology induced tensions of dead zone tourism, including the reflection, evaluation, and in some cases behavioral change in regards to the value or necessity of connected travel. Our findings suggest that some individuals are able to 'rehabilitate' themselves, change their behavior, and/or actively seek out opportunities for travel in dead zones. This is an important consideration for the tourism industry as technologically mediated travel becomes even more prolific. It also provides an area for future study as research on how individuals are coping with technology addiction while traveling is largely uncovered within the tourism literature. It has, however, started to receive increasing amounts of coverage in the media (Doyne 2013; Horn 2013; Lovitt 2013).

Groups like Digital Detox (thedigitaldetox.org) have emerged promoting "off the grid, no boss, no internet, no cell phone, no clock, no work" events, retreats, and summer camps. In 2013 NBC posted an article titled, "Tech-addicted travelers 'disconnect to reconnect'" which cited that 80 % of smartphone owners don't leave the house without their device. It highlighted rules such as "no cell phones in the bedroom" and a Yoga retreat that provides a 15 % discount to guests that turn over their electronics for the entirety of their stay (Lovitt 2013). The New York Times has offered suggestions such as the "phone stack game" during dinner parties, and establishing no-phone zones (Doyne 2013). The popular tech blog Gizmodo published, "The Right Way to Disconnect from Technology on Your Next Vacation" which outlined several rules that ranged from the benign "Change your whole home screen, actually" and "Make rules and stick to them" to the more extreme "Delete work email from your phone" and "Don't pack your laptop" (Horn 2013).

Many of our respondents gave examples of personal rules, such as 'leaving their phones at home' or carving out specific times/places during their trips when they would 'reconnect' virtually. Additionally, several individuals suggested that escaping the connected world allowed them to refresh their minds, allowing for a better 'vacation experience'. However, for some respondents, the trial disconnection, even for a short period while traveling actually caused them a higher level of anxiety. In these cases, the respondents suggested that even if they physically 'turned off' their devices or 'unplugged' mentally they were still thinking about being connected or what they were missing out on by being disconnected.

Hotels are developing offers and programs, to target the potential 'digital escaper' market, where guests are asked to give up their technological devices. For example: Four Seasons Costa Rica's 'disconnect to reconnect' program, Lake Placid Lounge's 'check-in to check-out' package, Riverplace Hotel in Portland's 'romantic revival' package aimed at rekindling romance between couples without the digital distractions, and the 'luxury boot camp' at the Ranch in Malibu which allows travelers to rid themselves of technology while also focusing on physical and spiritual health (Haq 2013).

The findings also illustrate a particular tension for mobile networked workers, like the travel bloggers in this study, who experience a tension between a dependency on being connected and self-identified problematic usage. One respondent, a full time travel blogger, reflected on a time in Dahab, Egypt where he shut himself

up day and night in his room writing stories for his blog. He expressed concern that he was only emerging for meals, and was mindful of the fact that he was actually missing out on the destination he was in, and that he'd probably never have a chance to return.

Popular travel bloggers, such as Ayngelina Brogan, author of Bacon is Magic, who are 'professional travelers' and make their income through social media and the internet have written on the advantages and need for disconnecting. Her blog post notes, "I know I have a problem" and when commenting on being in a quasi-dead zone states, "I have felt the immediate, panicky withdrawal symptoms. I know they will go away. I know that life will go on if I am not on Facebook". She closes the post out by noting that, "My addiction to the internet burns me out and drains my creativity".

5 Conclusion

The tensions and anxieties when disconnected while traveling are likely to increase as individuals embrace the freedom of mobility afforded by smartphones, mobile bandwidth, and cloud computing. As our ability to socialize, play, work, and learn become more dependent on mobile technologies and less dependent on physical location, a greater level of spillover between travel and non-travel experiences is likely. Thus, in addition to the great opportunities and potential afforded by the advancements in mobile technologies, there are psychological, social, and even ethical concerns that should be examined. In the travel context, one particular aspect that will influence the level of anxiety and type of tensions travelers experience by being disconnected is their level of control over the decision to be connected. A traveler can take measures and precautions to avoid being 'plugged in' or 'reachable', for example, 'leaving the work phone at home'. Additionally, if a traveler knows ahead of time that they are traveling to a dead zone they can take additional precautions for keeping connected even while absent by scheduling blog posts, informing their online networks that they will be 'off-the-grid', etc.

In these cases the traveler has a level of control or prior knowledge about the level of connectivity to expect during their travel experience, and even if it is uncomfortable, connectivity can still be 'managed'. In cases where there is a lack of control or prior knowledge disconnection can have a negative impact, for example an individual is disconnected by accident due to a lack of infrastructure or connectivity that is inconsistent and/or expensive creating an unexpected barrier to staying 'plugged in'. The intent of the trip tends to foreshadow the traveler's reaction to the dead zone. The purpose of travel needs to be delineated, because the basis for the travel could determine the perceived joy or anxiety associated with not being connected.

In practice, there may be some potential for 'disconnected holidays' to be developed and marketed toward travelers seeking refuge from their over-connected and over-stimulated daily lives. Additionally, the findings of this study suggest that

cases of disruption or inability to connect while traveling can cause quite powerful emotional and behavioral responses, which has practical implications for the industry. Customers now have a general expectation that they will be able to connect while traveling, and barriers to this connection could cause negative reactions, negative satisfaction, and thus have real-world implications for tourism businesses.

This paper provided an exploratory glimpse at the experiences of being disconnected for a small group of travelers. The findings are not generalizable, but instead provide a basis for further study. As this study focused primarily on technologically savvy individuals from predominately western societies, future studies should extend the breadth of this study to include populations from other cultures/societies contexts. Additionally, studies examining the behaviors and reactions to being disconnected during travel for solo travelers, travelers in groups or with family, business travelers, and travelers with different motivations could provide additional insights. Future studies employing ethnographic, auto-ethnographic, quantitative and experimental methods would be appropriate.

Acknowledgements An earlier version of this paper was presented at the Travel and Tourism Research Association annual conference held in Bruges, Belgium in June 2014.

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An Exploratory Study on Drivers and Deterrents of Collaborative Consumption in Travel

Iis P. Tussyadiah

Abstract Due to the rise of businesses utilizing the sharing economy concept, it is important to better understand the motivational factors that drive and hinder collaborative consumption in the travel and tourism marketplace. Based on responses from 754 adult travellers residing in the US, drivers and deterrents of the use of peer-to-peer accommodation rental services were identified. Factors that deter the use of peer-to-peer accommodation rental services include lack of trust, lack of efficacy with regards to technology, and lack of economic benefits. The motivations that drive the use of peer-to-peer accommodation include the societal aspects of sustainability and community, as well as economic benefits. Based on the empirical evidence, this study suggests several propositions for future studies and implications for tourism destinations and hospitality businesses on how to manage collaborative consumption.

Keywords Collaborative consumption • Sharing economy • Peer-to-peer accommodation • The mesh • Peer-to-peer rental

1 Introduction

In recent years, the phenomenon of sharing economy has emerged in the travel and tourism marketplace. ICT enables the development of this socio-economic model by facilitating the creation and sustenance of online peer communities. The increasing connectivity, propagated by online social network platforms, allows people to share access to products and services among each other. Belk (2014) explains this phenomenon as collaborative consumption, where people coordinate "the acquisition and distribution of a resource for a fee or other compensation" (p. 1597). Similarly, referring to it as market-mediated access-based consumption, Bardhi and Eckhardt (2012) explain the domain of collaborative consumption as consumers gaining access to goods and services by paying for the experience of temporarily accessing them, highlighting that no ownership is transferred in these transactions.

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_59

Businesses leveraging the sharing economy have flourished. Companies such as Airbnb and Uber develop scalable platforms empowering individuals to distribute and share access to excess capacity of accommodation (e.g., spare rooms) and transportation (e.g., cars or bicycles sitting idle) with one another. They act as a matchmaker by creating a global network connecting individuals with underused assets and others who are willing to pay for using them and, in so doing, allocating resources where they are needed (Economist 2013). Revenues generated from the sharing economy have surpassed US$3.5 billion in 2013 with growth exceeding 25 %, making it a disruptive economic force (Geron 2013).

Many believe that the sharing economy is an appealing alternative for consumers due to its economic benefits (i.e., low cost), which was considered important after the global economic crisis (Bardhi and Eckhardt 2012; Walsh 2011). However, Botsman and Rogers (2011) argue that collaborative consumption is driven by motivations that extend beyond cost-savings. Gansky (2010) suggests the changing consumers' attitude towards consumption as a motivational factor that drives the sharing economy. Consumers are willing to try out new brands (Gansky 2010) and are more open to new ways of accessing what they need (Botsman and Rogers 2011; Bardhi and Eckhardt 2012). Additionally, consumers are increasingly aware of the pressure that (over)consumption can pose to the environment. The idea of sharing idle capacity to reduce environmental concerns, the renewed belief in the importance of community, and cost-consciousness move consumers towards the practice of sharing, openness and collaboration (Botsman and Rogers 2011; Walsh 2011). Hence, it is suggested that collaborative consumption will continue to grow even when the economy is fully recovered.

The sprouting business model presents opportunities and challenges for travel and hospitality business as well as tourism destinations. According to a study by HR&A Advisors (Geron 2012), travellers utilising Airbnb spent a total of US$56 million in San Francisco, CA over the course of 1 year, generating income that is crucial to the local residents. On the other hand, the rise of such businesses also poses a critical question as to whether it creates a new market in the travel industry or replaces existing one (i.e., serves as a substitute to the established accommodation sector). Additionally, it is also important to assess the longevity of such business model given the ever-changing business environment in travel. To provide answers to this research issue, it is important to identify the motivational factors that drive or hinder travellers from engaging in collaborative consumption and to assess the potential impacts of this business model in creating a new tourism and hospitality market. Hence, using peer-to-peer accommodation rental services as a context, the goals of this study are threefold: (1) to identify the market characteristics of collaborative consumption (i.e., who the users are and how they are different from non-users), (2) to assess the motivational factors that drive collaborative consumption among users, and (3) to assess the deterrents of collaborative consumption among non-users.

2 Literature Review

2.1 Personal Innovativeness and Collaborative Consumption

Understanding the characteristics of consumers who participate in collaborative consumption will provide a better understanding of the market and its behavioural patterns. Demographic characteristics are associated with the market of the sharing economy. For example, Olson (2013) shows that younger demographics find collaborative consumption appealing (32 % of Gen X and 24 % of Millenials, in contrast to 15 % of Baby Boomer). Even though it seems counterintuitive, she also shows that consumers with higher income levels are more likely to participate in collaborative consumption. Collaborative consumption is characterized as innovative and on-trend (Botsman and Rogers 2011; Walsh 2011); a reinvention of what it means to be a citizen (Buczynski 2013). Hence, the diffusion of collaborative consumption can be associated with personal innovativeness traits, which explain consumers' proneness to try out new things, products, ideas, technologies, etc. Indeed, literature in marketing and management emphasizes the importance of lead users (i.e., those who are ahead of an important marketplace trend), suggesting them as a valuable resource for development, adoption, and diffusion of new products and services (von Hippel 1986). In line with diffusion theory (Rogers and Shoemaker 1971), it is suggested that there are always some consumers that perceive the need for new products earlier than others. These innovative consumers expect high benefits from new products and services and tend to adopt new products and services more heavily and quickly than others (Urban and von Hippel 1988). Therefore, it is suggested that consumers who participate in collaborative consumption are more innovative.

Based on the abstraction level of the traits, the measurement of personal innovativeness is differentiated into general and domain-specific innovativeness (DSI) (Goldsmith and Hofacker 1991). DSI reflects consumers' tendency to adopt new products within a specific domain of interest (e.g., product category). Past research confirms that DSI is more predictive of a particular behaviour than the general innovativeness traits (Agarwal and Prasad 1998; Goldsmith et al. 1995). Therefore, DSI should be applied to travel/tourism and ICT domains in order to predict travel-related behaviour involving the use of ICT. For example, Couture et al. (2013) show that innovativeness in the domain of tourism positively influences online behaviour, which includes number of visits to travel websites, average time between visits, online travel purchase, and other behaviours when using travel websites. Therefore, it can be suggested that users of collaborative consumption have high innovativeness traits in the domain of tourism. Perceived innovativeness in the domain of ICT is defined as an individual's willingness to try out, or experiment with, new technologies (Agarwal and Prasad 1998). Empirical evidence from e-commerce research indicates the predominance of this variable as a predictor of online behaviours (Goldsmith and Lafferty 2001). For example, San-Martín and Herrero (2012) suggest that innovativeness in ICT influences traveller's intention to make a

reservation for rural accommodation online. Therefore, it can be suggested that users of collaborative consumption have high innovativeness traits in the domain of ICT.

2.2 The Motivational Factors for Collaborative Consumption

In a market report on collaborative economy, Owyang (2013) suggests three drivers of collaborative consumption: societal (e.g., increasing population density, drive for sustainability, desire for community, etc.), economic (e.g., monetize excess inventory, increase financial flexibility, etc.), and technology (e.g., social networking, mobile devices, and payment system). From the consumers' perspective, several motivations underlying participation in collaborative consumption have been suggested, despite supported by anecdotal evidence. The global economic crisis caused consumers to rethink their values (Gansky 2010), to be more mindful with their spending habits, and to be more resourceful (Comunispace and Ogilvy 2011). In an increasingly liquid society where the relationship between attachment to material possession and wellbeing has become problematic, what is valued are ever changing (Bardhi and Eckhardt 2012; Botsman and Rogers 2010). The movement towards collaborative consumption is driven by the increasing value of access as an alternative mode of consumption, as opposed to ownership (Bardhi and Eckhardt 2012; Botsman and Rogers 2010). That is, collaborative consumption is perceived as offering more value with less cost (Botsman and Rogers 2010; Gansky 2010; Lamberton and Rose 2012; Sacks 2011). In summary, consumers are motivated to participate in collaborative consumption for its economic benefits (i.e., cost-savings for better value).

An increasing awareness of environmental pressure drives people to find ways to use resources more efficiently in order to have a more sustainable society (Gansky 2010). Indeed, since inefficient use of natural and human resources causes environmental harms, resource redistribution approach was born to offer an economic and social framework that enhances sustainability by efficiently deploying excess capacity of resources. Collaborative consumption is believed to help reduce the negative impacts on the environment because it reduces the development of new products and the consumption of raw materials (Botsman and Rogers 2010; Walsh 2011). For consumers with a greater preference towards greener consumption, collaborative consumption can be considered a manifestation of sustainable behaviour.

Since social network and collaboration fuel collaborative consumption, direct peer-to-peer interactions and the sharing of personal experiences allow participants to create and maintain social connections with others. Participating in collaborative consumption is an opportunity to make new friends and to develop meaningful connections (Botsman and Rogers 2010). Collaborative consumption platforms not only help strangers to meet and communicate online, they also allow individuals and communities to meet physically. Peer-to-peer accommodation rentals such as

Airbnb foster direct interactions between hosts and guests (i.e., by sharing personal experiences), allowing travellers to connect with local communities. Additionally, due to the increasing importance of reputation in the era of peer-to-peer reviews (i.e., where consumers and producers are publicly rated for their service performance), collaborative consumption is a new way for people to gain recognition and reputation capital (Botsman and Rogers 2010), to ensure that one "can be trusted" in the social marketplace. Guests and hosts rate each other on Airbnb, making it a big incentive to deliver good experience and, hence, to accumulate trustworthiness and reputation. Therefore, it is suggested that social connection and reputation motivate consumers to engage in collaborative consumption.

