# Information Technology and Development

## A new paradigm for delivering the Internet to rural areas in developing countries

**Jeffrey James**

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

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Attempts to bring the benefits of information technology in the form of the Internet to developing countries have, to date, foundered on the belief that this requires the beneficiaries to access the technology directly. As a result, the perceived staggering benefits of such an enterprise have often failed to materialize.

This original contribution to the debate on developing countries and IT suggests that the benefits of the Internet can be passed on via an intermediary. That is, what matters is not the Internet itself, rather its ability to provide information that can be made relevant and useful locally. Intermediaries are arguably more likely to provide such information and hence more likely to promote what Amartya Sen called individual 'functionings', for example the ability to be free of illness.

Jeffrey James is an impressive servant to the discipline of development studies, here he brings together previously fragmented literatures to break new ground in Internet intermediation. *Information Technology and Development* will interest development economists and practitioners in equal amounts.

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First published 2004
by Routledge
2 Park Square, Milton Park, Abingdon, Oxfordshire OX14 4RN

Simultaneously published in the USA and Canada
by Routledge
29 West 35th Street, New York, NY 10001

*Routledge is an imprint of the Taylor & Francis Group*

This edition published in the Taylor & Francis e-Library, 2004.



*British Library Cataloguing in Publication Data*
A catalogue record for this book is available from the British Library

*Library of Congress Cataloging in Publication Data*
A catalog record for this book has been requested

ISBN 0-203-32550-8 Master e-book ISBN

ISBN 0–415–32632–X Print Edition)

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# Acknowledgements

Beginning with Rob Langham of Routledge, who supported this project from an early stage, I am deeply indebted, in one way or another, to quite a large group of people from both developed and developing countries. Listed in no particular order, the following deserve not only my sincerest thanks but also my admiration: P.G. Ponnapa, Vinamra Agarwal, Bruce Girard, Rajeswari Rao Pingali, Chulie de Silva, Terry Clague, John Daly, Michael David, Paul Meyer, Rajesh Rajora, Charles Kenny, Richard Tarboton, Nathalie Muller, Don Slater, Mike Jensen, Fred Noronha, Michael Minges, Silvana Lemos de Almeida, Peter Benjamin and Jan Boone.

I am also grateful to Corina Maas for typing the original draft and to Michelle Remme for her editorial work in preparation of the final version of the typescript. This work helped enormously at the end of the process, when disorganization and chaos tend inevitably to set in. The author and publishers wish to thank the following who have kindly given permission for the use of copyright material: The World Bank for permission to reproduce the Appendix to Chapter 2, the figure contained therein and Table 3.2 from M. Pigato (2001), 'Information and communication technology, poverty, and development in sub-Saharan Africa and South Asia'; Tables 6.2 and 6.3 reproduced with the kind permission of ITU; Table 5.1 from Human Development Report 2002 by United Nations Development Programme. Used by permission of Oxford University Press, Inc.; *The International Journal of Development Issues* for kindly allowing me to reproduce a figure from my article in Vol. 1(2), 2002, entitled 'The digital divide between nations as international technological dualism' as Figure 2.1; The ITU for use of Table 6.1 which appears in Minges and Simkhada, 'Telecommunications in Asia', 2002, *ITU News*; Peter Benjamin for the use of Table 3.1, which he wrote on behalf of CommUnity.

# 1 Introduction

The purpose of this book is to advance the case for a major change in the way that the Internet is currently delivered to rural areas of poor countries. Incorporating as it does, changes in assumptions, concepts, values and practices,[1] the proposed change, we feel, is akin to a paradigmatic shift in policy focus away from the dominant approach.[2]

In its simplest form, what this shift entails is almost a complete methodological reversal: from, on the one hand, a model based on large-scale telecentres equipped with modern computers that are frequently financed by foreign capital, towards, on the other hand, an approach that, by contrast, provides Internet access primarily to local intermediaries, who are much better placed to provide information and services based on the Internet, in a form that is relevant to local circumstances (defined broadly to include incomes, customs, language and needs). What is provided to the rural inhabitants in the latter case is thus not individual access to computers with direct Internet connectivity, but rather the knowledge and services that are indirectly (via an intermediary) provided to meet the specific needs and challenges of the local community. In the following chapters, the argument in favour of the intermediary-based model is gradually advanced, with the goal, ultimately, of demonstrating just how powerful this approach could be if it is presented as an alternative paradigm, rather than, as now, a few isolated accounts of more or less randomly chosen examples.[3]

## Competing concepts and their intellectual antecedents

The most general and conceptual section of the book is in Part I, which, apart from defining and comparing the competing models in a suitable degree of detail, also suggests (on the basis of rather limited evidence) that the telecentre-based alternative has not at all performed well. (For

the purposes of this book, telecentres can be thought of as donor-funded, located in remote, or rural areas and offering a wide variety of technologies such as radio, fax, computers, e-mail and the Internet.) Far too often, for example, even freely available and Internet-connected computer equipment has remained largely idle, for reasons varying from a pronounced lack of user capabilities, to information and content that is irrelevant, in one way or another, to local needs and circumstances. What fundamentally underlies these disappointing experiences in our view, is a heavy reliance by the dominant approach on an outdated and discredited view of technology transfer to the industrial sector of developing countries. This is the sector, write Bell and Pavitt (1997: 83–4):

> in which, at least relative to earlier expectations, disappointment at the realised extent of 'catching up' [to developed countries] over the last four or five decades is perhaps greatest.
>
> Even at the beginning of that period, it was widely recognised that there were difficulties in transferring agricultural technologies from developed to developing countries. However, because industrial technology is less location-specific than agricultural technology, it was assumed that developing countries had much greater scope in industry than in agriculture for benefiting from the international diffusion of high-productivity technologies, which were already available in the advanced industrial countries . . . developing countries, it was argued, could benefit from the diffusion of industrial technologies without incurring the costs of technological innovation. Consequently, the expectation was that, given a reasonably rapid rate of investment in the physical capital in which the technologies were embodied (and 'learning' of the basic skills to operate them efficiently), developing countries would achieve high rates of growth of labour productivity in industry, and probably also of total factor productivity.

These authors conclude that the initial optimism about development via imported technology has turned out to be 'profoundly misplaced' and that policies based on these early views will continue to hinder rather than promote industrial development and 'catching up' (Bell and Pavitt 1997: 84).[4] Adherence to this outdated and discredited view of technology transfer is, as we see it, the root cause of the problems that have already occurred in no small measure with the widespread introduction of computers in so-called 'telecentres' (see Chapter 3 for a more detailed development of this important point).

For all the criticisms that have been levelled at telecentres in rural areas of the Third World, these forms of individual Internet access (not to be confused with ownership), seem to be as popular as ever. In Latin America, for example, it appears that several 'governments are setting up telecentres where people can surf the Internet, often free of charge, in an attempt to narrow the digital divide within their societies, which is perhaps larger than the gap that separates them from the industrialised world' (Márquez 2003). As often occurred in the early practice of technology transfer to developing countries, however, the growth of hardware in this more recent context is likely to outrun by a good margin, the complementary inputs that are required. In Mexico, for example, 'less than 10 per cent of the population knows how to use a computer… However, the government's plan is to increase the number of people with access to the Internet from 6 to 30 million, out of a total population of over 100 million' (Márquez 2003).

## The emerging paradigm and its intellectual antecedents

The emerging paradigm, by contrast, contains a very different (and more widely accepted) set of intellectual antecedents, which, in numerous ways, bring far more of the local setting to bear on the problem of delivering the benefits of the Internet to a vast rural population. One such antecedent, for example, is the literature on technological blending, which, when applied to the case of community radio, enables a vast audience to benefit from the combination of new technology (the Internet) and the 'old' means of communication (such as the radio). The latter is an existing resource owned by a relatively high proportion of rural residents in many developing countries, that can be used to enormous effect in combination with the Internet, when the 'blend' is carefully designed (Chapter 4 contains a detailed discussion of what this design means in practical terms). Girard (2003: 11) has usefully compared this function of the local radio with the underlying logic of the telecentre approach to Internet delivery. Thus:

> In the same way that a single cyber cafe or telecentre with a few computers can be an efficient way of increasing the number of people connected, providing access for dozens of people with only a few computers, a radio station with thousands of listeners that makes active use of the Internet can address the problem of access to the Internet's wealth of information with a tactic of *digital multiplication*, multiplying the impact of its Internet connection.