To date, empirical studies verifying the suggested motivational factors for collaborative consumption are extremely limited. One notable study by Hamari et al. (2013) suggests the motivations driving people to participate in online collaborative consumption with a consideration of self-determination theory, previous studies on parallel sharing, and context-specific adjustment (i.e., subjects were users of Sharetribe, $N = 156$). They conceptualize and test four drivers of attitude towards and behavioural intention for collaborative consumption: sustainability, enjoyment, reputation, and economic benefits. The results from this study show that the factors of enjoyment and economic benefits significantly affect behavioural intention for collaborative consumption, while sustainability and enjoyment drive attitude towards collaborative consumption.

2.3 Barriers to Collaborative Consumption

Owyang (2013) suggests several challenges associated with the collaborative economy concept, which stem from perceived disruption of existing regulation, lack of trust between peer-to-peer users, lack of reputation and standard, opposition from existing businesses, and uncertainty over the longevity of the business models. Further, Olson (2013) suggests trust as the most cited barrier to collaborative consumption, which includes the basic mistrust among strangers and concerns for privacy. As suggested by Botsman and Rogers (2010), collaborative consumption implies trusting strangers to a varying degree. To use peer-to-peer accommodation is to believe that it is safe to spend some times at the guest room of a perfect stranger. Furthermore, Keymolen (2013) argues that the mediation of ICT brings forth new complexities to trust relations in the context of collaborative consumption. The central role of ICT in mediating collaborative consumption implies "trust through technology," which results in interpersonal system trust that is built and shaped by ICT. Indeed, in the context of collaborative commerce, technology trust plays a significant role in companies' willingness collaborate (e.g., Ratnasingam 2004). Therefore, as a deterrent of collaborative consumption, lack of trust can be rooted from trust relations among users (i.e., interpersonal trust between buyers and sellers), trust relations between users and technology (e.g., trust with the payment

systems), and trust relations between users and the company (e.g., perceived uncertainty and regulatory issues).

Another deterrent is associated with the perceived utility of collaborative consumption. Sacks (2011) provides anecdotal evidence that collaborative consumption is preferred by consumers because it allows access to a desired product with lower costs. From their study on motion picture file sharing systems, Hennig-Thurau et al. (2007) confirm that consumers find the sharing economy attractive when they perceive that the benefits outweigh the cost. Hence, it can be suggested that the perceived lack of economic benefits (i.e., lack of cost-savings) prevents consumers from participating in collaborative consumption (Buczynski 2013). Consistent with this suggestion, Olson (2013) also shows that consumers are concerned of receiving bad quality products and services and that the value from collaborative consumption is not worth the effort. Finally, as collaborative consumption is enabled by ICT, consumers' adoption of collaborative consumption can be influenced by the characteristics of technology. For example, in the context of collaborative commerce, ease of use, complexity and trialability of the technology systems [as suggested in innovation diffusion theory; Rogers (2003)] are considered important adoption factors that allow multiple users to interact, collaborate, and transact with each other using an online platform (e.g., Chong et al. 2009; Park et al. 2004). Comparably, consumers will not participate in collaborative consumption if they find the technology systems too complex. In other words, lack of technology efficacy deters consumers from participating in collaborative consumption.

3 Methodology

Due to the recent emergence of this research topic and the limited empirical support for the motivational factors underlying collaborative consumption, in order to achieve the three research goals, this study applies an exploratory approach to gauge the drivers and deterrents for collaborative consumption. Following the definition provided by Belk (2014), this study focuses on peer-to-peer accommodation rentals (such as Airbnb) and excludes free peer-to-peer accommodation (such as Couchsurfing) and other forms of nonreciprocal, uncompensated social sharing practices. An online survey was administered to capture responses from adult travellers residing in the US. A questionnaire was designed to explore both drivers and deterrents for collaborative consumption. A list of motivational factors was developed from evidence as suggested in literature and the media consisting of 16 items corresponding to economic benefits, sustainability, social connection, reputation, enjoyment, and other benefit factors. Similarly, a list of potential deterrents was developed, consisting of 12 items representing trust, privacy and security, self-efficacy, cost-savings, and other practical issues. Responses were presented as a five-point Likert-type scale from 1–Strongly Disagree to 5–Strongly Agree. Additionally, open-ended questions were also integrated for respondents to

articulate additional factors that are not included in the questionnaire. In order to explain the market characteristics, demographic variables (i.e., gender, age, education and income levels), travel frequency, and domain-specific innovativeness scale, adapted from Goldsmith and Hofacker (1991) and applied in the domains of travel and tourism as well as the domain of ICT (Agarwal and Prasad 1998), were included in the questionnaire.

The questionnaire was distributed through Amazon Mechanical Turk to target adults who made at least one leisure trip in the past 6 months. The survey was conducted for about 5 h on August 24, 2014, resulting in 799 responses. Exploratory factor analyses were utilized to identify the drivers of and deterrents to collaborative consumption in the accommodation sector. Additionally, textual responses to open ended questions were analysed using content analysis to identify other factors that drive or deter collaborative consumption. Several independent-samples *t*-tests and *chi*-square tests were utilized to identify differences between users and non-users in order to distinguish the characteristics of the market.

4 Results and Discussion

A total of 799 adults completed the survey, 61 % of them are male and 39 % female. Respondents are relatively young, with 53 % of them between the ages of 25–34 years, 22 % of them are 24 years old or younger, and 15 % between the ages of 35–44 years. About 38 % respondents have a 4-year college degree and 30 % have some college education without a formal degree. A little more than 14 % respondents reside in California, 9 % in Florida, 5.5 % in New York, 5.5 % in Texas and the rest of respondents reside in other states within the US. About 61 % of respondents have an annual income of less than US$60,000, with 15 % in the range of $40,000–$49,999 and 15 % in the range of $30,000–$39,999. Out of 799 respondents, 754 of them stated that they have taken at least an overnight trip for leisure and tourism purposes within the last 6 months. Among these, the majority (599 travellers, 80 %) have not used peer-to-peer rentals; only 155 travellers (20 %) indicated that they have used peer-to-peer rentals before.

4.1 Market Characteristics

Based on *chi*-square tests on the demographic characteristics between users and non-users of peer-to-peer accommodation rentals, no significant differences were found in terms of gender and age (in contrast to Olson 2013). Significant differences were found in terms of education (i.e., users are more educated than non-users, $\chi^2 = 29.79$, $df = 7$, $sig. = 0.00$) and income [i.e., users have a higher income compared to non-users, $\chi^2 = 19.89$, $df = 14$, $sig. = 0.00$; consistent with Olson (2013)]. This finding indicates that the market of the sharing economy in the travel industry

consists of more educated consumers with higher income. Hence, based on the demographic characteristics alone, it can be suggested that collaborative consumption may imply more than just offering a low cost solution for travellers. Consumers who are well educated may have a greater awareness of the value in collaborative consumption. In terms of travel frequency, users travel more often than non-users ($\chi^2 = 50.37$, $df = 3$, $sig. = 0.00$) with 24 % users travel more than three times a year and 51 % travel 2–3 times a year, compared to 11 and 39 % for non-users, respectively. In terms of accommodation choices, the majority in both groups (79 % users and 83 % non-users) indicated that they stay at hotels with known brands (such as Hilton and Marriott), more users stay at independent and boutique hotels (43 %, compared to 27 % non-users), and more users stay at timeshares or condo rentals (26 %, compared to 11 % non-users) during traveling. This suggests that consumers of peer-to-peer accommodation rentals are more open to use different types of accommodation other than hotels with established brands. Thus, they may be more accustomed to different quality standards and experiences.

To assess the degree of innovativeness among users and non-users, domain-specific personal innovativeness scale (Goldsmith and Hofacker 1991; Agarwal and Prasad 1998) was adapted into two dimensions: tourism innovativeness and ICT innovativeness. Each construct consists of five items measuring how innovative respondents are compared to their peers in terms of travel and ICT. Using independent-samples *t*-tests, statistically significant difference was found in terms of travel innovativeness between users and non-users (Users: $Mean = 3.43$, $s.d. = 0.88$; Non-users: $Mean = 2.93$, $s.d. = 83$; $t = -6.49$, $sig. = 0.00$); users are more innovative in the travel domain than non-users (e.g., among the first to try out new tourism attractions or travel destinations compared to their friends). Hence, it can be suggested that participating in collaborative consumption in the travel context is relevant to personal travel innovativeness trait, which supports the finding from use pattern of accommodation types (i.e., users are open to new types of travel accommodation). However, in terms of ICT, there is no significant difference between the two groups (Users: $Mean = 3.61$, $s.d. = 0.95$; Non-users: $Mean = 3.50$, $s.d. = 89$), both indicating that they are on the innovative side when it comes to trying out new information technology.

4.2 Deterrents of Collaborative Consumption

Exploratory factor analysis (principal component analysis [PCA] with Varimax rotation) was employed to identify the underlying factors that prevented 80 % of travellers from using peer-to-peer accommodation. Nine items converged into three factors, labelled as "[Lack of] Trust", "[Lack of] Efficacy", and "[Lack of] Economic Benefits" (see Table 1). The three components explain 74.80 % of the total variance. Kaiser-Meyer-Olkin measure of sample adequacy (0.78) and Bartlett's test of sphericity ($\chi^2 = 2472.12$, $df = 36$, $sig. = 0.00$) indicate that the factor analysis can be useful for this data. Items with loadings of less than 0.40 were dropped

Table 1 Deterrents to using peer-to-peer accommodation ($N = 599$)

Factors	Factor loading	Eigen value	Cumulative percent (%)	Chronbach's alpha
[Lack of] trust		2.91	32.34	0.87
...I was concerned about safety	0.88			
...I was concerned about privacy	0.86			
...I did not trust the host(s)	0.85			
...I did not trust the online platform to execute the transaction	0.67			
[Lack of] efficacy		2.02	54.83	0.74
...I did not have enough information about how it works	0.89			
...I did not know what it is	0.85			
...it was not easy to search for the list of vacation rentals online	0.67			
[Lack of] economic benefits		1.80	74.80	0.80
...it was more expensive than staying at hotels	0.88			
...it did not save me enough money	0.85			

from the analysis. All three factors have Chronbach's alpha of 0.70 or more, supporting the reliability of the scales. The first factor that deterred travellers from using peer-to-peer rentals embodies their concerns and distrust towards accommodation hosts and the platform used to communicate and execute the transaction. This is consistent with the issues raised by Olson (2013), Keymolen (2013), and Owyang (2013). Secondly, travellers did not participate in collaborative consumption simply because they did not have enough information to use the system. Thirdly, the hindrance to collaborative consumption in accommodation services was the cost factor. Travellers chose not to use peer-to-peer accommodation because it did not generate enough savings to be considered valuable. This is consistent with previous literature on commercial sharing systems suggesting that consumers will only participate of the benefits outweigh the effort of collaborative consumption (e.g., Hennig-Thurau et al. 2007; Lamberton and Rose 2012)

From the overall means, Efficacy factor seemed to be the main barrier to using peer-to-peer accommodation rentals ($Mean = 3.27$, $s.d. = 0.99$), followed by Trust ($Mean = 3.00$, $s.d. = 0.89$) and Economic Benefits ($Mean = 2.82$, $s.d. = 0.82$). Hence, an increase in users' familiarity with the platform and/or the community within the sharing economy may reduce the barrier to collaborative consumption. From responses to the open-ended question, a few respondents mentioned their scepticism associated with the legal standing of such businesses (i.e., due to cases of legal disputes between Airbnb hosts, property owners and guests as well as lack of clear government regulation). Hence, they chose not to engage in collaborative consumption for the ease of mind of "staying out of trouble" when they are away from home. When asked about their future intention to stay at peer-to-peer rentals,

non-users indicated that it is unlikely for them to use it in the future ($Mean = 2.89$, $s.d. = 0.85$).

4.3 Drivers of Collaborative Consumption

Exploratory factor analysis was also employed to identify the drivers of collaborative consumption among users. Three underlying factors emerged and are labelled as "Sustainability", "Community", and "Economic Benefits" (see Table 2). Items with loadings of less than 0.40 and items with loadings of 0.40 or more on two or more components were dropped from the analysis. The three components explain 73.37 % of the total variance. Kaiser-Meyer-Olkin measure of sample adequacy (0.82) and Bartlett's test of sphericity ($\chi^2 = 973.51$, $df = 55$, $sig. = 0.00$) indicate that the factor analysis can be useful for this data. Chronbach's alpha of 0.70 or more supports the reliability of all three scales.

First, collaborative consumption was driven by the motivation to be more responsible travellers, to reduce the negative impacts of travel on the environment, to use resources more responsibly, and to support local economy. This is consistent

Table 2 Motivations to use peer-to-peer accommodation ($N = 155$)

Factors	Factor loading	Eigen value	Cumulative percent (%)	Chronbach's alpha
Sustainability		3.68	33.49	0.92
. . .I would like to reduce the consumption of energy and other resources while traveling	0.93			
. . .I would like to be a more socially responsible traveller	0.93			
. . .I would like to reduce the negative impacts of travel on the environment	0.91			
. . .I would like to support the local economy	0.71			
. . .it was a more sustainable business model	0.65			
Community		2.39	55.20	0.82
. . .I would like to have a more meaningful interaction with the hosts	0.84			
. . .I would like to get to know people from the local neighbourhoods	0.83			
. . .I would like to get insiders' tips on local attractions	0.79			
Economic benefits		2.00	73.37	0.73
. . .it saved me money	0.85			
. . .it helped me lower my travel cost	0.84			
. . .I would like to have higher quality accommodation with less money	0.73			

with the suggestions from Bostman and Rogers (2010) and Gansky (2010). Secondly, collaborative consumption was driven by social motivations to get to know, interact and connect with local communities in a more meaningful way, which is consistent with Bostman and Rogers (2010). The two motivational factors are consistent with Owyang's (2013) suggestion on the societal drivers of collaborative consumption. Finally, getting quality accommodation with less cost drove travellers to choose peer-to-peer rentals, which is consistent with suggestions from literature (Botsman and Rogers 2010; Gansky 2010; Lamberton and Rose 2012; Owyang 2013; Sacks 2011).

From the overall means, users indicated that the highest motivation was the Economic Benefits factor ($Mean = 4.24$, $s.d. = 0.57$). The other two factors were only slightly different (Community, $Mean = 3.40$, $s.d. = 0.95$; Sustainability, $Mean = 3.37$, $s.d. = 0.90$). While respondents recognized the motivations to connect with others as well as to protect the environment as the drivers of collaborative consumption, the cost-savings factor is still a dominant reason to engage in peer-to-peer consumption. From responses to the open-ended question, one reason to use peer-to-peer rentals was to have an authentic experience by staying with locals and, hence, adopting local lifestyle. Users stated that it is highly likely for them to use peer-to-peer rentals again in the future ($Mean = 4.24$, $s.d. = 0.78$).

5 Conclusion and Implication

In order to better explain the phenomenon of collaborative consumption in the context of travel and hospitality, this study explored the market characteristics, the motivational factors that drove the participation in the sharing economy, and the potential impacts of collaborative consumption on travel patterns. The market characteristics for collaborative consumption were derived from comparing groups of users ($N = 155$) and non-users ($N = 599$) in terms of demographic characteristics, travel behaviour, and personal innovativeness. The market for collaborative consumption in the travel context is characterized with highly educated consumers with higher income, who travel more frequently, are more open to different types of accommodation, and are more innovative in the travel domain. The finding suggests that, even though associated with lower cost, peer-to-peer accommodation attracted consumers who are in the high-income bracket. Those participating in collaborative consumption are highly educated, travel more often and use less conventional types of accommodation (e.g., boutique hotels, condo rentals and timeshare, etc.) and, thus, might be accustomed to different standards of quality and experience. This is relevant with their innovativeness trait as they are more open to new offerings in the travel domain. Therefore, the results confirm that collaborative consumption penetrates the market not only as a low cost alternative to accommodation, but more so as a new "mode" of traveling.

Three factors were identified as deterrents to collaborative consumption in the accommodation sector. They are: Trust (i.e., mistrust between strangers, distrust towards technology), Efficacy (i.e., travellers did not know how the system works or found it hard to operate) and Economic Benefits (i.e., lack of cost-savings). The following proposition is suggested:

P1. (Lack of) Trust, (Lack of) Efficacy and (Lack of) Economic Benefits deter participation in collaborative consumption.

Three factors were identified as drivers of collaborative consumption in the accommodation sector. They are: Sustainability (i.e., to travel more responsibly and to reduce negative impacts on the environment), Community (i.e., to develop meaningful social connections) and Economic Benefits (i.e., to get more value with less cost). The following proposition is suggested:

P2. Sustainability, Community and Economic Benefits motives drive participation in collaborative consumption.

Based on the findings, in order to reduce barrier to entry and increase participation, peer-to-peer accommodation businesses need to develop a platform that helps increase trust among users (e.g., with the inclusion of reputation scoring or regulatory measures), to educate the market to increase familiarity with the systems, and to highlight the sustainability and economic benefits from collaborative consumption (e.g., by offering transparent, side by side comparison with competing accommodation businesses). On the other hand, hotel businesses need to rethink their strategies to stay competitive in the market, considering the advantage of collaborative consumption in terms of sustainability, community, and cost-savings. Furthermore, tourism destinations should encourage collaborative consumption to promote a healthy competition in the accommodation sector by setting up necessary regulations in order to optimize its benefits for the local economy and, at the same time, to protect the users (i.e., hosts and guests). Finally, because this research is exploratory in nature, future research should test and verify the propositions in different contexts to support the applicability of the scales and generalizability of the findings in this study. Additionally, other factors such as enjoyment and reputation (from previous literature) that did not converge in this study, as well as authenticity and legal/regulatory concerns (as emerged from the open-ended questions) should be verified further.

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Senior Travellers as Users of Online Travel Services: A Qualitative Enquiry

Juho Pesonen, Raija Komppula, and Annina Riihinen

Abstract Importance of senior travellers as travel segment for the tourism industry increases continuously as the number of pensioners increases. These new senior travellers differ from earlier generations in many ways, one being increasing use of Information and Communication Technologies as part of their information search process. This study examines senior travellers as users of online travel services such as websites. A qualitative approach is chosen to provide insights into the topic and nine Finnish pensioners are interviewed. The results are analysed using content analysis. The results show that the senior travellers are a very heterogeneous segment regarding online travel services. However, there is no special marketing or website design that senior travellers really need but a good website also caters for the needs of younger as well as older consumers. More attention has to be paid to use of pictures and colours on websites as well as instructions.

Keywords Senior travellers • Information search • Website design • Elderly • Travel websites • Pensioners

1 Introduction

Senior travellers have become a main stream tourism segment. There is no common definition of what is meant by older consumer market and from what age would a person be considered as a senior. Definitions vary from 50 year olds (e.g. Lohmann and Danielsson 2001) to even 65 years (Norman et al. 2001). Maturing of the post-

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_60

war Baby Boomer generation has caused a refining of the meaning of senior (Reisenwitz and Iyer 2007), as Boomers tend to reject products that use the word 'senior' in marketing or are targeted to the older generation (Lohmann and Danielsson 2001; Reisenwitz and Iyer 2007). Seniorship is also often connected to the age of retirement, as is in this study.

Characteristics of senior travellers are an important research venue because of the market size and its potential for growth (Horneman et al. 2002). However, these new senior travellers differ from previous pensioner generations in many ways. People who are retiring now are more and more used to work with computers and interact with different kinds of Information and Communication Technologies (ICTs), many even have smart phones and tablets. Even though the senior market is one of the most influential groups of leisure travellers, the segment is often forgotten for example in hotel marketing and advertising (Hartman and Qu 2007). Lately many different stakeholders in tourism have emphasized the importance of seniors for the travel industry. For example Finnish Ministry of Employment and the Economy (2006) has identified seniors as one of the main target groups for Finnish tourism strategy and Amadeus (2007) regards active seniors (50–75 year olds) as a very important tourist segment in the future.

Several studies have found the elderly to be different from younger consumers (e.g. Reece 2004; Newbold et al. 2005). Nevertheless, elderly consumer segment is not a homogeneous group (Sudbury and Simcock 2009a; Nielsen 2014), and therefore it is likely that the group beholds heterogeneous needs. People with same age can have very different lifestyles (Kohijoki and Marjanen 2013), varying needs and they may value different things. Although chronological age is most commonly used to segment older consumers in marketing research, it can be regarded as ineffective segmentation technique (Sudbury and Simcock 2009b).

Elderly consumers are often considered as technology anxious and reluctant to adopt new technologies (Niemelä-Nyrhinen 2007). Older consumers for example have not adopted the Internet as well as other consumers and do not use it as often as others nor are they as active in social media (Statistics Finland 2012a, b, c, d). However, because of their still modest level of adoption, older adults are the fastest growing group of computer users and information seekers (Kurniawan et al. 2006). Elderly consumers are considered to have less willingness to try new products (Reisenwitz et al. 2007) since they prefer having same well-known brands, rather than adopting novel products (Lambert-Pandraud and Laurent 2010). Seniors also tend to consider fewer brands and tend to have repeat purchases to the same brand (Lambert-Pandraud et al. 2005).

Senior travellers and consumers are being increasingly studied in the tourism literature. Focus on earlier research has been on travel behaviour and is largely quantitative and concerned with developing market-oriented typologies (Sedgley et al. 2011). Research has also focused mainly on the behaviour of senior travellers during their trip (Sedgley et al. 2011). Sedgley et al. (2011) as well as Nielsen (2014) call for the voice of older people to be heard in the field of tourism research.

This study aims to answer the aforementioned important research gaps in the tourism literature by studying online travel services though the eyes of senior travellers. The focus is on examining how senior travellers use online travel

services in various phases of information search process. Additionally, the aim is to provide insights into how online travel services correspond to the needs of the older travellers and what are the attributes of an online travel service that they value.

2 Background of the Study

This study defines online travel services as different World Wide Web sites that travellers use when they are searching for information either before the trip, during the trip or after the trip. These can be either third party websites such as www.tripadvisor.com, destination websites or travel agent websites. Online travel services can also be applications that the travellers can use with their tablet devices or smart phones.

Several earlier studies (Dinet et al. 2007) indicate that the computer use among the older adults decreases as the age increases. The older the person is, the less computer knowledge and interest they are likely to have. The senior travellers in this study are defined as people living their third age. Peter Laslett (1987) divides the ageing process into third and fourth age that depict different phases of ageing. Third age means active phase of ageing when the person has the possibility for self fulfilment and extensive leisure time, they have good health and enough livelihood from pension. During the fourth age people start becoming dependent on others as their health deteriorates. For tourism businesses especially the senior travellers living their third age are a very prominent market segment. People living their third age are also much more likely to use ICTs during their travel search process than people already living their fourth age (Dinet et al. 2007). Even though Sedgley et al. (2011) state that those aged 80 years and older are underrepresented in the field of tourism literature, this study focuses generally on people who are better marketing 'prospects'.

Moschis (2003b) states that a consumer-oriented marketing philosophy is critical to create an effective marketing strategy for older consumers. Marketers need to know how older people differ from younger people. These differences tend to be result of two types of factors: either differences in aging processes or life circumstances they have experienced. This is why information on older consumers really is needed.

Use of online travel services is increasing among older people and many of them have been using the Internet for some time now. Dinet et al. (2007) found that travel and recreation was second most sought after topic for older Internet users after health and The World Wide Web has become a major information resource for older people. This indeed calls for more information on how this very interesting and important segment uses online travel services in their information search process. To this date there has been very limited amount of information on the role of Internet in senior travel market (Vigolo and Confente 2014) and extremely little qualitative information. However, it is well known that the older people search for information differently than other people. Already in the 1980s Gitelson and

Crompton (1983) reported that older vacationers were more inclined to use travel agents than other vacationers. Javalgi et al. (1992) stated that senior travellers engage less in external search, meaning that they tend to buy more pre-packaged tours than non-seniors. Contrary to earlier findings, Luo et al. (2004) did not find any significant differences in information search behaviour between senior and non-senior tourists. Senior tourists seem to use the same information sources as others but Luo et al. (2004) did not investigate if there were any differences in how these information sources are used. Vigolo and Confente (2014) studied past travel behaviour and online experience as antecedents of online purchase intention for older tourists and identified online word-of-mouth, previous online travel purchases and education as significant factors. Also, there were significant behavioural differences between prospective seniors and seniors. Vigolo and Confente (2014) defined prospective seniors as people aged from 50 to 64 years old and seniors at least 65 years old.

The literature agrees that the senior travellers are extremely heterogeneous segment with people with different travel motivations, demographics, psychographics, lifestyle and educational and income levels (Sedgley et al. 2011; Nielsen 2014). Senior travellers have been studied in many segmentation studies and a large number of senior traveller segments have been identified (Faranda and Schmidt 2000), establishing the senior market as an extremely heterogeneous. For example in the USA four older consumer segments have been identified in several studies: the "Healthy Hermits", the "Ailing Outgoers", the "Frail Recluses" and the "Healthy Indulgers" (Moschis 2003a). Moschis (2003a) also states that elderly consumers appreciate some specific attributes in products and services, namely convenience, functionality, quality, dependability, personalized service and product development.

This means that it is very difficult to make any generalizations about the senior traveller market. This also calls for qualitative research to make the voice of senior travellers heard (Sedgley et al. 2011; Nielsen 2014) and increase our knowledge on what online travel services really mean for senior travellers.

There has been a large number of research conducted on the older people as information seekers, or information search behaviour studies that have included information on older people. Dinet et al. (2007) studied online information needs and search strategies of older people using mixed methods research. However, qualitative research was used only to find out measurements for information search on the web. Their main findings were that individual characteristics make older people a very heterogeneous group of information seekers, but one major problem was relocating relevant information among information provided by the search engines. Fodness and Murray (1997) identified household life-cycle as an affective factor in tourist information search process. Johnson (1990) investigated age differences in decision making and found out that older people used less information, spent more time viewing, and re-viewed fewer bits of information than college-age participants in their study. Also information search patterns differed between age groups. Age was also found significant in the study by Klein and Ford (2003), even though their results are partially contrary to the results of Johnson

(1990). Czaja et al. (2001) found significant differences between different age groups in the performance of a complex information search and retrieval task. Older people have more difficulties in performing these tasks, but these can be alleviated by increasing the expertise of the user or by changes in interface design. They suggest that computer-aiding techniques may decrease the load on working memory and increase speed of performance.

Based on the earlier literature we know that the seniors are a very interesting demographic group. They differ from other consumers in their information needs and use of information channels, also in the digital age, but there is also huge heterogeneity within the group of senior travellers. Older people have widely adopted the internet as an important information source and they are using it a lot, but we still have very little information how they themselves perceive the online services. Especially in the field of tourism research, we have barely no information on the senior travellers as users of online travel services. The voice of the seniors is very seldom heard in research articles. This study aims to provide new insights into senior travellers as users of online travel services, thus increasing our knowledge on what these services mean for senior travellers, how they use them and why, and also how senior travellers have to be acknowledged when designing online travel services. As there is relatively little information on the topic, this study aims to provide general insights that can be used to focus future studies in interesting and important topics such as website design, use of social media and use of mobile devices.

3 Data and Methods

This study adapts qualitative research approach to investigate senior travellers as users of online travel services. The empirical data consist of eight semi-structured face-to-face interviews which were conducted among retired people. The interviewees were selected in collaboration with an association of retired people located in central Finland. Data was collected in Finnish, translations in this study are made by the authors. A snowball technique was applied when searching for senior citizens, preferably retired, and who are active travellers, meaning that the interviewee makes at least one trip abroad a year. The group of interviewees includes five women and four men. In qualitative research, the size of the sample does not matter, but rather what matters is the saturation level of data from the sample in question (Gummesson 2000). A representative sample of different kinds of personalities and backgrounds was the objective. Nevertheless, it must be noted here that as common in qualitative research, the aim was not to produce any generalizable or comprehensive information about Finnish seniors as web users but to increase our understanding of the senior travellers as users of online travel services. Qualitative approach is concerned with interpretation and understanding (Eriksson and Kovalainen 2008). Hence, the findings will rather give ideas for further research than aim to generalize the insights gained from this study.

The interviews were tape recorded and transcribed. The data was analyzed by content analysis, which is a tool to prepare the empirical data for the interpretation process by repeatedly reading and organizing the data and classifying or thematizing it (Eriksson and Kovalainen 2008). Observations were collected in matrix form in order to better understand the differences and similarities between the respondents. Relevant quotations of the interviewees are included in the presentation of the findings in order to understand the perspectives of the respondents and make their interpretation more transparent.

4 Findings

Background information about the demographics of the respondents as well as their travel preferences is presented in Table 1. Similar tables were created from the whole data, but only the first is presented here because of limited space. Most of the respondents come from rather modest circumstances, which is common in this after war age cohort in Finland. Only one respondent (M78) has a university degree, which has given him an opportunity to learn and use foreign languages. Except him and F64a, all the others do not manage with foreign languages. This is quite common in this age cohort, only generations born after 1960 have had English or some other language compulsory at school starting from the third class.

Mainly because of their family backgrounds the respondents did not travel during their childhood or youth, but as they got married or started their lives on their own, all of them started to travel abroad and in Finland as well. One respondent (F64a) prefers independent self organized trips, others book most often packaged tours. Some would even book the flights and accommodation separately, if the destination is familiar. Only three of the respondents have participated special trips targeted to seniors, and all of them regarded these trips as active and interesting. Most of the others had prejudices against senior trips, which were thought to be meant only for people in poor health. Common opinion seemed to be that "senior trips" or "trips for retired" would be not an attractive marketing brand or slogan:

> Senior trips, I don't think that's a good slogan. Not very successful marketing as people do not think of themselves as seniors but identify themselves through their earlier occupation or hobbies. (M78)

Regarding use of information technology the respondents have at least a computer or a laptop, some of them have also a tablet and/or a smart phone. Only one of the respondents (F68b) does not use internet independently but needs help even in information search. Two of the male respondents (M62 and M68) do search for information, but let their spouses make bookings. Two of the respondents (M62 and F68a) would not even consider acquiring any kind of smart technology but some of them (F64a, F68b, M78) already are active users of tablets and/or smart phones.