Another major characteristic of the new approach which has clear intellectual antecedents is the centrality it ascribes to the role played by the local community in the Internet delivery process. The antecedents I am referring to here, consist, for example, of the general models in the literature on agriculture and development, such as 'farmer-first-and-last' and farming systems research.[5] These models share a focus on a so-called 'bottom-up' approach to policy, which starts from the initial need to understand the requirements of potential beneficiaries and the context in which they live and work. (The contrasting 'top-down' approach in these literatures has much in common with the telecentre model that we are here seeking to supplant.) The emerging paradigm, we should emphasize, has no less an affinity with the highly influential and ongoing debate about the role of participatory approaches to development. As defined by the World Bank (1994: 7):

> Participatory development is a process through which stakeholders influence and share control over development initiatives, and the decisions and resources which affect them. There is significant evidence that participation can, in many circumstances improve the quality, effectiveness and sustainability of projects . . . Community participation strategies are found to be particularly important in reaching the poor.

Nowhere in the book is participatory development in this sense, better exemplified than in the Kothmale Internet Project (Chapter 4), but it also plays an important part in one of our other major case studies, the Gyandoot Project in Dhar District, India (Chapter 7). Yet, for all the considerable attention that these and other cases (such as n-Logue in Chapter 8) have received individually, no coherent alternative to the prevailing approach has thus far emerged. Much of this, we feel, has to do with the highly fragmented way in which the literature has evolved over time, with the result that the impact as a whole is much less than the sum of its many constituent parts.

## Fragmentation of the emerging paradigm

The essential problem we are dealing with here is that practitioners working to bring the Internet to the rural areas by means of local intermediaries, often tend to lose sight of the larger picture into which their own specific contributions can be fitted. Although community radio is

one of the most promising ways in which the Internet can be brought to rural areas, for example, the literature on this particular topic almost never refers to similar types of intermediation that are taking place in other related areas, such as telephones or kiosks.[6]

Our task here is thus to integrate these diverse areas of Internet-based intermediation into a coherent whole that carries more weight than a mere succession of unconnected anecdotes.[7] Fundamentally, what defines the integrated concept, or paradigm, is the role of an intermediary who, on the one hand, is well-versed in the use of the Internet and, on the other hand, is able to devise means of ensuring that the benefits of this technology are passed on to the local community (with whom the intermediary is also well acquainted). Chapters 4 and 5 discuss these (often imaginative) mechanisms in the realm of mass communications, while Chapters 7 and 8 cover the (equally imaginative) possibilities afforded by rural Internet kiosks (i.e. face-to-face forms of intermediation).

The material in Chapters (4–8) suggests that the basic idea of providing rural areas with benefits from the Internet in an indirect manner, rather than by means of direct access to a computer, does in fact have a wide range of applications. And by thus analytically consolidating so much relevant material (into an introductory classification system), we feel that there is now a much stronger basis on which to challenge the existing paradigm. For, we would do well in this regard to take into account the observation that

> once it has achieved the status of paradigm, a scientific theory is declared invalid only if an alternate candidate is available to take its place . . . the act of judgment that leads scientists to reject a previously accepted theory is always based upon more than a comparison of that theory with the world. The decision to reject one paradigm is always simultaneously the decision to accept another, and the judgment leading to that decision involves the comparison of both paradigms with nature *and* with each other.
>
> (Kuhn 1970: 77)

As a by-product of integrating formerly separate (albeit closely related) bodies of literature into a distinct conceptual whole, we also gained a tentative insight into the factors that best seem to explain some of the more successful examples across (rather than within) the various categories described in Chapters 4–8. In particular, our impression is that the intermediary-based approach to Internet delivery, works best when it can be described as a distinctly local endeavour. By the term local in this

context, we do not mean simply the absence of foreign, developed country sources of influence on the project. For that situation would be consistent with the use of entirely inappropriate local resources (inappropriate, i.e. from the point of view of undermining the prospect of a successful project outcome). By the term local, we refer instead to inputs that are effective, precisely because they exploit as fully as possible the advantages of the indigenous (such as knowledge of local needs and languages, designing innovations that fit in with local circumstances and so on).[8] Thus, despite the functional differences between say Kothmale, Gyandoot and n-Logue, each project is imbued with a profoundly local character (be it an indigenous innovation, an initiative of state government or skilled volunteers on a radio browsing programme).

## Priorities for future research

Let us return at this point to Kuhn's observation that the decision to reject one particular paradigm invariably occurs at the same time as a decision to accept another and 'the judgment leading to that decision involves the comparison of both paradigms with . . . each other' (Kuhn 1970: 77).

In this book we have sought to construct a new paradigm and to compare it with the prevailing view of how the Internet should be brought to the rural areas of developing countries. By far the largest impediment to even a relatively crude comparison, however, is the almost total lack of quantitative data about the costs and benefits of telecentres on the one hand and intermediary-based Internet projects on the other. It follows from this lamentable state of affairs that, in order to conduct and compare social cost–benefit analyses of projects drawn from both paradigms, the necessary data will need to be collected in the field for each particular case. Even if only a sample of such cases is included, moreover, it is clear that this represents a major research topic and one that is perhaps best suited to an international organization (such as the World Bank) with extensive experience in the area. Ideally, of course, this research programme would include an exercise where the two paradigms are applied to the same project in a manner that is akin to a controlled experiment (and the outcomes can then be ascribed to paradigmatic differences as opposed to other factors). It is also clear that benefits from the Internet will need to be defined in some detail, given our emphasis below on Sen's concept of functionings and its relation to well-being. The question, that is to say, is how individual functionings are enhanced (or hindered) by the application of information derived from the Internet.

Even if the results of this research do lend strong support to the new paradigm, however, much would need to be done in order to overcome the various barriers that prolong a possible transition from the existing paradigm. Perhaps the most useful (but by no means the only) endeavour in this regard, would be to draw up a manual for policy-makers who are interested in the application of the intermediary-based approach to the delivery of the Internet to rural areas. Such a manual would have to be based on the study of a large number of projects, with a focus on lessons to be drawn from failures as well as successes. And although we have been successful in uncovering a reasonably wide range of cases with the intention of showing that the new paradigm is capable of generalization across a number of different areas, there is no doubt that far more cases exist in the developing countries, some of which may even warrant changes in my initial classification of intermediary-based Internet projects.

In any event, it is crucial that any handbook or toolkit that results from the detailed study of individual projects, should explicitly deal with, rather than shy away from the pervasive bureaucratic and political obstacles that we shall encounter in the chapters that follow. In particular, it is of the utmost importance that projects be designed, taking those obstacles specifically into account, rather than hoping that they will not occur. Indeed, it may well turn out that the relatively successful projects are those that have best dealt, at various stages, with the range of bureaucratic and political obstacles that they confronted.

Ultimately, however, my hope is that this initial attempt to provide a generalized model for delivering the benefits of the Internet via intermediaries, will set in train a process of debate, criticism and a dialogue between practitioners on the one hand and the more academic research community on the other. For, as things now stand, there is little or no communication between these two groups.[9]

At the same time, if the World Summit on the Information Society (that was conducted during 10 December 2003) is any guide to current thinking, a fresh approach to the problem of bringing the Internet to rural areas of developing countries is sorely needed. For, as far as one can tell from the contents of the available summit documents, the emphasis seems to be mainly on lists of well-known problems and a selection of equally familiar attempts to overcome those problems. What is lacking, however, and could thus be profitably inserted into the debate, is a new approach that embodied the paradigmatic qualities described in this book. Tellingly, a search of the entire set of available documents for the term ‘intermediaires’, yielded no match at all.

# Part I

# Analytical foundations of a new paradigm

# 2 The existing paradigm and its limitations

The purpose of this chapter is to describe and criticize the prevailing paradigm that governs policy towards the diffusion of IT in the poorer regions of developing countries.[1] Briefly stated, this paradigm consists in the main of efforts by foreign aid donors and NGOs to import information technologies that belong to modern, Western, technological systems into totally different systems prevailing in poor, rural areas of developing countries.[2] Such efforts, moreover, usually manifest themselves in so-called telecentres and other forms of communal, rather than individual forms of access to the technologies (see later for discussion of the telecentre concept).

Our main argument will be that the prevailing paradigm, thus summarized, is subject to all the problems that beset transfers of modern technological systems (as defined later) to what, for the sake of simplicity, may be described as traditional technological systems. This critique will be developed by means of locating the existing approach to IT and development in a number of different concepts, the first of which is the notion of international technological dualism that began at the end of the 1960s and the second of which is the notion of a technological system. We then argue in the second part of the chapter that the establishment of telecentres has done very little to solve the problems of importing foreign ideas, institutions and technologies into the Third World (problems that are encapsulated in the notions of international technological dualism and the juxtaposition of highly divergent technological systems).