Table 1 Background information on the interviewees

	M62	F61	F64a	M68	F64b	F68a	F68b	M69	M78
Gender	Male	Female	Female	Male	Female	Female	Female	Male	Male
Age	62	61	64	68	64	68	68	69	78
Occupation	Foreman	Nurse	Technical officer	Military Prof.	Farmer	Kitchen maid	House wife	Shop keeper	Ph.D.
Education	Vocational	Vocational	Vocational	Military	Elementary school	Elementary school	Vocational	Vocational	University
Annual household income	35,000	35,000	50,000	20,000	20,000	18,000	30,000	10,000	60,000
Family	In relationship	In relationship	In relationship	Married	Married	Widow	Married	Widow	Married
Retired	2013		2014	2012	2012	2007	2006	2010	2000
Childhood living conditions	Modest	Modest	Modest	Modest	Poor	Poor	Middle class	Middle class	Well-off
Travelling in child-hood/youth	None	A lot	Domestic	None	None	None	Domestic	Domestic	In Europe
Travel experience dur-ing working years	Limited	Regular	Regular	Limited	Limited	Regular	Regular	Regular	Regular
Travelling after retirement	Seldom	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular
Packaged/self administrated	Packaged	Both	Self	Packaged	Packaged	Packaged	Both	Both	Both
Preferred destinations	Familiar and new	Familiar	New	Familiar	Familiar	Familiar	Familiar and new	New	New
Has participated/could consider senior trips	Not yet	Not	Yes	Not yet	Maybe	Not	Yes	Yes	Not

Except one respondent (N68a) all the others use the Internet and online services regularly or even daily. The Internet was used for information search, banking, library, e-mail and online shopping. Six respondents also have a Facebook profile, but not all of them use it actively.

> (In Facebook) I mostly follow the lives of children and grandchildren, but I very seldom comment the posts or post anything about myself. Just not my thing, but of course it is nice to go and have a look when they upload pictures of their trips there. (M78)

All the respondents use the Internet at least to some extend when planning the trip. For all except F68a the Internet is the major source of information when planning the trip. All the respondents book their trips in the Internet, six independently and three with help of a family member. Those who buy their trips as packaged tours regarded them as easy and safe. These respondents were not that afraid of problems in buying the flights and accommodations from the Internet separately but much more worried about the possible problems that might occur in the destination and that without help of a travel operator they would be on their own, without a command of foreign language.

Only one respondent uses the Internet actively during the trips abroad (N64a). One respondent (N68b) has sometimes had her laptop with and she has used Skype and chat, but not always. M78 uses his smart phone or tablet mainly for searching for maps. The other respondents have not used the Internet during their trips abroad, not even at Internet cafes or hotel computers. The respondents were worried of the costs and security of the Internet usage. Instead, the respondents preferred the traditional sources of information at the destination, namely tour operators' hotel books, brochures, TV, and pre-printed material brought from home. They also preferably relied on tour guides and hotel personnel.

After the trip the experiences and photos may be shared in the Facebook (F61, F64, M68, F68b) and if the tour operator sends feedback forms, they will be filled and sent (F61, F68b, F64b, M68). Sometimes more detailed information about the destination may be searched also after the trip.

Most of the respondents go to travel web pages only when they have a plan to make a trip and the topic is current. As soon as the intention to travel arouses the interest to search information will grow. The goal of browsing the websites is to purchase and for that reason information search is conducted. Purchase decision is typically not made during one browsing session but different options are considered with time and in the end the most suitable travel product will be chosen.

Some of the respondents do actively search for travel offers and last minute travel deals, even though the time for their next holiday is not decided. Some of them also dream about trips that they do not have the possibility to take at the moment (F64a, F64b, M68).

> I do have some places that I have not visited yet but have already printed the maps. Little bit of pre-planning if just my health stays good. (M78)

As soon as the trip has been booked, the tour operators' pages will be visited several times. The respondents also visit other travel websites to check up on their

own reservation multiple times and search for more information on the destination and plan the details of the trip. Google and domestic travel websites (Rantapallo.fi, Napsu.fi, Ellit.fi) are often used. Information search process increases travelling spirit and this also has huge impact on what the older tourists experience at the destination:

> When you read something online and look at pictures you always get a certain image. Then when you go there the destination feels completely different than if you had not got familiar with the place at all. (M62)

Before the international trip the respondents search for information about the destination: history and current state, number of inhabitants and other factual information, culture and customs, weather, sights, activities, events, local transportation, shopping opportunities, opening times, seasonality, price level, restaurants, local specialities, recommended vaccinations and currency information. Also various pictures about the destination are very important. Besides destination information the respondents also put a lot of time and effort to search for information of the booked accommodation. Pictures are again crucial as respondents want to have clear image on both the rooms as well as general areas in the hotel. All this information is read several times over and over again and also maps are examined in great details before the trip.

Regarding travel website attributes the respondents valued simplicity, clarity, ease of use and trustworthiness. Simplicity and large headings increase clarity and distinct colours on the website make it easier to see text and photos. Also black text on white background is preferred. The front page must be designed to enable logical navigation to different themes. Updating the website frequently increases trustworthiness, as does instructions and help to the user. A good website directs the user forward in every page and clearly states what happens when different links are clicked.

> I have now learned that the credit card numbers have to be typed without spaces, even though there are spaces on the card. And it is not said anywhere. (M78)

The respondents value websites that has a lot of information and is logically structured. If the information is plentiful and easy to find the respondents are prone to return to the website. Also within site search engines are often used by older travellers. Pop-up advertisements and websites that have too many advertisements are disruptions in the information search process, but if the advertisements are clearly placed for example to the right side of the page, they do not interfere the information search process.

Some of the respondents know English, German or Swedish besides Finnish, but everyone preferred sites in Finnish:

> I do not go to sites that are in other language as I do not understand it well enough, so I prefer Finnish websites. (F61)

Half of the interviewees prefer familiar and safe brands when using online services, other half also uses websites that are not familiar to them or generally known to search for information and even book services.

The interviewees regard themselves as sluggish internet- and travel site user. Even though they want the connections and sites to be fast they are a little bit nervous to make decisions too quickly. For example when they are booking tickets or making a reservation the reservation system deadlines that discard everything are regarded as too short. On the other hand the respondents are very patient website users. In their experience everything works out if you give them enough time and even though some of them have had bad experiences, in the end everything has worked.

The respondents did not expect or hope from the travel pages to offer any special experiences, but regarded the Internet as a tool to search information and make bookings. The Internet was regarded especially as a tool, not something you do for fun or entertainment. Still, they were open to for example receive an e-mail from the tour operator before the trip to prepare them for the trip and increase the travel spirit.

5 Discussion, Conclusions, Limitations and Further Research

This study aimed to explore senior travellers as users of online travel services. The goal was to find out how online travel services correspond to the needs of the older travellers and what are the attributes of an online travel services that they value. This kind of insights make it possible for tourism businesses to understand the older consumers and make online services that corresponds to the needs of this customer group. This study brings forth the voice of older consumers as called for by Sedgley et al. (2011) and Nielsen (2014).

According to earlier studies elderly consumers are often considered as technology anxious and reluctant to adopt new technologies (Niemelä-Nyrhinen 2007). This is partly confirmed also in this study. Even though the elders are adept users of the Internet, they have not widely accepted smart phones and tablets into their lives. The interviewees in this study have different knowledge on the use of online travel services and even the ones with the least experience used the Internet to purchase holidays online.

This means that businesses should really focus on websites as they are often used by this economically very important segment. A travel website does not need to be custom made just for older consumers but a good website serves both older and younger consumers. If a company wants to make the information search process easier for older people they should have at least working within site search engine. Also, some website design elements that younger people take for granted need to be clearly explained to older consumers. However, older people seem to be a travel segment does not easily abandon shopping basket when they have found a holiday or parts of it that they really want.

We really have to be careful with generalizations about the older consumer market. Even this study shows that there are very different types of older consumers in terms of using online travel services. Some are adept users of websites, some require help from younger generation.

The findings of this study are in line with Moschis (2003a). Older consumers seem to appreciate convenience, functionality, quality and dependability also regarding online travel services. One of the main differences between this and earlier studies is the attitudes and use of online travel services by older travellers. Whereas earlier studies identified older consumers as users of traditional information channels such as travel agents and as insecure users of information and communication technologies, this study provides a whole different image. Experienced elderly travellers seem to prefer to use the Internet to search for information and to book holidays and are quite open to the use of technology.

As the post war generations are starting to retire and the number of old people is growing, the tourism businesses should pay attention to and get to know this heterogeneous segment. This study, as well as earlier studies show that the older travellers do not find tailor made services necessary. The reason for this can be for example that aging is seen as a negative thing in western society. Senior travellers do not think of themselves as old or aging and do not connect with those terms for example in marketing.

Companies do not necessarily need differentiated sites for older tourists pages. Website developers should adopt "design for all" philosophy. Making sites work for older tourists does not mean that they wouldn't be as good for other travellers.

Acknowledgements This study was funded by the Council of South Savo/the European Regional Development Fund (ERDF) Operational Programme for Eastern Finland.

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Part IX
e-Learning

Online Learning and MOOCs: A Framework Proposal

Jamie Murphy, Nadzeya Kalbaska, Laurel Horton-Tognazzini, and Lorenzo Cantoni

Abstract Decades of distance learning evolution and innovation, particularly due to the Internet and recently, Massive Open Online Courses (MOOCs), have led to industry and academic confusion about online learning nomenclature. This study takes a preliminary step in reducing the confusion, proposing a conceptual framework for categorising online learning. Drawing on content structure and interactivity, the paper proposes four categories of online learning: resources, tutorials, courses and MOOCs. These four categories serve as a base for illustrating five online learning variables—open versus closed access, cost, interactivity, recognition and assessment—which subsequently help clarify the framework of the four somewhat overlapping categories. The resultant framework gives industry and academia common ground for discussing online learning and for future research such as MOOC types and additional variables to consider, i.e., synchronicity, learning outcomes, openness, and self-direction.

Keywords Online learning • Tourism training • Distance education • MOOCs • eLearning

1 Introduction

Massive Open Online Courses (MOOCs), a recent and exciting online learning iteration, are taking academia and the popular press by storm. A startling predicted MOOC outcome is that half of US universities will disappear in 50 years, or sooner, and Harvard will have ten million students (Harden 2013). On a similar grandiose

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_61

note, a New York Times columnist declared 2012 as the "Year of the MOOC" (Pappano 2012).

Yet at least one academic argues that another New York Times columnist, David Brooks, confounds MOOCs and online learning.

> In talking about MOOCs and online courses as interchangeable and equivalent entities Brooks is doing a disservice to both. He is demonstrating a shocking ignorance about the work that many of us have been involved in for many years to help design and teach small online courses, ones that mimic the learning (and sometimes enrollment) of a traditional seminar (Kim 2012)

Such MOOC versus online learning confusion also exists in academia. Few specifics plus ambiguity about different online learning classifications can often lead to misunderstandings (Negash and Wilcox 2008). Similarly, the lack of a taxonomy or clear framework has led to general confusion and improper generalisation of MOOCs across a wide array of courses with vastly different characteristics and goals (Baker and Surry 2013).

In the use of online technologies for hospitality and tourism training, complexity is also the rule. For instance, a tourism study could not classify online courses based on their technologies, intended audiences, course level or course topics. The study did, however, classify the courses based on four provider types—academic, corporate, destination management organisation, and independent (Cantoni et al. 2009).

A growing chorus calling for MOOC definitions, MOOC developments, MOOC outcomes and the use of online learning, supports the need for a framework of online learning, and how MOOCs fit into this framework (Baker and Surry 2013; Cantoni et al. 2009; Chauhan 2014; Negash and Wilcox 2008). The framework could also help address how online learning categories—which vary in abilities, assessment methodologies, scholarship intentions, instructional and learning strategies, resources and openness—align with different subsets of learners (Baker and Surry 2013; Bates and Sangrà 2011; Peters 2003).

Such a framework could help universities and academics, baffled by the hype and considering online learning initiatives, utilise and create viable online options such as MOOCs (Daniel 2012). Most every vice chancellor or rector worldwide is considering the impact of massive, free online courses on traditional educational offerings (Conole 2013). Industry is also stumbling through the hype, embracing online learning options to educate and train employees. This paper helps address the industry and academic needs for terminology clarification and uniformity by proposing four categories of online learning, and discussing how online learning variables align with these categories. The hospitality and tourism industry, particularly its Human Resource Management, could benefit from such a classification and uniformity.

2 Literature Review

2.1 Distance and Online Learning

Today's online learning options, including MOOCs, are an evolution and type of distance learning. Distance learning began as early as St. Paul's letters preaching

Christian doctrine to communities in different countries (Peters 2003). Millennia later, early references to learning at a distance by surface mail include educational entrepreneurs in 1728 advertising shorthand courses to residents in Boston, Massachusetts and composition courses for residents in Lund, Sweden in 1833 (Holmberg 1995). Postal correspondence courses were the rage in the 1920s, with four times the enrolment of all US universities and colleges combined (Carr 2012). Since then, the radio, motion picture, television, programmed learning, computers and the Internet have served as additional and evolutionary distance learning platforms (Daniel 2012).

Information and Communication Technology (ICT) combined with the Internet, online learning or eLearning, is "the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration" (CEC 2001, p. 2). Internet characteristics, particularly interactivity and connectivity, have the ability to make the Internet a powerful global educational platform.

Online learning impacts education worldwide, transforming training, instructional design and educational curricula. Students from different countries and employees in different industries receive and interact with educational materials online, as well as engage with tutors and peers in dynamic and diverse ways. The resultant online learning market is a complex system of academic, corporate and consumer fields that integrates myriad segments such as consultancies, training courses, services development, technology providers and academia (Admiraal and Lockhorst 2009; Bell and Federman 2013).

Companies, especially those with a large geographic distribution, use online rather than in-house training to update existing staff and orient new ones. The hospitality and tourism industry uses online learning to update their employees' knowledge and to inform their customers (Kalbaska 2012; Kuttainen and Lexhagen 2012; Nadkarni and Venema 2012; Sigala 2002). The Hilton and Accor hotel chains, for example, use online training for their employees, while destination marketing organisations and cruise companies train the travel trade on relevant tourism products.

2.2 Online Learning Trends

Four online learning trends in this century are Learning Management Systems (LMSs), Open Courseware (OCW), Online Courses and MOOCs. About 90 % of all US universities and 95 % of all British universities have an overarching LMS, such as Blackboard or Moodle (Lonn and Teasley 2009). Rather than for learning activities such as interactive discussion forums or collaborative Wikis, however, students and academics tend to use the LMS as a repository for resources such as class syllabi, announcements, lecture notes, slide presentations and readings (Handel et al. 2010; Lonn and Teasley 2009).

Online courses (OCs), a second trend, draw heavily on the LMS as a virtual classroom for their students. The dot com frenzy late last century spurred academic

institutions and industry start-ups to launch online courses. Although some initiatives failed to eventuate, online courses have arrived (Daniel 2012). Tourism academic institutions provide online tourism courses such as Sheffield Hallam University's Hospitality and Tourism Management bachelor's degree and the Glion Online MBA in International Hospitality and Service Industries Management.

While LMSs and OCs typically restrict access to registered students, OCW has open access. Within the OCW movement, the Massachusetts Institute of Technology (MIT) and hundreds of other universities proudly and freely share their course materials with anyone online (Murphy 2012). OCW, however, supplies just the course materials with no lecturer, assessment or recognition.

Massive Open Online Courses extend the OCW concept to OCs, adding **M**assive and **O**pen to the OC acronym to yield the MOOC acronym. Anyone with Internet access can take a free MOOC, receiving feedback, grades and recognition of participation for successful completion. Although exemplar MOOCs have hundreds of thousands of participants in a single course (Murphy et al. 2014), these massive numbers are the exception. A survey of 91 MOOCs found an average of over 42,000 participants in a single MOOC (Jordan 2014), which still dwarfs traditional offline or online class enrolments.

Drawing on interactivity, content structure and representative examples, this paper proposes four broad categories of online learning: resources, tutorials, courses and MOOCs. Subsequently, it discusses five online learning variables—open versus closed access, cost, interactivity, recognition and assessment—that interact across and within the four categories.

3 Conceptual Model: From Resources to Tutorials to Courses

Distance learning and related variables have existed for well over a century. This paper uses content, and scenarios of how learners and instructors access, produce and negotiate the content for conceptualising four online learning categories. Drawing on three major interactions that improve learning—S2C (Student/learner to Content), S2S (Student/learner to Student/learner), and S2T (Student/learner to Teacher/trainer/tutor) (Negash and Wilcox 2008; Piccoli et al. 2001)—the proposed framework is a progressive continuum from *resources* to *tutorials* to *courses*. MOOCs, as this paper argues, are a type of course. Table 1 presents the proposed framework and variables for online learning generally available to the public.

Courses have the presence of a lecturer and interactivity such as forums, quizzes and other assessments. *MOOCs* resemble courses in interactivity and structure, but differ in size, cost, access and recognition. *Resources* provide rich and diverse educational materials but lack the structure of courses and tutorials. Between resources and courses, online *tutorials* typically lack a lecturer, have a limited course structure and interactivity and similar to resources, are generally self-directed.

Table 1 Proposed framework of online learning

	Interaction	Assessment	Access	Cost	Recognition
Resources	S2C and possibly S2S	No	Typically open	Typically free	No
Tutorials	S2C and S2S	Limited	Typically open	Typically free	Typically not
Online courses (OCs)	S2C, S2T and S2S	Yes	Typically closed	Typically cost	Yes, up to full (university) credit
MOOCs	S2C, S2S and some S2T	Yes	Open	Free	Usually a certificate of participation

A broad resource example is YouTube's Education Channel <youtube.com/channel/HC-r1FlvvNFs0>, an automatically generated video collection for learners of all ages. Another resource is Technology, Entertainment, Design (TED) <ted.com>, a non-profit organisation devoted to spreading powerful ideas via a library of almost 2,000 short talks, usually videos under 18 min. In tourism, the International Federation for Information Technology and Tourism (IFITT) shares resources <ifitt.org/resources> including information and communication technology case studies, reference lists and lecture slides across three areas: introductions, case studies and trends.

Moving along the content continuum, tutorials have more structure, pedagogy and specific uses than resources. Tutorials can contain learning objectives, videos, examples, case studies and exercises. A tutorial example is Google's digital marketing curriculum, which opens with a preparatory tutorial, introductory tutorial and then seven subject tutorials <google.com/onlinechallenge/dmc>. One tourism example is Building Excellence in Sustainable Tourism Education (BEST EN), a collaborative network of tourism academics and practitioners. BEST EN members develop and share sustainable tourism tutorials <besteducationnetwork.org/Teaching_Materials> with pedagogical resources similar to Google. The Australian Tourism Data Warehouse (ATDW) provides 60 tutorials in nine subject areas related to ICT in Tourism <tourismekit.atdw.com.au/ekittutorials>, with pedagogical materials in addition to questions and suggested answers. Seventy-five National Tourism Offices offer online tutorials to the travel trade to improve their knowledge of the concerned destinations (Kalbaska 2012). Some of them are so elaborated that one would categorize them as courses.

A final tutorial example, the Open Course Ware (OCW) movement mentioned above, provides learning materials for a university course but none of the classroom interaction. OCW materials range from a syllabi with readings to all class handouts and full audio-video recordings. OCW resources have generated a strong response without additional classroom features such as enrolment, quizzes and assessments, assignment deadlines and statements of accomplishment (Cooper and Sahami 2013). The incorporation of these additional classroom features helps differentiate tutorials from the final two categories, courses and MOOCs.

While online courses typically restrict enrolment to students that meet university admission requirements and pay fees, MOOCs are free and open to all. The MOOC market is evolving and diverse, with at least two models. In one model, higher education institutions, non-profit organisations and academics provide content and collaborate with platform providers/market makers such as Coursera.org, edX.org, FutureLearn.com and Udacity.com. In the other model, organisations such as Alison.com, Floofl.com, KhanAcademy.org and Google.com provide the content on their own platform.

In summary, online learning material—and related learning experiences—might fall into the four above-listed broad categories: resources, tutorials, OCs and MOOCs. The first three categories overlap along a progressive content continuum, increasingly adding structure and interaction. MOOCs are a type of OC, free and open with thousands of students in a single course. The following review of five online learning variables—interaction, cost, access, recognition and assessment—clarifies and exemplifies the proposed framework.

4 Online Learning Variables

4.1 Interaction

Interaction provides a foundation for discussing variables across the four online learning categories. As mentioned above, three types of online interaction—S2S, S2T and S2C—improve learning (Negash and Wilcox 2008; Piccoli et al. 2001). A meta-analysis of about 1,000 articles found that increasing S2C showed the greatest learning effect, followed by S2S and S2T (Bernard et al. 2009). S2C interaction examples include frequently asked questions (FAQs), automated testing and simulations (Anderson 2003; Daniel et al. 2009). Online interaction, which tends to increase from *resources* to *tutorials* to *courses*, varies in formality, automation and personalisation.

S2C and S2S interactions in all four categories could include a FAQ section, the ability to search for content and opportunities to post comments. Two resources for example, YouTube's Educational Channel and TED, allow S2C interaction via their search functions and S2S interaction by commenting on videos. Tutorials expand S2C and S2S interaction over resources, such as in wikis that allow visitors to edit the content and discuss those edits. Tourism destination tutorials offer S2S interaction via forum and chat functions. Yet even with the ability to interact with other travel agents in these destination tutorials, users rarely interact and many discussions lack S2T moderation (Kalbaska 2012).

S2T interaction tends to be mainly in OCs and somewhat in MOOCs; few if any resources or tutorials provide S2T interaction. A learner could email questions to the tutorial author, such as an MIT or BEST EN academic, but there is no guarantee the academic would respond. Traditional university OCs have a designated lecturer managing the course, assigning due dates, monitoring forums, providing feedback

and assessing submitted work. Relative to OCs, MOOCs have less S2T interaction, more S2C interaction via automated testing and more S2S interaction via forums.

4.2 Costs and Access

Two key variables within the four categories, cost and access, vary with and within each of them. All four categories have an implicit privacy cost. Learning analytics, a burgeoning research stream, draws on digital tracks such as Internet Protocol addresses and clicking behaviour to track users and user behaviours. Technicalities aside, no cost and open access separate MOOCs from OCs. Similar to MOOCs, resources generally have no cost and slightly more open access. The resources mentioned above—YouTube's Education Channel, TED and IFITT's eTourism Resources—require no fees, no registration and are open to anyone.

Some tutorials, particularly OCW, are open to anyone. As of 11 October 2014, the Open Courseware Consortium <ocwconsortium.org/courses> listed 26,658 sets of OCW from 80 providers. Anyone with Internet, assuming no governmental censoring or firewalls, can access these OCW materials. Other tutorials however, restrict access or have minuscule costs such as the time to register and explicit sharing of personal data. To access Google's Digital Marketing tutorials, for example, one must log into a Google account such as Gmail in order to access the videos and other content. Similarly, one must create a free account to access BEST EN tutorials.

National Tourism Organisations (NTOs) restrict their free tutorials, such as those by Australian Tourism and the Switzerland National Tourism Board, to those in the tourism industry. In a study of 75 NTO tutorials, travel agents had to provide their official registration number for 68 of the 75 tutorials (Kalbaska 2012). Some agents also had to provide personal information and professional data, such as sales volumes, markets, client segments and destinations they sell. In some cases, registered travel agents have personal profiles that track completed modules and testing activities.

OCs vary in cost and access. For example, universities require a fee for most courses and may have pre-requisites such as completing a basic math course before taking advanced math. HooteSuite University <learn.hootsuite.com/>, a start-up social media education venture, is open to all that pay a US$21 monthly fee to access its courses. The American Hotel and Lodging Association Educational Institute (AHLAEI), founded in 1953, offers over 30 online courses <ahlei.org/Programs/Distance-Learning/> for about US$200 each. Unlike university courses, HooteSuite and AHLAEI courses have no entry requirements.

MOOCs are open to anyone with Internet access, albeit some MOOCs have suggested pre-requisites. Apart from the time to register and sharing supposedly accurate personal information, MOOCs cost nothing. Recognition, discussed next, is another key distinction between university OCs and MOOCs.

4.3 Recognition

Recognition is a key online learning variable, ranging from none to full credit at a traditional university. The type of recognition usually relates positively to monetary cost and the granting institution. For example the University of Florida, a large public southeastern US university, grants 4-year bachelor degrees online, with the same entry requirements, content and rigour as their on-campus programs <distance.ufl.edu/bachelors>. HootSuite and the AHLAEI grant branded certificates for learners that pass their exams. Finally, some destination organisations provide a specialist certificate upon successful completion of a free course. Users, in this case qualifying travel agents, have a certificate and subsequent competitive advantage as a recognised specialist of a certain destination (Cantoni and Kalbaska 2010).

MOOCs may charge for formal recognition. Students successfully finishing a Coursera MOOC, for instance, usually receive a free statement of completion signed by the instructor. Students may also select Coursera's signature track option in some courses for a US$30–90 fee <coursera.org/signature/guidebook>. The signature tract option affirms the learner's identity and links to a verified certificate on a secure Coursera web page. Coursera also partners with universities to provide formal credit for some MOOCs. For US$195, the University of California San Diego (UCSD) awards UCSD credits to students who pass its 'Climate Change in Four Dimensions: Scientific, Policy, International, and Social' MOOC <extension.ucsd.edu/studyarea/index.cfm?vAction=singleCourse&vCourse=BIOL-40282>.

Rather than formal university credit or a statement of participation, the Khan Academy offers free energy points and over 100 badges across six progressive badge classes <khanacademy.org/badges>. These extrinsic rewards help motivate students, particularly young students. Such badge attainment, however, may lead to an illusion of understanding rather than mastering the material and obtaining knowledge. In addition to recognition, the Khan Academy offers assessment and in many cases student to teacher (S2T) interaction.

4.4 Assessment

OCs advance beyond tutorials and resources by adding assessment and subsequent recognition. Although possible via S2C and S2S interaction, few if any resources offer assessment or subsequent recognition of such assessment. Tutorials may offer S2C assessment, such as multiple-choice and true/false questions. Both OCs and MOOCs use S2C assessment. University OCs tend to use S2T assessment, while MOOCs often use S2S assessment. MOOCs are also experimenting with self-assessment (Wilkowski et al. 2014).

A University of Western Australia (UWA) first-year orientation exercise <student.uwa.edu.au/learning/resources/cars>, Communication and Research

Skills, illustrates S2C assessment and the grey area between tutorials and courses. UWA and non-UWA students may access the readings and take the automated test. There is no recognition or certificate for non-UWA students, while UWA students must pass the assessment in order to continue their studies. Similarly, Università della Svizzera italiana (USI Lugano, Switzerland) students must pass an online tutorial on "Academic integrity" in order to sit face-to-face exams.

5 Conclusions, Limitations and Future Research

This conceptual paper proposed a framework of four categories of online learning. Resources, the first category, are loose collections of learning materials. Tutorials, the next category, tend to add structure to the content and interaction with both the content and other learners. OCs resemble a traditional face-to-face class with structure, assessment, a lecturer managing the course and formal recognition for successful completion. MOOCs are massive and open OCs with no cost, less S2T interaction and less recognition than OCs. The paper also reviewed and applied five variables—cost, access, interaction, assessment, and recognition—to illustrate these categories.

A main limitation of this conceptual study is the difficulty in reviewing a new and dynamic subject area; MOOC research is limited and evolving (Daniel 2012). Testing the validity—such as construct, face, discriminant and content—of these proposed categories is another limitation and a future research stream. A third limitation and future research area is additional online learning variables.

Two additional online learning variables to consider are synchronicity and presence (Cantoni et al. 2007; Negash and Wilcox 2008; Tankelevičienė and Damaševičius 2009). For example, what are the learning outcomes of convenient asynchronous courses versus traditional and fixed synchronous courses? As to presence, some Google MOOCs are available on a self-study basis without a lecture team or discussion areas, while other Google MOOCs are open for a fixed duration with a lecture team and an active student cohort in discussion forums. To what extent does the real-time presence of learners and lecturers influence learning?

Baker and Surry (2013) propose a taxonomy for differentiating and classifying open online learning environments but this study reviewed just one type of openness, open access. Open can also refer to the learning environment, that is, the extent that the learner can control the presentation (Piccoli et al. 2001). Emerging research suggests that many MOOC students do not follow the prescribed sequence of learning activities (deBoer et al. 2014).

Openness may also relate differently to two common MOOC types, the xMOOC and cMOOC (Rodriguez 2013). The former tends to rely on cognitive/behavioural pedagogies while the latter draws on constructivism and connectivism (Daniel 2013). In cMOOCs for example, "Educators and institutions might introduce more openness in the curriculum by using social media and global participation

outside the boundaries of the institutional classroom to invigorate the learning experience of their students (Kop and Fournier 2011, p. 217)."

In addition to openness, MOOC types and iterations are a promising future research avenue. Further research could go beyond just the two MOOC types, xMOOC and cMOOC (Conole 2013; Shimabakura 2013), and investigate the emerging alphabet soup of acronyms such as Small Private Online Courses (SPOCs), Big Open Online Courses (BOOCs), Distributed Open Collaborative Course (DOCCs), Little Open Online Courses (LOOCs) and Massive Open Online Research (MOOR) (Fox 2013; Chauhan 2014).

This paper argues MOOCs and their iterations are simply a type of online course. Yet the MOOC versus online course disagreement supports the need for future research of online course types and related variables.

Acknowledgements This paper is an updated, expanded and improved version of an APacCHRIE 2014 manuscript.

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The Evolution of eTourism Research: A Case of ENTER Conference

Shahab Pourfakhimi and Tianyu Ying

Abstract Using bibliometric analysis approaches this study aims to extend the existing literature about the evolution, structure and spectrum of eTourism research by analysing the major themes and trends of the papers published in the ENTER conference proceedings from 1994 to 2014. Analysing the subjects and research themes of 972 research papers published in this series, the authors propose a structural model for the categorisation of eTourism research. Through a longitudinal observation of the frequently addressed research subjects and technologies, this paper reveals four different phases of the evolution of eTourism research on applying information and communication technologies in tourism. This study contributes to the better understanding of the different stages of the evolution of eTourism research and its future trend.

Keywords eTourism • Research trends • Research categorisation • ENTER proceedings • Meta-analysis • Bibliometrics

1 Introduction

Since the dawn of information and communication technologies (ICTs), the entire realm of tourism and hospitality industries have been constantly revolutionised by the incorporation of this group of technologies (Buhalis 1998, 2003; Law and Jogaratnam 2005; O'Connor and Murphy 2004). Due to the magnitude of this transformational impact, studying eTourism, the integration of ICTs, business management and tourism (Buhalis 2003) has attracted the attention of academic researchers (Buhalis and Law 2008; Law et al. 2009). Since 1994, ENTER conference has provided a venue for international researchers to exchange knowledge and

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_62

debate on the current issues and future trends of eTourism (Law 2002). This conference is regarded as *the* leading international research platform of this field (Liu et al. 2011) and a major force behind the consolidation and formation of eTourism research (Buhalis and Law 2008).

The application of tracking academic publications to identify trends of knowledge development has been recognized by Van Doren and Heit (1973). In tourism and hospitality, this approach has been found to be beneficial in verifying the evolution (Xiao and Smith 2006) and development trend of tourism research (Ballantyne et al. 2009). Within this framework, literature review, content analysis and other bibliometric approaches have been used to track the evolution and nature of tourism research (Benckendorff 2009; Yuan et al. 2014).