## International technological dualism

More than 30 years ago, Hans Singer (1970) introduced the concept of international technological dualism, by which he meant essentially unequal

developments in the area of science and technology, between rich and poor countries.[3] Here we suggest, first, that Singer's analysis remains highly relevant to our understanding of the technological relationships between these countries and we suggest, furthermore, that the prevailing approach to IT and development is a reflection of the same basic forces that give rise to past and present forms of international technological dualism. Indeed, in certain key respects information technology may even strengthen such forces and thereby accentuate still further the problems described originally by Singer.

First however, let us examine in some detail precisely what he meant by the concept. Thereafter, we re-appraise the main elements of the concept in the contemporary global context, including as it does, fundamental innovations in information and communication technology and attempts to apply such innovations in developing countries.

In essence, what Singer identified was a 'process of scientific and technological advance' that 'in all its stages – basic research, applied research and blueprinting – has been heavily concentrated in the richer countries' (1970: 62). Indeed, according to Singer (1970: 62): 'The best estimate we can make at the present time is that measuring the distribution of advance by the distribution of inputs in the form of research and development expenditures, we find that 70 per cent of world expenditure is in the U.S., 25 per cent in Europe, and 2 per cent in the less developed countries.' The acute inequality of global R&D expenditures thus identified:

> would not matter if the direction of advance, the scientific and technological priorities and the methods of solving scientific and technological problems, *were independent of where the work is carried on*. This, however, is patently not the case. The 98 per cent of research and development expenditures in the richer counties are spent on solving the problems which concern the richer countries, according to their own priorities, and on solving these problems by the methods and approaches *appropriate to the factor endowment of the richer countries*. In both respects – selection of problems and methods of solving them – the interests of the poorer countries would be bound to point in completely different directions. Yet the two-thirds of mankind with its different problems accounts for only 2 per cent of all expenditures – a discrepancy per capita ratio of no less than 100 : 1.
>
> (Singer 1970: 62, emphasis added)

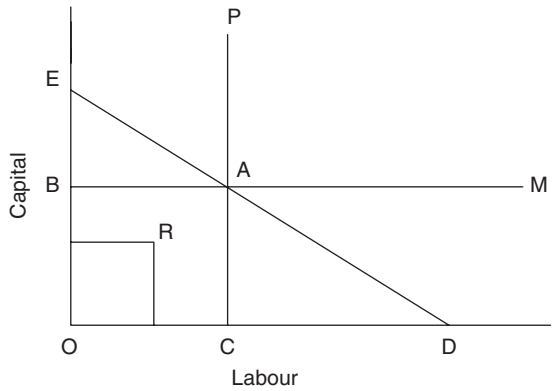


*Figure 2.1* Factor endowments and the direction of technical change.
Source: James (2003: 17).

With respect to the divergent nature of technical change that would be dictated by the factor endowments prevailing in rich rather than poor countries, Figure 2.1 provides a simple but useful depiction of the problem.

Point A represents a certain level of output on an arbitrarily chosen iso-cost line ED. Technical change in the figure is represented by reductions in the amounts of capital and labour that are required to produce the given level of output associated with point A. In the case of point R, for example, because less of both inputs are required to produce the same level of output as at A, the former combination dominates the latter in the sense that it is a more efficient technique at *all* factor price ratios. Conversely, A dominates all factor combinations within the area PAM, where *more* of both inputs are needed to produce the said level of output.

In Singer's analysis, the direction of technical change in actual practice is dictated by the concentration of R&D expenditures in the developed countries, where, in general, labour is scarce relative to capital and innovations will consequently tend to take place in the area above AB and to the left of PA. Such innovations can be described as biased in the Hicksian sense that they lead to an increase in the ratio of capital to labour. (Note that biased technical change in this sense does not require that the absolute amount of both factors be reduced per unit of output.) Very few innovations, by contrast, would occur in the (capital-saving) area below AM and

to the right of PC, given the paucity of R&D expenditures undertaken by the developing countries themselves, as noted earlier.

Even what little R&D does take place in the Third World, moreover, is not necessarily of the kind that would be dictated by the factor endowments and other conditions prevailing in those countries. For, as Singer further points out in his discussion of international technological dualism:

> The fact that the richer countries have such a virtual monopoly of research and development expenditures, as concretely expressed in terms of institutions, equipment, number of trained scientists and technologists, as well as virtual monopoly of deciding where the existing frontiers of knowledge are, has the further consequence that the activities of the small number of institutions and people, represented by the 2 per cent of research and development expenditures in the poorer countries, is also itself largely devoted to the problems and methods determined by the richer countries. Much of the present expenditures of the poorer countries represent a hopeless attempt to compete from an inferior position in solving the same kinds of problems by the same methods.
>
> (Singer 1970: 62–3)

To some extent, this process, may, as Reddy (1997: 95) suggests, take the passive form of 'a virtually unexamined and unquestioned introduction of alien and inappropriate guidelines, preferences and paradigms into the relevant institutions in the developing countries'. In part, however, the process described by Singer may also reflect a more active emulation of developed country scientists that international (and to large degree also national) rewards accrue to those working at the research frontiers. Indeed, because these rewards are usually more easily won by working in the developed countries themselves, an international 'brain-drain' emerges, and constitutes the third dimension of Singer's concept of international technological dualism. As he himself put it, 'The existence of the richer countries, with their immensely superior facilities, and the glamour associated with work on their self-defined "frontiers of knowledge" exert a powerful attraction resulting in the well-known "brain drain"' (Singer 1970: 63). (In fact, even by the early 1970s the problem had assumed such importance that economists such as Bhagwati (1976) were proposing to tax professional migrants in order to raise revenue for the developing countries that suffered from the consequent loss of scarce human capital.) For Singer then, the problem is not that

the volume of accumulated knowledge has failed to increase over time. It has rather to do with the differential relevance of that body of knowledge to developed as opposed to developing nations. In particular, the latter have increasingly found themselves exposed to the types of technological advances that bear little or no relevance to their own particular problems.

> and this in turn is due to international dualism, the fact that knowledge is accumulated by the richer countries, and in respect of the problems of the richer countries. These are not the problems or methods of primary concern to the developing countries. The richer countries are mainly interested in sophisticated products, large markets, sophisticated production methods requiring large inputs of capital and high levels of skill and management while saving labour and raw materials. The poor countries by contrast are much more interested in simple products, simple designs, saving of capital and particularly land, reduction in skill requirements, and production for smaller markets. The potential impact of the increasing stock of knowledge – no doubt still very important and on balance useful to developing countries – has been largely offset by a *tendency for each unit of this knowledge to become less and less useful to developing countries*.
>
> (Singer 1970: 62–3)

It is true that the technology thus emanating from the developed countries may still have some relevance for the more modern sectors of developing countries, but the resulting situation of growing *internal* technological dualism would then hardly be conducive to growth and development, as Singer himself recognized and others, such as Johnston and Kilby (1975) and Stewart (1977) have confirmed.[4] As we see it, moreover, the main elements of international technological dualism thus described have continued to retain their general relevance in the contemporary world of IT and globalization.[5]

While noting the rapid rise of R&D expenditures in South Korea, Taiwan and Singapore over the past decades (and more modest increases in some other developing countries), Freeman and Hagedoorn (1995: 37) for example, conclude that global R&D expenditures are nevertheless 'highly concentrated in the rich OECD countries'. While, at the other extreme, 'The Third World, on the most generous estimates, accounts for only about 6 per cent, and without China probably less than

4 per cent of global R&D' (p. 37). If, therefore, the composition of global R&D has not changed markedly since the time when Singer originally discussed the problem, is there any indication that this type of investment has become more relevant to the problems of poor countries?

Perhaps the best answer to this question is provided in the 2001 version of the *Human Development Report*, which, after noting that 'research on and development of technologies for poor people's needs have long been under funded', goes on to suggest that 'Despite the possibilities of technological transformations, this continues to be the case' (UNDP 2001: 109). Although there are few precise estimates of spending on developmental needs (itself 'a sign of the lack of attention paid to this problem'), the pharmaceutical industry is more revealing than most. More specifically, for example:

> In 1992 less than 10% of global spending on health research addressed 90% of the global disease burden. Just 0.2%, for example, was dedicated to research on pneumonia and diarrhoea – 11% of the global disease burden. This funding gap creates research and medicine gaps. In 1995 more than 95,000 therapy-relevant scientific articles were published but only 182 – 0.2% of the total – addressed tropical diseases. And of 1,223 new drugs marketed worldwide between 1975 and 1996, only 13 were developed to treat tropical diseases – and only 4 were the direct result of pharmaceutical industry research. Reallocating just 1% of global spending on health research would provide an additional $700 million for priority research on poor people's maladies.
>
> (UNDP 2001: 109–10)

By the same reasoning, what one also needs to ask in the present context is whether the increased amounts of research spending in developing countries have become any more oriented to their own needs and problems than they seemed to be in the past (as discussed earlier). As in the case of developed country R&D, however, it is difficult, if not impossible to provide a specific answer to this question, given the same lack of empirical material.

Again as in the case of the developed countries, it is far from difficult to cite cases where R&D investments have generated innovations that are relevant to local low-income needs, such as small-scale tractors in India or low-cost computers in Brazil. Basing her view on a number of

country case studies, Stewart, however, argues that such examples as these:

> represent only a minority of cases . . . within the innovations of the R&D institutions in developing countries . . . there is tremendous potential for improving the productivity of traditional methods in Indian agriculture; this potential has not been realised partly because of deficient R&D . . . The study of technical change in Latin America indicated that *no efforts* had been made to channel innovations towards appropriate technology.
>
> (Stewart 1987: 293)

If this particular problem thus seems not to have been reduced to any significant degree over the past three decades or so, it is in all likelihood due to the same biases that link local R&D and other related institutions so strongly to the developed countries. Only recently, for example, a prominent Brazilian scientist took critical note of how universities and research centres in developing countries 'have become isolated from the rest of the country in an ivory tower, more connected to research centres in Europe or the United States than to the obvious needs of industry, agriculture and education in their own countries . . . Heavy government bureaucracies wind up cultivating whatever science and technology is fashionable in the developed countries' (Goldemberg 1998: 2). Such an atmosphere, needless to say, only serves to increase the attraction of working in the developed countries themselves; an attraction that continues to erode the supply of crucial research and other capabilities in much of the Third World. Some of the most acute losses have occurred in small African, Caribbean and Central American countries, which according to one estimate, have lost no less than 30 per cent of individuals with a tertiary education (Carrington and Detragiache 1999). The same data source also record a substantial brain drain from Iran, Korea, the Philippines, and Taiwan Province of China. These figures tend to confirm that in several developing countries the outflow of highly educated individuals is still a major policy issue.

## Information technology as international technological dualism

Developed as it almost entirely was for the conditions prevailing in the developed countries (such as skilled labour, capital abundance, advanced

infrastructure and high incomes), information technology applied in developing countries represents in many respects a reflection of the same pattern of international technological dualism that has helped to induce the pronounced and growing gap in incomes between rich and poor countries. From this point of view that digital divide (defined as the unequal distribution of computers, Internet connections, fax machines and so on between countries) is merely another technological gap that emanates from and reflects the highly skewed distribution of global research expenditures between the North and the South. (Consider, e.g. the direction in which developed country research expenditures have transformed the characteristics of the once basic personal computer. Not only has this product become vastly more powerful and faster over time but (in the form, for instance of the Pentium 4 variety), it has also acquired a host of such high-income characteristics as DVD and CD-RW drives, a Trinitron monitor and highly sophisticated sound equipment.)

Relative to the period when the concept of international technological dualism was first introduced, however, the emergence of information and communication technologies has raised several new issues with regard to the *internationalization* of R&D and the possible implications thereof for scientific and technological forms of dualism between rich and poor countries. 'Prior to the mid-1970s', that is to say:

> one of the reasons stated by TNCs for not internationalising R&D was the difficulties involved with the supervision and control… But the introduction of new information and communication technologies (ICT) has significantly increased the scope for global sourcing of technologies. By the mid-1970s, the telecommunications, and computer industries were leaders in adopting the new methods of control for *worldwide organization of R&D*…
>
> In recent years, the R&D functions, especially in the high-tech industries such as… microelectronics… have become more science-based and research intensive… basic scientific knowledge is playing an increasingly crucial role in major technological advance; and many recent major innovations have occurred through cross-fertilization of different scientific disciplines. These ongoing paradigmatic changes in S&T are increasing the pressure on firms. These pressures can be met partly by increasing the in house R&D, both at home and abroad, or by the establishment with other firms of joint venture R&D or research cooperation with universities.

> Since the 1980s, inter organizational technology cooperation has also become a widespread practice.
>
> (Reddy 1997: 1823, emphasis added)

If advances in communications technologies have thus made it feasible for multinational operations to internationalize (or globalize) their research operations, conditions in the labour market for R&D personnel are necessitating such operations. Indeed, one observer has gone so far as to argue that 'The key driving force for globalization of R&D in the 1990s has been the increasing demand for skilled scientists' (Reddy 1997: 1823). According to this view, an international market for science and technology personnel has arisen which extends beyond the OECD countries, to include 'uncommon countries . . . for international corporate R&D such as Israel, Brazil and India' (p. 1823).

As examples of this emerging trend, one can cite first the case of Texas Instruments in India, which performs geographically dispersed, but globally integrated R&D activities as a result of new information and communications technologies which allow the firm to 'send and receive the latest support information, design technology and applications information for its products and services' (UNCTAD 1995: 153). In another example, Motorola has a paging device plant in Singapore employing 75 local engineers in its R&D centre. Indeed, according to the same source the 'Scriptor' pager was developed by local scientists at this centre, while yet another major American firm in the industry, Hewlett-Packard, uses its plant in Singapore as the 'global R&D and production centre for the company's portable ink-jet printers'.

From one point of view, this emerging propensity for R&D activities to spread themselves more widely across the developing world (or, at least a small part of it), clearly undermines the notion that developed countries undertake research activities only in the rich parts of the global economy. On the other hand, one also needs to consider the *content* of research expenditures thus dispersed to parts of the Third World. For, as noted earlier, one cannot necessarily assume that research expenditures undertaken in developing countries are directed solely to local needs and problems. Reddy's (1997) study of multinational firms in India, for example contains the most comprehensive information about the direction of R&D activities in that country and what is especially useful about his results is a comparison of 'new technologies' firms with firms in 'conventional' industries. In particular, whereas the latter conventionally perform some degree of adaptive R&D (i.e. adaptations of products

and processes to the local environment), the former conduct considerably less of this type of R&D behaviour. Specifically, all the efforts to develop new products and processes for major world markets and to generate 'basic technology of a long term or exploratory nature for use by the corporate parent' (Reddy 1997: 1828) took place in the new technologies firms, only 25 per cent of which undertake any adaptive type of R&D.

According to the same source (p. 1828),

> This suggests that in new technologies there is less need for product or process adaptation to the local market…
>
> Similarly, the development of products exclusively for the local market… by new technologies firms is also less, except in the case of biotechnology companies developing new plant varieties based on local soil and weather conditions. On the other hand, an overwhelming majority of new technologies firms are involved in developing products for *the global markets*, e.g., computers, communications, equipment, etc.

Thus, although globalization may be inducing some degree of dispersion of research activities outside the OECD area, the above evidence – limited as it is – suggests that the direction of the resulting innovations, such as 'global' products, may be even less relevant to the majority of those living in developing countries than the more adaptive type of research that was undertaken when subsidiaries were less closely integrated into global research and production networks. That research at least was intended to make products and technologies somewhat more relevant to developing country conditions (e.g. to the climate, environmental conditions).

At the same time, however, there is growing evidence from countries such as Brazil and India that local scientific personnel have developed innovations designed specifically for the income levels and other conditions prevailing in those countries.[6] Both countries, for example have developed extremely low cost computers and Indian scientists have come up with a very low cost form of wireless local loop technology. And even in the developed countries themselves, there is a certain amount of research now being conducted on ways of bridging the digital divide by means of low cost information technologies (such as some of the research programmes at the Media Lab of the Massachusetts Institute of Technology). Changes in the worldwide organization of R&D are not

just confined to intra-firm locational behaviour (as just described) but also include various types of cooperative ventures between independent firms. It has been further suggested that these new coordination mechanisms, such as strategic alliances, may grant developing countries an opportunity to share in the generation of innovations in IT. Here too however, there is doubt whether any such arrangements entered into by developing country firms are likely to address poor country concerns and needs in the area of information and communications technologies. For while there are numerous developing countries that participated in such alliances between 1984–1994 (such as China, Korea and Mexico), and while such participation may have enabled the firms concerned to gain access to knowledge that would otherwise have been inaccessible, there are again serious doubts as to whether the resulting innovations have had much, if anything, to do with the problems of poor people (though again there is very little evidence to make an assessment one way or the other).