Previous research in this field has been largely focused on the journal articles (Benckendorff and Zehrer 2013) or dissertations (Ying and Xiao 2012). The same trend applies to studies in the eTourism domain (Ip et al. 2011a; Law et al. 2014). On the other hand, Freyne et al. (2010) report that exclusively focusing on journals may result in missing significant research findings presented in the conferences. Furthermore, the limited scope of previous reviews has been criticized (Yuan et al. 2014) and the need for expanding their scope has been recommended (Xiao and Smith 2006). Particularly in this field, Law et al. (2014, p. 743) recommended the inclusion of *proceedings*. Therefore, due to the focal position of this conference in the field of eTourism (Buhalis and Law 2008), its long history, and the necessity of going beyond the limited number of journals for research trend studies (Yuan et al. 2014) particularly in the domain of eTourism (Law et al. 2014), this study aims to fill the research gap and identify the development trend of eTourism research from the perspective of ENTER conference. A structural model for the classification of eTourism research has been developed based on the previous research and is presented in this article. Following the analysis of 972 eTourism publications, this structural model was found to be suitable in classifying eTourism research from multiple dimensions and identifying its research development trend.

2 Previous Works

ENTER conference proceedings have been exclusively examined by Liu et al. (2011) and Wang et al. (2013). Analysing 745 full papers published in these proceedings until 2010, Liu et al. (2011) used bibliometric methods to evaluate the research contributions from the longitudinal, regional, individual and institutional perspectives. Wang et al. (2013) employed citation analysis to identify the academic foundations of research contributions published in ENTER proceedings. They suggest that academic research in this conference is substantially constructed on the basis of other academic fields. This demonstrates the contribution of this conference into the diffusion of knowledge (p. 277) and its functionality as a medium for the diffusion of research and knowledge from other disciplines to the eTourism domain.

In the last decade the progress, evolution, and development of ICT applications in tourism and hospitality has been studied using literature review and content

analysis (e.g. Buhalis and Law 2008; Ip et al. 2011b; Law et al. 2009, 2013, 2014; Leung and Law 2005; Li et al. 2013; O'Connor and Murphy 2004). Four of the above studies (i.e. Ip et al. 2011b; Law et al. 2013; Leung and Law 2005; O'Connor and Murphy 2004) exclusively focused on the hospitality context. Li et al. (2013), using an interdisciplinary viewpoint reported the dominant research trends. Law et al. (2009) analysed 215 journal papers in 57 journals and provided a comprehensive review of the development of ICT applications in the tourism industry from 2005 to 2007. Law et al. (2014) later extended the existing literature and critically reviewed 107 publications from 2009 to 2014. Buhalis and Law (2008) critically reviewed 149 of the most influential publications from 2003 to 2008 in the field of eTourism and discussed the dramatic revolution of tourism as the result of ICTs development. They constructed "*the axes of eTourism research*" (p. 610) based on the three themes of consumers, technological innovation, and industry functions.

3 Research Method

Benckendorff (2009, pp. 3–4) specified that systematic use of bibliometric techniques such as content analysis and meta-analysis is useful for investigating the key themes and trends of knowledge evolution. Meta-analysis has been previously employed by Park and Gretzel (2007) using keywords as the unit of analysis. However Yuan et al. (2014) advised that the meaning of keywords may change with the context. Therefore as suggested by Benckendorff (2009), abstracts of the articles have been used in addition to their titles and keywords for analysis in this study. Abstracts and other bibliometric data of the papers published in the ENTER conference proceedings from 1994 to 2014 have been collected in March 2014 for the purpose of systematic meta-analysis. The model used by researchers to categorise the papers is discussed in the next section. This model is consisted of five components namely, *subjects*, *sector*, *focus*, *method* and *purpose*. Subsequently, 972 published papers from 1994 to 2014 have been analysed by both authors based on the framework presented in Sect. 4. For the articles without abstracts, the content of their first page has been used to determine the subjects.

A classification scheme was developed to assist the authors in determining the *subjects* of the research. In order to create the guide list, 1,711 unique keywords of the papers were consolidated by authors and compared with the combination of all subjects introduced by Li et al. (2013), Buhalis (2003, p. 8), Leung and Law (2005, p. 58), Buhalis and Law (2008), Law et al. (2009), Ip et al. (2011b), Law et al. (2013, p. 13) and Law et al. (2014), as well as the list of chapter titles picked by the proceedings editors to ensure its comprehensiveness. After another round of consolidation, a guide list with 67 subjects was used for analysing the subjects. The initial results were reviewed and a final subject list containing 37 different subject groups with 20 subject groups on ICTs and 17 subject groups on tourism and business were created. The *sector* classification scheme has been created based on Buhalis (2003). The *focus* list is based on the Buhalis and Law (2008, p. 610) axes of eTourism research. The *purposes* of papers are identified based on a

modified version of March and Smith's (1995, p. 255) IT research framework. The *method* is the only component of our model which was not evaluated by the authors. In order to evaluate the publications based on their methodology, a systematic review of the full length of the papers was required which was beyond the available resources of the authors. After the independent categorisation of all the 972 publications independently by both authors, discussion sessions were held to resolve the disagreements. Conventional statistical descriptive analysis has been used to analyse the trends of knowledge development. The similar approach was previously used by Ballantyne et al. (2009) and as a part of Park and Gretzel (2007) method. Polynomial trend analysis has been used to analyse the trend and to determine the appropriate length of time periods (Ardanuy et al. 2009), therefore the 21 years history of this conference have been initially divided into seven 3-year periods and then based on the observed trend, the periods were later grouped into four stages of eTourism research evolution.

4 Categorisation of eTourism Research

Although the classification of eTourism research has not been their main purpose, the previous researchers have used well established frameworks to categorise the research based on the industry stakeholders presented by Buhalis and Law (2008). Their model of analysing research based on the technology, demand, and supply dimensions was used by other scholars (Law et al. 2009, p. 602). Law et al. (2009, 2014) further used Engel et al. (1990) model of consumer behaviour for demand-side research classification. On the supply side different models were used by Law et al. (2009), Ip et al. (2011b) and Law et al. (2014). The above models are a suitable fit to discuss the implications, adoption and impact of ICTs from the supply, demand and technological viewpoints. However for the purpose of *research classification*, the previous models, as discussed by Li et al. (2013), lack in the ideal reflection of the multidimensional nature of eTourism research and some of its essential features such as the nature and method of research (Novikov and Novikov 2013). Therefore this study aims to propose a new model which can (1) reflect the multidimensional nature of eTourism based on the Buhalis (2003) model, (2) reflect the complex nature of eTourism research based on the Buhalis and Law (2008) axes of eTourism research, (3) cover the various sectors of the industry, (4) recognize the different goal-directedness (Novikov and Novikov 2013, p. 62) and the nature of research and finally (5) reflect the research methods used by researchers. This model is illustrated in Fig. 1.

The first component of this model is the research *Subject*. Subject as defined by Yuan et al. (2014) is a "*branch* of knowledge in a *field* of study". Buhalis (2003, p. 77) defines eTourism as an amalgam of ICT, business and tourism. eTourism research is expected to contain elements of Tourism and ICT. Without the coexistence of these elements, the research work does not fit in the domain of eTourism as it would be considered as a pure IT or Tourism research. Business is the third part of the eTourism domain. Any research incorporating IT and business fits into this model as

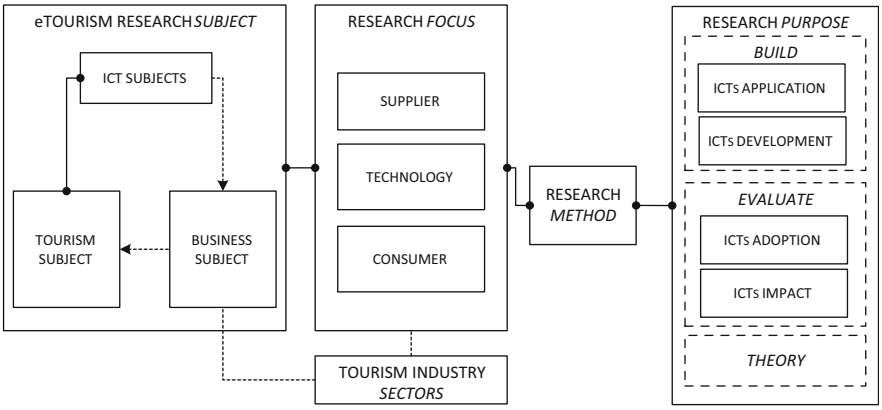

Fig. 1 Structural model of eTourism research categorisation based on Buhalis (2003, p. 77), Buhalis and Law (2008, p. 610) and inspired by March and Smith (1995)

far as a third tourism (or hospitality) subject *or* sector is concurrently concerned. *Sectors* in this model are the subcategories of tourism and hospitality industries such as hotels and destinations (Buhalis 2003). Research in eTourism may aim to answer a question in a broader scope than a certain sector, thus this component is not considered an essential part of the model but it is helpful to draw an overall picture of how researchers studied different components of Tourism industry. Research *focus* is constructed based on the Buhalis and Law (2008, p. 610) axes of eTourism research namely: consumers, suppliers and technology (Buhalis and Law 2008). They indicate the focus of the research and the nature of the research problem. Any subject from the eTourism domain can be studied from at least one of these perspectives. The rationale behind this argument is based on the multidimensional aspect of eTourism, and the complexity of Tourism and Business paradigms. eTourism research fundamentally fit in the domains of both ICT and tourism (or management) and the latter field(s) can be studied from supplier and consumer viewpoints and therefore any eTourism research problem can be studied from at least one of the above perspectives. Research *method* in this model encompasses methodology and research design (Sreejesh et al. 2014) to categorise the research based on the *theoretical* models or *techniques* of investigation (Dann et al. 1988).

Purpose of research indicates the *goal-directedness* of researchers and is directly related to the nature of *research problem* (Novikov and Novikov 2013). As an essential component of research design, it demonstrates the *purposefulness* toward performing a scientific *task*, confirming a *hypothesis* or resolving a *problem* (Novikov and Novikov 2013). March and Smith (1995) introduced an IT research framework with a dimension used to classify the nature of research activities. This framework was later adopted by scholars in other fields (e.g. Osterwalder 2004). It divides IT research *activities* into four categories of *build*, *evaluate*, *theorize* and *justify*. This study uses a modified version of this model by merging 'theorise' and 'justify' into the first two groups. March and Smith (1995, p. 258) define *build* as the

construction of an artefact and demonstration of its *possibility*. At the early stages of the development, the research evolves around the *utility* and *ability* whereas in the later stages, the focus shifts to the *improvement* and *performance* (p. 260). eTourism researchers may discuss ICT considering their *utility* and *ability* or their *design* and *architecture*. Thus (1) the '*application of ICT*s', studying the *utilisation* and *abilities* of ICTs within the tourism domain; and (2) the '*development of ICTs*', studying the *creation*, *architecture and design* of such applications are the two subcategories of the model. March and Smith (1995, p. 258) elaborated the *evaluation* as investigating how well an artefact works. This evaluation involves using metrics to measure *operationality*, *ease of use*, and *impact* of a product on the environment and users (p. 261). Therefore two other subgroups can be defined as (3) the '*adoption of ICTs*', studying their *operationality*, *usability* and *ease of use* and (4) the '*impact of ICTs*', investigating the impact of ICTs on users and tourism environment. The eTourism researchers focused on notions of evaluation and application has been presented by Li et al. (2013, p. 309). The other two dimensions of the March and Smith (1995) model, theory and justify, are replaced with a distinctive category (5) to classify the research works studying the '*theories*' and theoretical aspects of eTourism.

Comparing the original framework of March and Smith (1995) and the model of this study, it should be noted that the categories defined in this model do not precisely correspond to the definitions by March and Smith (1995). The natural science notions of theory and justify are jointly merged with notions of build and evaluate to extend the scope of our four purpose categories to cover eTourism studies using theorisation and justification to investigate eTourism research problems. Thus while their categories of build and evaluate only comprises of research using design methods; the four categories of this model are used to determine the *purpose* of studies and do not necessarily reflect the methodologies. So each of these four categories covers both of their notions of theorize and justify. Yet to categorise the studies based on their methodologies and focus, two separate components are added to this framework.

To Summarize, '*application*' studies include research investigating the applications and potentials of a certain technological production—often at the early stages of the development of a technological product. '*Development*' studies discuss ICT with the purpose of design and creation. "*Adoption*" and '*impact*' studies usually investigate the aftermath of the development. Whilst the *adoption* studies are concerned with evaluating the use, performance, usability or acceptance of a technology, the *impact* studies are concerned with studying the outcomes, effects and consequences of that use. Subject to the validity of research problem, eTourism researchers can design their studies to investigate the *ICTs subjects* with any of the above *purposes* from any of the above *focus* perspectives. The essential factor is that the studied *ICT subject* should be either concurrently studied with a *tourism subject* or in the domain of tourism and hospitality *sector* or both. An eTourism research often addresses several subjects, therefore in this study most of papers have been categorised with more than one *subject*, as it reflects the multidimensional nature of eTourism. However, each paper is categorised with

only one *focus* and one *purpose*. Here is an important consideration in the use of above model. A research work might fit into more than one group of research *focus* or *purpose*, as researchers often address several research questions or investigate them from different perspectives. In this study, the *dominant* purpose and focus of papers have been considered for the purpose of classification.

5 Results

Categorising 972 articles illustrated the overall picture of research works presented in Table 1. Further investigation provided more insight for the identification of eTourism research trend. From a research focus perspective, 25 % of development, 45 % of adoption, 47 % of impact and 39 % of application studies have been conducted from the *suppliers*' perspective showcasing the significance of this sector for researchers. *Demand-side* has been more considered by adoption and impact researchers compared to other two groups. Apart from the '*destination*' and '*hospitality sectors*', all the other sectors have been associated with a small number of the papers. The above findings are in compliance with Li et al. (2013) findings; however it should be noted that each of the subject categories in this study represents a broad range of different technologies, products and services associated with them. For example the *smart systems* covers all the subjects related to the intelligent systems, semantic web, ontology, decision support and recommender systems. It is therefore important to interpret the findings considering the broad categories.