## Technological systems

To an even greater extent than is true of most other technologies, IT, especially in its more sophisticated forms such as the Internet, is reliant on a wide variety of complementary inputs, which collectively, one can usefully describe as a technological system, following Stewart (1977) and James and Khan (1998). The former, for example, has argued that at any point of time, techniques tend to be

> developed against a background of a particular technology package. . . . Any single technical innovation has to fit in with the rest of the system both in terms of the requirements it imposes for inputs, and in terms of the demand for the goods. A new technique must use inputs that are available or can be made available, and must provide output which will fit into production if it is an intermediate good; or into consumption patterns if it is a consumer good . . . There are technological linkages between different parts of the system which mean that much of technology comes as a package, which cannot be separated and introduced bit-by-bit, but which goes together.
>
> (Stewart 1977: 6–7)

In the specific case of the Internet, for example, the accompanying inputs that form part of the technology system in most developed countries

are simply not available in the remote, rural areas of the Third World. Providing such inputs adds thus greatly to the costs of Internet provision. Kenny (2002: 9–10), for example, has shown that the cost of telephony alone, will make Internet access unaffordable for the poorest groups in rural areas of developing countries. To this already substantial cost, one needs to add the additional average costs of Internet access, including as they do the need to supply the missing elements of the technology system in which this innovation belongs. In particular,

> A recent estimate for the cost of Internet access in Mozambique … suggests that the annualised fixed costs of access to one Internet enabled computer (excluding telephone installation and rental but including equipment costs plus yearly Internet fee for unlimited use) were $1,172 per year. Services for a part-time technician to support users is likely to add at least another $2,000. On top of these costs are those for electricity, call charges and housing, which can be very significant in rural areas. Shakeel et al (2001) estimate off-grid power costs per Internet enabled computer at about $4,000 fixed and $200 recurrent costs, for example. Providing Internet access is made more complex if [as seems often to be the case] there are no roads on which to travel to repair broken equipment, or if technicians have to travel long distances to assist remote facilities – again this is frequently the case in poor, rural areas.
>
> (Kenny 2002: 9–10)

Faced with such daunting cost estimates as these the donor community recognized that universal service (providing individual households with the new technologies) needed to be replaced by universal access (i.e. providing poor rural communities with communal services) and this in turn took the form mainly of so-called telecentres.

## The donor response: universal access via telecentres

Telecentres, write Oestmann and Dymond (2001: 1) 'have been hailed as the solution to development problems around the world because of their ability to provide desperately needed access to information and communication technologies'. The same authors provide a useful summary of both the concept and the history of such widely touted institutions.

As they (p. 3) put it:

> Telecentres may be defined as strategically located facilities providing public access to ICT-based services and applications. They are typically equipped with some combination of:
>
> - telecommunication services such as telephony, fax, e-mail and Internet (via dial-up or ISDN, high-speed telecommunications network);
> - office equipment such as computers, CD-ROM, printers and photocopiers;
> - multimedia hardware and software, including radio, TV and video; and
> - meeting spaces for local business or community use, training and so on.
>
> While facilities and usage vary across telecentres, all reflect the intention to address the issues of access by providing technology, develop human capacity and encourage social and economic development. Depending on the size and extent of the services provided, these centres are usually operated by a manager and a small number of staff who may be part-timers or volunteers.
>
> Originating in Sweden around 1985, telecentres (also known as 'telecottages') experienced fairly rapid growth in Western Europe and other industrialised countries where rural isolation, lack of purchasing power & low-quality telecommunications and information technology facilities were seen to be a hindrance to participation in the information economy. By 1994, there were more than 230 telecentres in Australia, Austria, Canada, Denmark, Finland, Germany, Ireland, Japan, Norway, Sweden, the UK and the USA. The idea then spread and has become adapted to the needs of emerging markets and developing countries. Hungary is the first country in Central Europe to establish a large number of rural telecottages (more than 150).

It is difficult to assess with any degree of precision how far telecentres have spread in developing countries. Such evidence as is available, however, indicates that the degree of diffusion is already far from negligible. Oestmann and Dymond (2001), for example, suggest that Telecentre Projects can be found in at least 21 developing countries, while many more such endeavours are still in the planning or pilot stage.

Within some of these countries, moreover, the numbers of telecentres may already run well into the hundreds. South Africa, for example, is reported by one source to have as many as 500 multi-purpose community telecentres (UNESCO 2003). As far as rates of telecentre growth are concerned, Fuchs (2000: 1) has suggested that, with the help, often, of international aid donors at least several hundred are being established per annum in developing countries.

Donor interest in Telecentre Projects, one should note, is concentrated on 'the creation of multi-purpose telecentres – providing computers, e-mail and Internet, not just telephones and fax – which are expensive to install, operate and maintain' (UNDP 2001: 23). This predisposition, we suggest, is far from peculiar to IT. Indeed, it has long been recognized that donors investing in developing countries tend to favour large-scale, capital- and foreign exchange-intensive projects. The explanation, now as then, has to do with the internal procedures and incentives in the donor institutions themselves.[7] Although she was by no means the first to identify the forces in question, Stewart (1987: 286–7) has described them with an unusual degree of clarify. To begin with:

> An overwhelming objective of aid administration in many cases is to meet their target flow of finance, while ensuring that the projects financed meet the procedures that have been laid down. Questions of project efficiency and social desirability often come second. It is always easier to meet financial flow targets with a few big projects than with a multitude of small ones. Moreover, many small project managers may not be able to fulfil the mandatory auditing requirements.

When these objectives are combined with tied aid (as frequently is the case with bilateral donors), the above-mentioned propensity towards large-scale, capital-intensive and highly costly types of telecentres becomes virtually inevitable. On the other hand, 'Multilateral aid donors normally finance only the foreign exchange component of the capital cost of a project which automatically imparts a bias in favour of projects with heavy capital costs and a high foreign exchange component of the capital costs' (Stewart 1987: 287).

## Evaluating telecentres

Most of those who have studied the performance of large-scale, donor-funded telecentres in developing countries tend to arrive at the same

basic conclusion, namely, that with few exceptions and on most indices of performance, these projects have performed rather poorly. The UNDP, for example, is an international institution that is generally sympathetic to the use of IT in developing countries. However, the same institution (UNDP 2001: 23) points out that:

> the evaluative evidence of numerous donor-funded telecentre efforts – including several high profile initiatives in Africa – reveal fundamental problems and limitations. For example, three wide-ranging assessments of the telecentre experience in Africa, Latin America and the Indian sub-continent reveal that none of the major donor-funded initiatives have managed to become self-sustaining, and most have not achieved their expected development outcomes.

Similar conclusions have also been reached by Oestmann and Dymond (2001: 5) who conducted a review of telecentres for the Commonwealth of Learning. After noting that 'telecentres are praised as a crucial development tool and have considerable potential', these authors go on to indicate that 'the data available on rural demand and usage of the Internet in such centres suggest that this is not sufficiently realised. A survey of telecentres . . . in South Africa found that personal computers and the Internet were severely underutilised . . . It would also appear that computer training has increased Internet and personal computer usage in South African telecentres only minimally'. In perhaps the most extensive review of community telecentres yet undertaken, however, the Canadian International Development Resource Centre (IBRD) conducted a sample study of telecentres in Uganda, Mali, Mozambique, South Africa and Senegal (Etta 2002–3). Though the results of the survey will be officially presented at a conference hosted by the Acacia Initiative of the IDRC in April 2003, the basic findings are already available. (Note that the telecentres in all five countries offered similar services, including Internet access.) Before presenting the most salient of those results in the present context, note that the summary of the book produced by the IDRC (Etta 2002: 5) includes the statement that 'Although still surrounded by many unknowns, it is believed that as a delivery model for ICTs, telecentres have the potential to transform the lives and livelihoods of many in the developing world and even those in remote locations in developing countries.'

Yet, at the same time, that potential scarcely seems to have been realized. For, in spite of the fact that the telecentres in the five countries

noted earlier have brought many people into contact with IT, it remains true that

> Still a small percentage of the total population was using the telecentre facilities . . . Users are shown to have been disadvantaged on the basis of age, gender, education, literacy levels, and socio-economic status. A striking observation is the absence of old people at the telecentres . . . Education appeared to be a key determinant of telecentre use. A popular view expressed by respondents was that telecentre services were for the elite or educated . . . low or non-use for some services was reported, for the Internet and email in the more rural MCTs in Uganda, Mozambique and Mali.
>
> (Etta 2002: 4–5)

Finally, as argued by Kenny (2002: 1), the experience with telecentres can usefully be viewed in terms of the social costs and benefits to which they give rise. In particular, the same author convincingly shows that, in spite of the growing popularity of Internet-based telecentres, these institutions tend to produce a very low ratio of benefits to costs in the context of poor, rural communities in the Third World. Thus, in spite of the 'movement in the development community pushing for the widespread rollout of community access points to the Internet as a tool for direct poverty relief', the problem, as Kenny sees it, is that:

> The nature of extreme poverty in LDCs – *very* low incomes, subsistence and unskilled wage labor as the dominant income source, food as the dominant consumption good, low education and high illiteracy, minority language group status and rural location – points to an unsustainably high cost and relatively low benefit of direct Internet service provision through telecentres to the very poor. This might suggest that the push for Universal Internet access as a tool for poverty relief is misplaced.
>
> (Kenny 2002: 1–2)

Though he does not cast his argument in terms of international technological dualism or the diverse nature of technological systems, Kenny's list of problems associated with Internet-based telecentres in poor, rural areas has in fact much to do with these particular concepts (which were described in the early part of this chapter). Recall from that earlier discussion – especially the parts dealing with the international

technological system – the suggestion that technologies developed in and for developed countries tend to have little or no relevance to the poorest deciles of those living as they do, largely in the rural areas of developing countries. Now consider that supposition in relation to a description of telecentres in developing countries, which runs as follows:

> There are some economies in which telecentres might be rational. They are those with good access to reticulated electricity, existing telecommunications networks, high population densities, and cash economies. In other words, telecentres are the product of, and designed for, cities very like the ones inhabited by the people who came up with the ideas for telecentres in the first place. However, since the world in which telecentres are supposed to deliver their benefits is very often a small town or rural community with poor infrastructure and minimal cash economy, there are fundamental gaps between the requirements of the telecentre model and their environment.
>
> (Mardle 2003: 2)

The same author (p. 3) goes on to point out, what in our terms, are the many problems associated with the insertion of modern technological systems into systems that are more reflective of traditional (often pre-capitalist) modes of economic behaviour. And while our earlier discussion of this concept was cast in rather general terms, the citation here refers specifically to IT and more specifically still, to

> The recent Pentium or equivalent [which] is the product of an economy from which serious dust and water intrusion, physical assaults, and major power fluctuations are excluded as a matter of course. The only way the Pentium [and by extension the Internet] can function in an LDC is to import a slice of its native economy with it. That requires sealable windows and doors, air conditioning, and large wedges of money.
>
> (Mardle 2003: 3)

Mardle alludes also to the need for electricity, satellite Internet and so forth. 'Then', once these are supplied (p. 3), 'we [in the West] hand this over-capitalized, souped-up, expensive system over to the local community', whose task becomes one of making the project 'economically viable'.

The point that is being raised here is in fact a crucial one for the viability of Internet-based telecentres in developing countries. The point being that these imported structures form part of an extensive socio-economic system (or package), which needs to be supplied to the recipient country in the Third World, if the technological part of the package is to function at all. And even if many such components can indeed be supplied by aid-donors (at a formidable cost), there are other parts of the package that cannot be so supplied (at least in the short to medium run). Consider, for example, illiteracy and cultural attitudes to IT, which in the African case mentioned earlier, seemed to be crucial barriers to Internet access. Or again, take the bias against women users, which in that same case, was also clearly documented. Not least, moreover, is the fact that even literate users of the Internet will be very hard put to find relevant material in his or her particular local language (with English being by far the most common language used on the Internet). The essential point about these problems is not that they cannot be solved. It is rather that this will take quite some time: time which a newly established telecentre simply cannot afford if it is to reach the poor people that it purports to help.

## Conclusions

The concept of Internet-based telecentres originated in and for the circumstances prevailing in the developed countries. As with much else in the technological relationships between rich and poor countries, this model has been incorporated by many segments of the international development community into their current thinking. Indeed, there are many elements of this community that view Internet-based telecentres as a crucial vehicle for assisting the vast numbers of poor rural communities in the Third World. And largely as a result of this prevailing view (or in its most elaborate form a paradigm for IT and development), so-called multi-purpose community telecentres have seen rapid growth in many areas of the developing world, as illustrated by the figures cited in the early part of the chapter. Our review of the admittedly rather scant evidence of the Telecentre experience, suggests, however, that it has provided minimal support to the poor, rural communities in the developing countries. In particular, the vast majority of that group has barely even come into contact with the Internet service thus provided (mostly by international aid-donors). More generally, following Kenny (2002), one can say with some degree of empirical backing, that the social benefits

of Internet-based Telecentre projects have been very low in relation to the high costs that they clearly entail.[8]

Though there are many and varied reasons for this generally disappointing outcome, we have argued that the basic problem can be traced back to the neglect, in theory and practice, of several key concepts that were advanced in the technology and development literature as early as 1970. Briefly summarized, those concepts warn against the import of technologies from developed countries, partly because those technologies tend to be irrelevant to the needs of the impoverished rural communities in developing countries. At the same time, however, because technologies form part of a much wider socio-economic system, in order for the Internet-based telecentres (or any foreign technology for that matter) to function, the entire system needs to be replicated in the places where they are located. The problem is then that while some elements of the technological package can be imported (albeit at prohibitively high costs), others simply cannot be (at least in the short to medium run). I am referring here, for example, to illiteracy, cultural attitudes to new technology, and engaging villagers in the Telecentre project. Either way, our conclusion is that the existing paradigm is seriously flawed and needs to be replaced by an alternative model, as we seek to show in the following chapter.[9]

## Appendix

Figure 2A.1 depicted the general nature of technical change in developed countries. The figure can be usefully supplemented by the following analysis of the implications of technical change in IT for the size of the digital divide. The analysis begins with four questions, namely:

(i) Why the poor and the rich use different communications techniques;
(ii) Why the nature of technical change in ICT has hitherto been biased towards the rich;
(iii) How the consequences of (ii) has been a widening of the digital divide; and
(iv) Policy implications of (i)–(iii).

1 In the initial period, ICT consists of three fixed-coefficient techniques (oral, written word, fixed line telephony). Each technique requires different amounts of user time combined with different

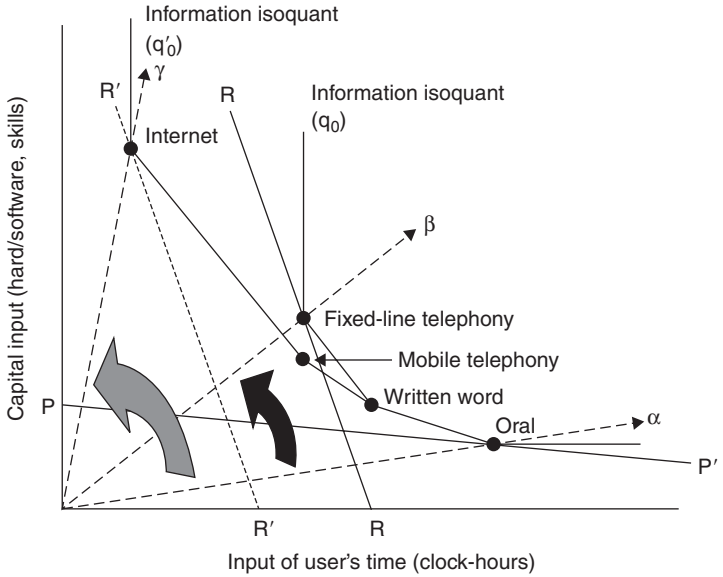


*Figure 2A.1* The direction of technical change in IT and the size of the digital divide.

Source: Pigato (2001: 63–4).

amounts of 'capital' (hard/software, operating skills) to produce a given amount of information. Since each technique is technically efficient, an information isoquant ($q_0$) can be constructed as a convex combination of techniques.

2 The ratio of the hourly value of user time to the hourly user cost of capital varies between rich and poor. The value of time to the poor is low due to under-employment and low productivity, while the user cost of ICT capital to the poor is high due to liquidity constraints, imperfect capital markets, etc. Consequently, the relative price of capital faced by the poor is high (PP′ in Figure 2A.1). By contrast, the value of time to the rich is high as they are more likely to be employed and at a higher wage than the poor. The user cost of ICT capital to the rich is lower as they are more likely to live and work in an infrastructure-rich environment, and borrow at lower rates than the poor. Consequently, the relative price of capital faced by the rich is low (RR in diagram).

3 The implication of (2) is that the rich and poor choose different least cost IC techniques, even if they face the same choice set (isoquant). The rich choose to communicate by fixed line telephony, while the poor choose to communicate orally.