The structure of research however has been dramatically changed within the last two decades. A dramatic growth in *consumer-oriented* research was observed increasing from 9 % in 2000 to 35 % in 2005. From 2009 onwards the periodical share of consumer-oriented research remained at about a 30 % level. An opposite

Table 1 The overall percentages

Top 10 ICT subject groups		Top 10 tourism and business subjects groups		Research focus	
ICTs (in general)	25 %	Management	30 %	Technology	43 %
Websites	19 %	Marketing	22 %	Supply	37 %
Smart systems	16 %	Consumer behaviour	17 %	Demand	20 %
Evaluation/Optimization	13 %	SMTEs	6 %	*Research purpose*	
Social media/Web 2.0	12 %	Distribution	5 %	Development	38 %
Information systems	11 %	Satisfaction	3 %	Adoption	31 %
Mobile/Wireless	6 %	Research	3 %	Impact	15 %
Online booking/Sale	8 %	Culture and heritage	3 %	Application	15 %
User information search	8 %	eLearning/Training	2 %	Theory	1 %

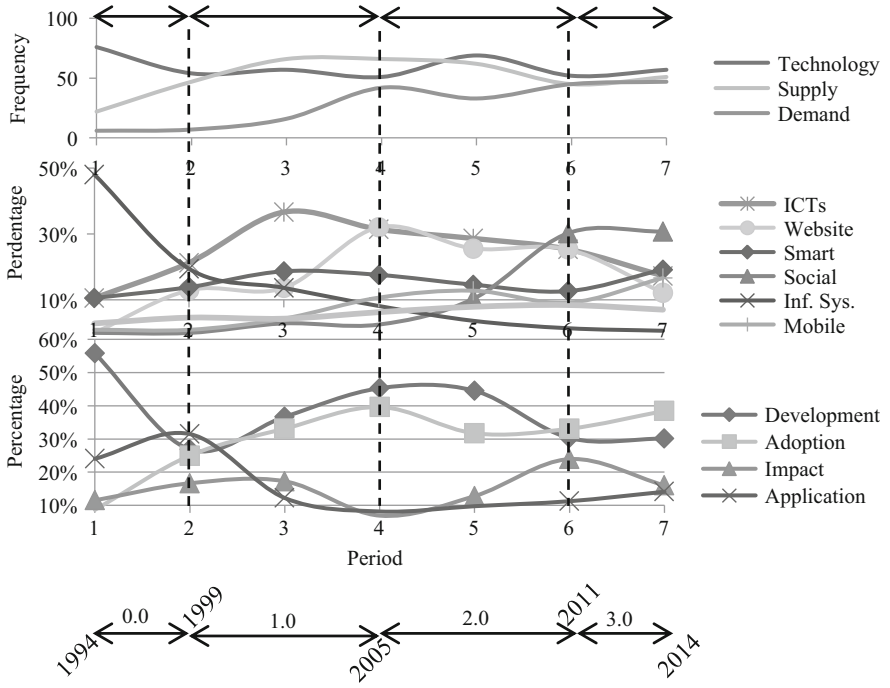

Fig. 2 The *periodical* trend of change in the frequency of papers categorised by their focus, ICT subject and purpose

trend was observed for *technology-oriented* research. While in the first two periods (94–99), technology-oriented research was the mainstream trend; supply-oriented studies had been the largest group from 2000 until 2005. Since 2008 the three groups have had a convergent trend and a nearly equal share. This trend is illustrated in the upper section of Fig. 2. By further investigating the periodical trends the general development trend of eTourism research can be divided into four different stages.

5.1 Four Stages of eTourism Research Evolution

Considering the most frequently used subjects, focus and purpose as the, ENTER conference predominant research themes and trends have been constantly reformed over previous years. Investigating the above indicators the 21 years history of eTourism research can be divided into the following four ages:

1. *The age of Information Systems*: From 1994 to 1999 is associated with the dominance of *technology-oriented* research and the insignificant share of consumer-oriented studies. This represents an era when the academic focus was on the automation of industry operations (Buhalis and Law 2008, p. 617).

More than one third of studies in this period are associated with *information systems*. *Multimedia* and early *smart systems* were the other popular subjects. This period begins with the dominance of *development* research, largely dedicated to the study of the architecture of the above technological products. However within this period supply oriented studies with the focus on *application* and *adoption* grew steadily. In 1998, application studies reached their highest rate of 38 %, as researchers focused on the investigation of the potential applications of new ICT developments in tourism and hospitality industries. Discussions about the adoption and applications of information technologies grew rapidly from 1996 and discussion about *online reservation*, especially from the development point of view began to emerge. This period ends with a drop in the number of *technology-oriented* and *information systems* papers as the mainstream focus of researchers shifted from development to the adoption of technology by the supply side stakeholders.

2. *The age of the adoption of ICTs and the website development*: About 60 % of the presented papers from 2000 to 2005 were discussing either *websites* or *information technologies* in general. *Supply-oriented* research was the major trend as the adoption studies reached its highest rate in this period. More than 40 % of papers in these years studied the *adoption* of ICTs, websites and *online reservation*. The study of *mobile* systems and *social networks* began to emerge in this phase. While the trend of application studies decreased, *demand-side* studies after 2004 began to flourish, reaching a share of 24 % at 2005. Consumer studies however remained largely related to the *websites* and *information technologies* in general. Technology oriented studies in this period were largely related to the recommender and decision support systems. Apart from the *tourism* and *hospitality*; *internet*, *information technology*, *websites* and *recommender systems* were the most popular author-picked keywords in this era. This period is identified by the predominant trend of the supply-oriented and websites development research and a growing focus of researchers on the adoption of websites by the supply side stakeholders. This period ends with a decline in the popularity of the websites, supplier-oriented and adoption studies, as the attention of researchers shifted toward a newer generation of ICT applications.
3. *The age of consumer-oriented and social media studies*: The year 2006 marks a decline in the research of *websites*. However *technology-oriented* studies began a second period of growth, this time largely in relationship with the *smart* and *mobile* technologies. The impact studies began to gain popularity and continued to grow reaching a 30 % share in 2011. Following the emergence of web 2.0 (O'Reilly 2009) applications, from 2008 there has been a dramatic rise in the number of research studying *web 2.0*, *social media*, *social networks and user generated content*. The share of these studies rocketed from 4 to 25 % in 2008 and then to 40 % at 2011. From 2008 this group remained the most popular subject with at least 28 % share.

   Consumer-oriented studies continued to grow and reached a peak of 36 % in 2010. The year 2008 was the turning point for the *location based technologies* as the share of this group reached to its peak of 12 %. *Impact* studies were mostly

related to the group of *social media* and *social networks*. The majority (83 %) of the *consumer-oriented* research has been associated with the *websites* or *social media*. *User generated content* and its similar keywords (e.g. eWoM and online reviews) have been the top author-picked keywords surpassing *tourism*, *recommender systems* and *hospitality*. This stage is identified with the overall dominance of web 2.0, growth of *consumer-oriented* and the decline of research about web 1.0 technologies such as websites and information systems. However, the stabilisation of the share of social media studies and the beginning of a second period of rise for application and adoption studies marks a new era of eTourism research where researchers shifted their attention to the business potentials of smart, mobile and social technologies.

4. *The age of social, smart and mobile eTourism research*: Since 2012, *social media* and *network* has remained the most popular subject with a constant rate. However two other groups, namely *smart systems* and *mobile systems*, have gained a significant growing rate. The *smart systems* group has reached a 20 % share. *Gamification* has emerged for the first time. Perhaps the most significant trend was the emergence of a second growing period for the *adoption* studies as its share rose from 25 to 44 % and surpassed the development studies for the first time after 10 years. With a closer look at these studies it was observed that the number of research investigating the *impacts* of social media subjects has reduced and instead the number of research investigating their *adoption* has risen dramatically. Within the last few years, user generated content gradually has lost its position among the most frequently used keywords and *social interaction* and *mobile marketing* replaced its place. Reviewing the literature that has have been associated with these subjects revealed that while in the last years of 2000s, the study of *social media* has been mostly concerned with their impact on consumers and suppliers; in 2010s this focus turned to the *use* and *adoption* of these technologies by consumers and suppliers [see for example: Inversini and Sykes (2013), Scaglione et al. (2013)]. Top three ICT subjects based on their frequency in each of the above four stages are presented in Table 2.

Table 2 Top three ICT subjects in each period

Period 1	Period 2	Period 3	Period 4
1994–1999	2000–2005	2006–2011	2012–2014
Information systems (33 %)	ICT (34 %)	ICT (27 %)	Social media (31 %)
ICTs (16 %)	Websites (23 %)	Websites (25 %)	Smart systems (19 %)
Smart systems (15 %)	Evaluation (18 %)	Social media (20 %)	Mobile systems (17 %)

6 Conclusion

The main objective of this research was to investigate the evolution of eTourism research from the perspective of ENTER conference. The bibliometric details and abstracts of the entire 972 research papers have been systematically analysed using a new framework created based on the previous research. The model encompasses five components of *subjects*, *focus*, *sector*, *method* and *purpose* with the purpose component is divided into five categories of *application*¸ *development*, *adoption*, *impact* and *theory*. This framework has proved to be helpful in the identification of eTourism research trend from a multidimensional perspective. The model assisted researchers to investigate the extent of research concerning each group of the ICT products and enabled them to evaluate the trend and nature of the studies in each group based on their purpose, focus and the tourism industry sector involved in the research. From an industry sector perspective the number of research studying ICTs in relation with hospitality and destinations sectors has been significantly larger than research investigating the other sectors of tourism industry such as transportation and attractions. Further investigation of the trend revealed four different stages in the eTourism research. While the earlier years of the conference were mostly associated with technology-oriented research, the trend later shifted to the supplier-oriented studies and with the growth of consumer-oriented studies from 2008, the conference papers have been fairly divided between the above groups.

In a similar trend while the early eTourism research has been mostly conducted with the purpose of development of ICT products, the focus of researchers later shifted to the applications of ICTs in the tourism context and its adoption by suppliers and consumers. From the mid-2000s, the research investigating the impact of ICT technologies on both sides of tourism industry has grown. Information systems, ICTs in general, websites and social media have been the most popular ICT subject groups. However research on the first two groups has declined within the previous decade as the attention of researchers has been shifted to the social media, mobile and smart technologies. Within the recent years while social media group has remained as the most popular ICT subject, the mainstream approach towards its investigation has recently shifted from studying its impacts on the demand side to investigating its wide range of potentials and applications for the supply side of tourism industry and its adoption by them. The mobile and smart technologies are the most recently growing subjects. Furthermore some new subjects such as gamification began to emerge.

This study contributes to the better understanding of the evolution of eTourism research and its future trend by introducing the major ICT subjects which have been the predominant focus of the academic researchers' investigations within the previous decades. It further reveals the latest developments and emerging themes in the eTourism research. The researchers identified four distinctive stages in the evolution of eTourism research and discussed how the focus of eTourism researchers has changed in each stage. This study further illustrates the nature of research in each phase based on the focus and the purpose of researchers. The paper

presents that eTourism research has recently reached a balanced trend in studying ICT subjects from the technological, supply and demand perspectives.

Due to the restriction in the space, the statistical details have not been presented. The lack of investigation of methodologies is the major limitations of this research. The other limitation lies in the reliance of this research on a single source of data, ENTER conference proceedings. The research classification is based on the abstracts rather than the full length of papers; this categorisation is subjective and is dependent on the perspective of the respective authors. Furthermore, the identified trend might represent the orientation of organisers rather than the academic society. Further research investigating this trend using less subjective methods such as citation coupling is recommended. The trend found in this research should be examined using other means of academic communication such as journal articles and dissertations.

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Investigating E-learning Effects on Continuance Intentions of Hospitality Management Students

Tsong-Zen Liu, Tai-Yi Huang, and Chia-Shiang Hsu

Abstract The last decades have understood growing importance place on research of e-learning in education. In recent years, there has been a dramatic proliferation of research concerned with the effectiveness of e-learning in higher education. The purpose of this study is to examine the influence of e-learning on hospitality management students' perceived behaviours, satisfaction and continuance intentions. The study surveyed undergraduate hospitality management students who completed online classes. The findings of this study showed that (1) students' continuance intention of e-learning was strongly determined by satisfaction and confirmation of the learning management system (LMS). (2) Students' expectations were confirmed by their satisfactions of e-learning management system. (3) Students' satisfactions and confirmations of e-learning strongly predicted by perceived usefulness and perceived playfulness. Implications of findings for using e-learning in hospitality management education are suggested.

Keywords Hospitality management student • Perceived behaviour • Satisfaction • Continuance intention • E-learning

1 Introduction

E-learning has been a rapid growing in higher education due to the most universities worldwide open their courses to both on-campus and off-campus (Selim 2007). E-learning is used for improving individual learning or organizational performances through telecommunication technology, for example, computers, CD-ROMs, Internet, or intranets (Clark and Mayer 2003). They also argue that

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I. Tussyadiah, A. Inversini (eds.), *Information and Communication Technologies in Tourism 2015*, DOI 10.1007/978-3-319-14343-9_63

"e-learning courses are intended to help learners reach personal learning objectives or perform their jobs in ways that improve the bottom line goals of the organization" (Clark and Mayer 2003, p. 13). Morrison and Anglin (2005) point out that "the design and development of e-learning materials presents the instructional designer with an environment, opportunities, and constraints quite different from those associated with the design of instruction for a traditional classroom context" (p. 94).

Kotler et al. (2003) and Walker (2007) indicate that major differences between hospitality products and others are providing physical products, service delivery, service environment, and the service products. To work in the hospitality or tourism industry can be very demanding; there are many situations where communication with customers and co-workers is vital. Sciarini et al. (2012) report that administrators of hospitality and or tourism program in 37 countries believe that more than 80 % of higher education students will take at least one online course within 5 years; however, they query the quality of online courses. Since the differentiated learning characteristics of hospitality management students, this study is to investigate the e-learning effects using the Information Systems Continuance model (ISCM) proposed by Bhattacherjee (2001) and extending the Technology Acceptance Model (TAM) by Moon and Kim (2001). The purpose of this study is to examine e-learning effects on perceived behaviours, satisfaction and continuance intentions of hospitality management students. This study might explore e-learning best practices for hospitality management students by educators and university's administration.

2 Literature Reviews

E-learning is identified by researchers as: Educating learners whenever needed, approaching resources between distant sites, creating learning communities, updating content and making modifications easier by facilitators, satisfying differences between learners, containing many kinds of media, such as text, audio, graphics, video and animation (Chen 2010; Cook 2005; Rosenberg 2001). Researchers also point out that e-learning provided many advantages to help university students to succeed in the education market, to decrease universities' cost, and to solve universities' quality problems (Rosenberg 2001; Selim 2007). Rosenberg (2001) stated that "a true e-learning strategy certainly addresses issues of technology and learning effectiveness, but it also addresses issues of culture, leadership, justification, organization, talent, and change" (p. 32). Sigala (2004) says that "computer network-based systems are being designed specifically to support classroom experiences, especially group discussions and joint projects, while electronic discussion groups and "chat rooms" extend the reach of the classroom beyond the physical campus" (p. 11); He indicates technology factors, instructors' characteristics and students' self-regulatory are three important factors determining e-learning effectiveness in tourism and hospitality education (Sigala 2004). Jayawardena (2001) argue that creating and delivering international hospitality programs for knowing multi-ethnic and multi-national student mentality. It is

a biggest challenge for educators to help students' careers in international hospitality business. There are four major types of e-learning courses which were identified recently in accordance with providers including: Academic, Destination Management Organizations, Corporate, and Independent (Cantoni et al. 2009; De Rose et al. 2014). Sigala and Baum (2003) suggest six future targets should be concerned by hospitality and tourism educators, such as lifelong learning, a seamless web, asynchronous learning, affordable learning, interactive and collaborative learning, developing the knowledgeability students and diversity. Selim (2007) found out that eight critical success factors for e-learning acceptance by universities' students including: Instructor's attitude towards and control of the technology, instructor's teaching style, student motivation and technical abilities, student interactive collaboration, e-learning course content and structure, ease of on-campus internet access, effectiveness of information technology infrastructure, and university support of e-learning activities.

As considering the progress of proposed technology acceptance model (TAM), Davis (1986) modified Ajzen and Fishbein's Theory of Reasoned Action (TRA) to TAM which is used for explaining computer usage behaviour. TAM is a well-known model to examine the relationship between users' beliefs and behavioural intentions to use technology (Davis 1986; Ham et al. 2008; Jacques et al. 2006; Wang et al. 2003). Researchers conclude perceived usefulness, perceived ease of use and users' intentions are three main reasons to influence people to use computer and information system. In TAM model, Davis et al. (1989) presents two major internal beliefs, which are perceived usefulness and perceived ease-of-use will effect users' attitude toward using information systems. They also point out that perceived usefulness is the most important determinant of people's intentions to use computers (Davis et al. 1989). Moon and Kim (2001) clarify perceived playfulness as "an extrinsic source of motivation and perceived enjoyment as an intrinsic source of motivation" (p. 218); they also discover that perceived ease of use on intention will be effected by perceived enjoyment and perceived usefulness. Ruiz-Molina and Cuadrado-Garcia (2008) found out that e-learning would improve students' motivation, involvement and performance because students experienced excitement in e-learning courses.