4 At the end of the initial period, two new techniques become available (mobile telephony and the Internet). Mobile telephones save on significant amounts of associated infrastructure (transmission towers replace overhead/underground cables), but require the same amount of user time per unit of information communicated as fixed telephony. Communication over the Internet is very fast, thereby saving user time, but requires much more capital per unit of information communicated than any of the existing techniques. This pattern of technical change implies that only the relatively capital-intensive segments of the isoquant shift in towards the origin. Two of the initial techniques remain unaffected (oral, written word), while one (fixed-line telephony) becomes technically inefficient (obsolete).

5 The distributional consequences of this pattern of technical change are profound, because only the segment of the isoquant (economically) relevant to the rich is affected. So, in the second period, the rich switch from communicating by fixed telephony to using the Internet, while the poor remain communicating orally.

6 The effect of (5) is to widen the digital divide as measured by the angle between the capital/labour ratio of the technique used by the rich and that used by the poor. The magnitude of the digital divide in the first and second periods is shown in the diagram by the short and long arrows.

7 The implications for a pro-poor ICT policy are clear at a general level:

- Reduce the relative price of capital to the poor (improve access to training, extend electricity grid to low income areas, selective and temporary subsidies to poor users);
- Shift focus of R&D in ICT to poor-user friendly techniques, that is, shift in the south-eastern segment of the information isoquant.

(Pigato 2001: 63–4)

# 3 An emerging paradigm

Given the orders of magnitude that seem to separate the benefits and costs of Internet based telecentres in poor, rural areas of developing countries, it seems to us highly doubtful that policy adjustments undertaken *within* the prevailing paradigm will be sufficient if such projects are to function without ongoing donor funding. For, it is the very nature of this paradigm that sets limits to what can be achieved with respect to both costs and benefits (at least in the short to medium run). On the one hand, that is to say, the paradigm embraces the idea that the target population should have direct Internet access at a location set aside specifically for this purpose where a host of supporting constituents need to be imported from the West (as part of what in the previous chapter was referred to as a modern technological system), if the telecentre is to function at all. On the other hand, the existing paradigm presupposes a relatively advanced set of user capabilities, whereas in reality the level of user capabilities and other socio-cultural barriers to the demand for Internet access, make the entire over-elaborate technological package irrelevant to all but a few of the designated beneficiaries. The essential point is that precisely because of its package nature, the prevailing approach allows very little in the way of major reform. Thus, as we shall argue in this chapter, an entirely different paradigm is needed if the ratio of benefits to costs from Internet use in poor rural communities is to change as drastically as appears to be necessary for a viable approach to this crucial policy issue. We begin the chapter by contrasting in a simple diagram the organizational differences between the existing and the proposed paradigms. Thereafter, we identify the mechanisms through which the latter alters the benefit–cost calculus of Internet use and, finally, show that many such mechanisms can be traced back to, and draw on, a number of earlier debates in the literature on technology and development.

## The paradigms compared

In Figure 3.1 the existing model is simply portrayed, involving as it does, just two of the elements (the target group of rural poor on the one hand and the Telecentre on the other) in the diagram. Furthermore the relationship between these elements runs only in one direction, namely, from providing the target group with direct access to the Telecentre that houses a connection to the Internet.

The proposed alternative, by contrast, is far more complex, involving not only almost all the elements in the diagram but also multiple directionality in the relations between them. Essentially, what is portrayed is a sequential process that begins with an expression by the local community members of the type of knowledge that best accords with their specific needs (such as information about a crop disease or prices of specific items). These needs are then transmitted by *existing* channels of communication, such as radios, phones or bicycles[1] to an *intermediary* (which might be a radio station or a crude mobile vehicle containing a computer), whose task is not only to search the Internet for the desired information, but also to communicate the knowledge thus gained, back to the local community, again using an existing channel of communication, (though not necessarily the same one) in a relevant and accessible

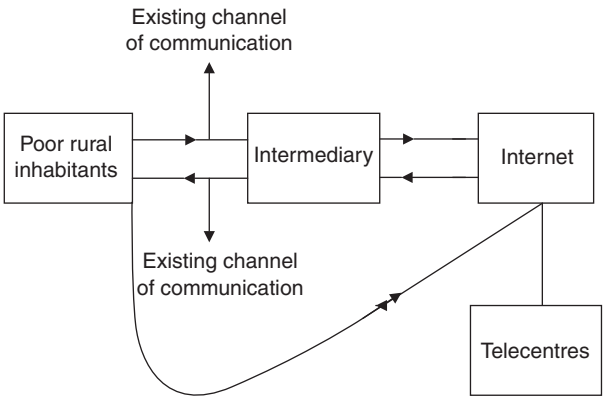


*Figure 3.1* Two paradigms compared.

Notes
Single arrows represent direction of knowledge flows. The upper lines signify the demand for knowledge and the bottom lines indicate the supply response. The double arrow indicates the direct provision of access by the rural poor to the Internet via telecentres.

form. This dual role of the intermediary has been aptly emphasized by Girard (2002), who suggests that what is really crucial 'is that the "institution", whether a radio station or a midwife must take the role of community intermediary – translating the Internet's information into locally useful knowledge'.[2] Indeed, if there is one distinguishing feature of the approach here being proposed, it is the existence of and the role played by intermediaries of one kind or another (such persons or institutions, we should emphasize, are notably absent in the prevailing paradigm where the target group has *direct*, as distinct from *indirect* access to the Internet).

Brief though our description of the alternative paradigm has been, one can nonetheless use Figure 3.1 to delineate the major mechanisms through which it is likely to alter the ratio of social benefits and social costs, as compared with the prevailing model. Let us begin then with the cost side of the equation. From this point of view, major gains potentially accrue to the new paradigm from the use of existing channels of communication and perhaps even the institution that serves as an intermediary in the project (such types of gains are perhaps most readily apparent when, for example, computers in schools are used outside of school hours by other members of the community who would otherwise need to acquire IT of their own). The question is then whether and to what extent existing channels of communication are in fact able to realize gains of this kind in the particular context of poor, often remote rural areas of developing countries. Kenny (2002: 25), for example, has suggested that 'Through intermediary technologies including radio and telephony the Internet might also have a significant impact on information flows directly to and from the poorest.' He further suggests (p. 2) that 'access programs focused on the telephone and radio might have a higher benefit–cost ratio and lower overall cost as alternatives to and intermediaries for the Internet in poverty alleviation programs'. While recognizing that such traditional means of communication are by no means the only vehicles for transmitting information to and from the poorest groups, they are certainly one of the most important.

## The ubiquity of radio and telephony in rural areas

It is relatively easy to find the number of radios owned by those living in the rural sector of a developing country. A survey by the National Statistical Office in Malawi, for example, showed that in 1998 (Malawi Population and Housing Census 1998: 138) the percentage of

the population owning at least one radio was close to 50 per cent. More generally, approximately 40 per cent of rural households in low-income African and Asian households are thought to own a radio (Kenny 2002: 6). What is most useful from our perspective, however, is the ownership of radios by poor *people* in poor *countries*. Fortunately a survey by Pigato (2001) of demographic and health surveys in 26 African and South Asian low-income countries, conducted between 1991 and 1999 provides ownership of information and communication assets by wealth quintiles. Overall, these surveys suggest that 'Radio is owned by about 10% of the 20% poorest households and by about 40% of households in the second poorest quintile' (Pigato 2001: 19). Note that these last estimates would understate the degree of telephone access by the poorest deciles in the developing world for two reasons. The first is that the sample countries are heavily drawn from the poorest, rather than the entire group of countries that are defined as being underdeveloped. The second reason is that the estimates in question refer to household ownership of radios rather than household access to these products.

The point here turns partly on the fact that use of the radio by one individual, in contrast to say a computer, does not preclude others from simultaneously enjoying the benefits thus provided. When one adds to this the tradition of sharing that exists in many developing countries (as manifest for example by multiple readers of a daily newspaper), it may well be that the difference between ownership of and access to radios in rural areas is quite sizeable. This is certainly true in the case of telephones, as we shall now seek to demonstrate.

Let us first consider the situation in South Africa, which is one of the few countries where household surveys ask questions about access to telephones as well as ownership of them (the latter being typically the only data that are available in most countries). In addition, as shown in Table 3.1, data from the 1997 Household Survey differentiate between ownership (or universal service) and universal access for a number of major racial groups.

Note that in Table 3.1 universal service refers to fixed or cellular phones (or both) in a dwelling, while access is self-defined (whether in house, neighbour, communal phone or phone shop).