Information Systems Continuance Model (ISCM) was proposed by Bhattacherjee (2001) based on the original Expectation Confirmation Theory (ECT). His research focused on the affective factors of continuance intention after purchasing behaviour by surveying the users of bank systems. In this model, pre-adopting expectation factors will be eliminated. Perceived usefulness factor of TAM would be added into ISCM, since it can be recognized as the concept of post-adopting expectation (Davis et al. 1989). Therefore, perceived usefulness, confirmation, satisfaction and continuance intention are the inside factors of ISCM to explain post-adopting behaviour of information systems. Ifinedo (2006) also argues that the ISCM has been used for forecasting users' continuance intention of operating a new information system. DeLone and McLean (2003) point out that "use" and "user satisfaction" have strong collection, and they believe that good experience with "use" will contribute "user satisfaction" in a causal sense. Hsu et al. (2008) added the characteristics of Blog into this model to understanding the

user behaviour of Blog platform. Perceived characteristics contained factors of perceived playfulness and perceived interactive and perceived use had the factors of perceived usefulness, easy-of-use and compatibility. In this study, perceived usefulness, easy-of-use and playfulness are used to affect confirmation and satisfaction.

3 Methodology

3.1 Research Model

Based on the literature reviews and adopting TAM into ISCM model, the proposed research model was derived as shown in Fig. 1. In this study, usefulness, ease-of-use and playfulness of post-acceptance e-learning courses were assumed to have positive influences on the satisfaction and confirmation for the hospitality management students (e-learner). The effects between confirmation, satisfaction and continuance intentions of the target students using the learning management system (LMS) behaviours will also be discussed in this research results. Structural Equation Modelling (SEM) analysis method was applied by using SmartPLS software. Nine hypotheses (*H1* to *H9*) will be proposed in this research to investigate the effects between variables.

3.2 Respondents and Survey Procedures

The online survey data were gathered from web-based e-learning courses set up at the learning management system (LMS) of National Kaohsiung University of Hospitality and Tourism (NKUHT) in Taiwan. Senior students of hospitality management school must study this web-based e-learning course, hospitality

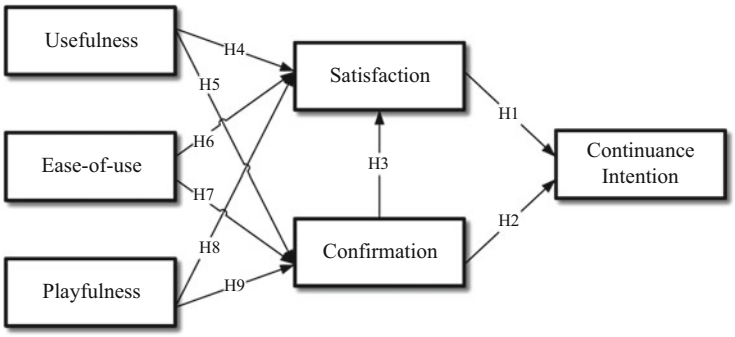

Fig. 1 The proposed research model

information system, and will response the online questionnaire after complete this course voluntarily. Learning activities of this e-learning course are blended of asynchronous and synchronous technologies. Students can read the well constructed learning materials on LMS website and discussion their learning problem by online meeting room, message boards, and forum. They also needed to take a lot of face-to-face classes during the learning period. The online questionnaire survey began on September 15, 2012 and ended on December 31, 2013. 200 students had completed this course, and 136 valid respondents were received. It was about 68 % response rate.

Among the respondents, 16.9 % (23) were male and 83.1 % (113) were female. The respondents' average time durations per day to use internet were 2.22 % below 1 h, 37.04 % between 1 and 3 h, 50.37 % between 4 and 7 h, and 10.37 % upper 7 h. It is shown that most respondents had heavy internet-use behaviour. In addition, 39.01 % students used to have online e-learning experience while 74.47 % already used this LMS website before taking this course. On the other hand, 20.57 % respondent had joined an internet discussion board activities, and only 9.86 % respondents had the experience of synchronous online discussion activities before taking this course. It is represented that most respondents did not have sufficient e-learning experience before they took this web-based e-learning course. Moreover, All of the respondents had completed 1 year hospitality industry internship and expected to have full experience of hospitality practice.

3.3 Constructs and Measurements

The statistic results of validity and reliability tests are shown in Table 1.

The reliabilities and validities of the proposed questionnaires were measured by Cronbach's alpha values and Confirmatory Factor Analysis (CFA) factor loadings which must be consistent with Nunnally (1978) proposed thresholds. The proposed standard thresholds are followings. It is represented passing validity test if all of the standardization item loadings are greater than 0.5. The Cronbach's alpha value greater than 0.7, the Average Variance Extracted (AVE) values larger than 0.5, and the Composite Reliability (CR) values bigger than 0.8 will show passing the reliability test. Output values are all larger than the proposed thresholds. It is verified that the proposed questionnaires are with significant good validity and reliability.

In addition, the correlation matrix (CM) test was used to verify the independences of proposed six measures constructs. Means and standard deviations (S.D.) of confirmation (CO), Satisfaction (SA), Playfulness (PF), Ease-of-use (EU), Usefulness (UF), and Continuance Intention (CI) were 5.198 (S.D. = 0.852), 5.198 (S.D. = 0.861), 4.905 (S.D. = 0.929), 5.441 (S.D. = 0.827), 5.470 (S.D. = 0.687), and 5.224 (S.D. = 1.069) respectively. As shown in Table 1, the diagonal shaded values of proposed constructs were larger than 0.7. It is verified that the proposed six measures constructs were independent.

Table 1 Results of validity, reliability, and correlation matrix tests

Measures construct		CFA loading	Cronbach's alpha	AVE	CR	CM test
Confirmation (CO)	CO1	0.864	0.833	0.750	0.900	0.866
	CO2	0.844				
	CO3	0.890				
Satisfaction (SA)	SA1	0.912	0.897	0.829	0.936	0.910
	SA2	0.934				
	SA3	0.885				
Continuance intention (CI)	CI1	0.934	0.921	0.863	0.950	0.798
	CI2	0.938				
	CI3	0.915				
Ease-of-use (EU)	EU1	0.788	0.806	0.561	0.864	0.749
	EU2	0.729				
	EU3	0.731				
	EU4	0.708				
	EU5	0.786				
Playfulness (PF)	PF1	0.625	0.901	0.637	0.923	0.769
	PF2	0.606				
	PF3	0.863				
	PF4	0.873				
	PF5	0.842				
	PF6	0.886				
	PF7	0.837				
Usefulness (UF)	UF1	0.686	0.9120	0.592	0.928	0.928
	UF2	0.757				
	UF3	0.729				
	UF4	0.862				
	UF5	0.897				
	UF6	0.790				
	UF7	0.682				
	UF8	0.813				
	UF9	0.676				

4 Findings

Structural equation modelling (SEM) is particularly used to test the relevance of multivariate analysis effectively. On the other hand, if the size of samples is less than 200, it is suitable to use SmartPLS software to test small size samples as key performer. In this study, the number of respondents is 136 and the SEM model has six independent variables. The results of multi-regression analysis will be shown as following sections.

Table 2 Results of proposed hypotheses testing (*H1* to *H9*)

Independent variable → Dependent variable	Main effects
Satisfaction → Continuance intention (*H1*)	0.411*** (3.305)
Confirmation → Continuance intention (*H2*)	0.453*** (3.744)
Confirmation → Satisfaction (*H3*)	0.461*** (5.220)
Usefulness → Satisfaction (*H4*)	0.167* (1.964)
Usefulness → Confirmation (*H5*)	0.422*** (4.973)
Ease-of-use → Satisfaction (*H6*)	0.035 n.s. (0.465)
Ease-of-use → Confirmation (*H7*)	0.052 n.s. (0.510)
Playfulness → Satisfaction (*H8*)	0.317*** (3.976)
Playfulness → Confirmation (*H9*)	0.424*** (5.559)
R-square	0.688

*$p < 0.05 = t > 1.96$; **$p < 0.01 = t > 2.58$;
***$p < 0.001 = t > 3.29$; with one-tailed test

Based on the proposed research structure, there are nine proposed hypotheses needed to be test. The direct effect of independent variables and dependent variables are consistent with regression model. The regression tests of *H1* to *H9* by using SmartPLS are shown in Table 2. It is represented that *H1* to *H5* and *H8* to *H9* are positive significant and supported, where *H6* and *H7* are non-significant and not supported. Hence, the perceived ease-of-use behaviour will not significant affect confirmation and satisfaction for the hospitality management students. Moreover, the perceived ease-of-use also do not affect the continuance intention of the students using LMS in the future.

As the result shown in Table 2, SEM method evaluates the path coefficients of all the correlation between six variables. At the second stage of proposed model, the path coefficients between confirmation and satisfaction and, satisfaction and continuance intention are = 0.461*** (t = 5.220) and, 0.411*** (t = 3.305) respectively. This results are positively significant and, *H3* and *H1* were strongly supported. Hence, confirmation of students to study an web-based e-learning courses can strongly positive affects satisfaction of e-learning behaviour and e-learning satisfaction also can strongly positive affects their continuous intention to apply another e-learning course in the future. In addition, confirmation and continuance intention path coefficient is = 0.453*** (t = 3.744). It represents that proposed *H2* was positively significant and strongly supported. Therefore, confirmation of students to take an e-learning courses can strongly positive affects students' continuous intention behaviour directly.

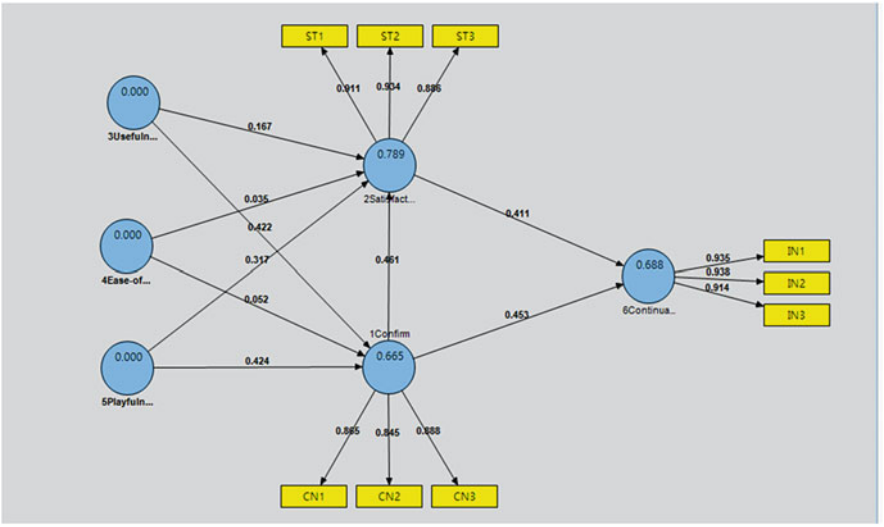

Fig. 2 Results of the path coefficients for the proposed research model

Results of the proposed model's first stage were used to investigate the effects between students' using perception and, satisfaction and confirmation. As shown in Table 2, hypotheses *H4*, *H5*, *H8* and, *H9* were proved to be positively significant while hypotheses *H6* and *H7* were nonsignificant. It revealed that hospitality management students will not pay much attention on the easy-of-use e-learning interface. They will focus on the usefulness and playfulness of e-learning content. The path coefficients between usefulness and, satisfaction and confirmation are = 0.167* (t = 1.964) and 0.422*** (t = 4.973). It can be denoted that perceived usefulness of e-learning content can affect confirmation to take this course more than satisfaction of this course. Hence, it is suggested that the technology factors (Sigala 2004) to containing many multimedia in e-learning courses will not be important for hospitality management students. On the other hand, useful content will plays more important feature to implement an e-learning course for the hospitality management students. Course content can be denoted as the fourth important factor for the results of Sigala (2004).

In addition, playfulness and, satisfaction and confirmation path coefficients are = 0.317*** (t = 3.976) and 0.424*** (t = 5.559) respectively. It is shown that *H8* and *H9* were strongly supported and positively significant. By comparing the coefficients of *H4* and *H8*, It reveals that hospitality management students with lively personality will satisfy to a joyful course than a useful course. The result map of the path coefficients for the proposed research model is shown in Fig. 2.

The R-square of overall proposed structure equation model is = 0.688 > 0.5 reveals that this result has good explanation to investigating the relationship between these factors. It can be claimed that perceived playfulness has more affective effect than perceived usefulness and perceive ease-of-use for hospitality management students adopting e-learning class to study the professional courses. It

is suggested that teachers must design their e-learning materials more interesting, joyful and interactive to make more playfulness effect.

5 Conclusion

Most people are well aware of the value of learning, but learning has traditionally been explained by causes, processes, and consequences (Schunk 2008). E-learning has now become a well-known method to deliver knowledge because it has many advantages (Chen 2010; Cook 2005; Rosenberg 2001). In addition, Kim et al. (2011) present some critical advantages of e-learning, for example, providing information promptly and helping hotel managers grow operating efficiency to achieve both customers and employees' satisfactions. E-learning has been adopted by many higher education institutions and organizations. In this paper, a web-based eLearning system was used by the instructor to deliver a food and beverage course at NKUH. This paper focused on investigating e-learning effects on perceived behaviours (perceived usefulness, playfulness and ease-of-use), satisfaction and continuance intentions of hospitality management students. Walker (2007) believes that some of the exciting parts of the hospitality and tourism industry are the various professionals involved in and created by the industry. As a hospitality management student, it is necessary to continue professional development. Three important results were found in this study. Firstly, researchers indicated that hospitality management students would have continuance intentions of e-learning systems because of satisfaction and confirmation. Secondly, hospitality students' satisfactions and confirmation of e-learning were strongly predicted by perceived usefulness and playfulness. Thirdly, students' satisfactions of e-learning management systems confirmed students' expectations. However, the results of this study didn't show that perceived ease-of-use was able to use for forecasting hospitality students' satisfactions and confirmation of e-learning.

The findings of studies of Feinstein et al. (2007) and McDowall and Lin (2007) also showed that e-learning would improve hospitality and tourism students' learning experiences. In the study by Lee et al. (2009), researchers also point out both perceived usefulness and perceived playfulness have a positive impact on the students' intentions to use e-learning.

6 Limitation and Future Research

In the future, the university's administrations and educators might pay attention to increase students' satisfactions and confirmation in online courses in order to raise continuance intentions of using e-learning system. The materials of online courses in hospitality management might be enhanced perceived usefulness and playfulness. Much more also need to design online courses for hospitality and tourism

management program. The report of the Taiwan Network Information Center (TWNIC) shows that there were 77.25 % (15.94 million) of Internet users (above age 12), and 80.99 % of households had access to the Internet in 2012 in Taiwan (TWNIC 2013). Young generations are surrounded with information technology in their daily life. Taking advantages of e-learning to improve learning or training processes will be the future trend. This study might offer perspectives for future research in e-learning for other industries.

The main limitation of this study is the sample which was used. The sample of this study only collect from one university (NKUHT) from 2012 to 2013. Further research should be undertake the study in different universities or in the corporations.

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