Thus, for the country as a whole, the universal access measure is more than twice as high as the figure for universal service (or household ownership). More recent data provided by the International Telecommunications Union (ITU 2001: 4) suggest that in 2000 '42 per cent of South Africans had universal service (a telephone in their home) while 80 per cent had

*Table 3.1* 'Ownership of' versus 'access to' phones in South Africa, 1997

| *Universal service* | | *Universal access* | |
|---|---|---|---|
| Total | 32.2 | Total | 68.1 |
| African | 13.6 | African | 59.4 |
| Coloured | 37.2 | Coloured | 72.4 |
| Indian | 74.2 | Indian | 89.1 |
| White | 84.9 | White | 91.5 |

Source: CommUnity (1997: 1).

universal access (within 30 minutes of a telephone)'. Compared with the earlier data, that is to say, there has been a slight narrowing of the gap between ownership and access. Note, finally, that these average figures do not of course tell us anything about the size of the gap in the rural areas, which may be far more substantial.

Apart from the unusual South African case, where data collection practices admit of direct comparisons between ownership of and access to telephony, most of the work on this issue has been conducted by Michael Minges (2002) at the International Telecommunications Union. Forced by the lack of relevant data in many poor countries to make numerous simplifying assumptions Minges (2002: 4) is nevertheless able to estimate (albeit crudely) that almost 70 per cent of the rural population in developing countries has access to a telephone (though, one should emphasize that this does not mean that the phones all work, or that the population actually knows how to use them, or even that they are affordable to every single rural inhabitant).

## Differential costs and benefits

Compared to the approach based on telecentres, the alternative paradigm we have sketched, relies heavily on existing modes of communication, which, as just noted, tend to be more abundant in rural areas of developing countries than is often thought to be the case. And even when, say, radios still need to be purchased, this can be done relatively cheaply. For, as Kenny (2002: 6) notes 'the radio is by far the cheapest electronic communications technology. Receivers cost perhaps $10 plus the cost of batteries (or a wind-up model, which does not need batteries, can be purchased for $70 to $100). They do not require an electrical

connection and . . . they are stand-alone appliances'. The Internet-based Telecentre concept by contrast, relies much more heavily on relatively new technologies such as computers, which, more often than not, have to be imported in their entirety from the developed countries. The differential costs of the two approaches depend, in addition, on how much knowledge is provided by the Internet to residents of rural areas. In the case of telecentres, individual access is provided to the entire World Wide Web, regardless of how much of it is actually relevant, whereas in the emerging paradigm, the intermediary function of the model requires only a tiny fraction of the knowledge on the Internet, and in particular that part that is regarded as relevant by the villagers themselves. The Internet, in other words, is used selectively in a targeted manner in the one case and indiscriminately in the other.[3] And it is correspondingly far less expensive to give an intermediary access to the Internet in order to supply relevant information to an entire village, than to give each individual in the village direct access to a computer and the Internet. Finally, and perhaps least emphasized in the literature on IT and development, is the differential value attached to time by rich and poor people. At its simplest, the argument is that time is valued more by those who earn high incomes relative to those who earn appreciably less per unit time. Hence, gains in time saved from technological innovations such as microwave ovens or washing machines, will tend to be more appealing to the rich than the poor, as household consumption surveys of these income groups would surely reveal. The latter group, on the other hand, would tend to be better served by a product or service that is less time-saving and less expensive. Obvious though these observations may perhaps seem, they are important to the case for an emerging paradigm in that they point to the scope for a form of knowledge transmission, which, while based on the Internet, does not require the instantaneous receipt of that information by the rural poor. For, as our argument indicates, the lack of instantaneity would probably be outweighed by the relatively low cost of the information provided (in Figure 3.1) by the intermediaries.

If the emerging paradigm seems to be associated with lower costs than its more fashionable counterpart, it also brings a range of benefits to the rural poor that are negligible or entirely absent under the telecentre approach. In the first place, the persons belonging to the target group of beneficiaries do not need advanced user capabilities since they come into no direct contact with computers or the Internet (in stark contrast to those who rely on telecentres).[4] Instead, they depend on

*Table 3.2* Capability levels required for operation of contrasting user technologies

| | *No literacy* | *Basic literacy* | *High literacy/ language skills* | *Computer literacy* | *Technical competence* |
|---|---|---|---|---|---|
| Oral communication | * | | | | |
| Radio | * | | | | |
| Television | * | | | | |
| Fixed line | | | | | |
| Telephone | * | | | | |
| Mobile telephone | * | | | | |
| Public phone | * | | | | |
| Newspapers and printed sources | | * | | | |
| Fax machine | | * | | | |
| E-mail | | | * | * | * |
| Internet | | | * | * | * |

Source: Pigato (2001: 7).

existing channels of communication, such as radios and telephones, which, as Table 3.2 indicates, require the least advanced of all the user capabilities listed there.

Inasmuch as the rural poor do in fact comprise persons with such basic user capabilities then an approach based on existing channels of communication and intermediaries in the sense described earlier, is potentially capable of helping vast numbers of the target group who would be excluded under the telecentre model. Much still depends, however, on the manner in which information derived from the Internet (or elsewhere) is transmitted back by the intermediaries to the local population. And in this regard the familiarity of the intermediary with the local population becomes crucial in determining the success or otherwise of the mechanism depicted in Figure 3.1 as the transmission of knowledge gained from the Internet back to the target group. Although it is discussed much more extensively in the following chapter, it is useful to summarize here, how the Kothmale radio project in Sri Lanka overcame the problems that bore on this problem. In particular,

> A daily one hour live radio program in which an announcer and a panel of resource persons browse the Internet at the requests of listeners, has proven to be capable of overcoming linguistic barriers in

> using the Internet by non-English speakers. The radio station adds value to the information by interpreting it into a local context, by broadcasting it in vernacular languages, and by providing a platform for feedback through local discussion and networks of local correspondents.
>
> (Kenny 2002: 23)

If this is a good example of how an existing communication channel such as radio can be used to gain knowledge from, rather than access to, the Internet in poor rural communities, so too are there instances which conform to the emerging paradigm based on the telephone (which, as argued earlier, is much more widely diffused in rural areas than is often thought). Consider, for example, the case of an American-based firm called Voxiva, whose

> messaging, data collection, information, and transaction services will be accessible from all phones, which will allow users to send and receive voice mail, submit reports, order goods, and access libraries of pre-recorded information using the phones keypad and their own voices to enter data. Information captured by this digitised voice technique will also feed directly into Internet and computer networks, expanding the reach of important social services networks into under-equipped rural communities by phone. *By deploying a low-cost, telephone based technology that will extend Internet-like functions and information to poor and rural communities in developing nations, Voxiva has the potential to serve as a model for the successful use of ICT for development goals*.
>
> (Markle Foundation 2003, emphasis added)

Still further expansion of the potential for providing knowledge gained from the Internet is possible, if the channel of communication to the villagers from the intermediaries consists not of radios but basic loudspeakers, as in a project initiated by the M.S. Swaminathan Research Foundation in India (UNDP 2001). This too, one should emphasize, is a good example of combining new and more traditional technologies in an organizational model that is based heavily on intermediaries of one kind or another.

With the help, partly, of the last three examples, we are now well placed to summarize and contrast the main features of the existing and emerging paradigms, as shown in Table 3.3.

*Table 3.3* Juxtaposition of two paradigms

| *Emerging paradigm* | *Prevailing paradigm* |
|---|---|
| Demand driven | Supply driven (by aid donors for example) |
| Provides access to *knowledge* | Provides access to *technology* |
| Access can be spatially dispersed | Access concentrated in telecentres |
| Access by villagers based indirectly on other sources of Internet information (e.g. radio) | Access based on new technologies located in telecentre (e.g. computers) |
| Intermediary plays crucial role in the process | Intermediary role unimportant |
| Intensive in local needs, resources and channels of communication and unintensive in time-saving | As part of developed country technology system, is intensive in capital, skills and time-saving |
| Combines relatively old and new technologies at different stages of the process | Based entirely on imports of new technologies such as computers (often financed by foreign aid) |
| Makes Internet (indirectly) available to relatively large numbers of poorest groups in developing countries | Internet accessed by only a very small minority of rural poor in telecentres |
| As a result of all these factors benefit/cost ratio tends to be relatively high | As a result of all these factors benefit/cost ratio tends to be relatively low |

## Intellectual antecedents of the emerging paradigm

We have already argued in the previous chapter that the right-hand column of Table 3.3, representing the dominant approach to the use of the Internet in developing countries, can be interpreted in terms of concepts (such as international technological dualism and technology systems) that have long been part of the technology and development literature. And to this extent, we argued that the existing approach to the diffusion of the Internet suffers from all the problems of international technology transfer described in those concepts. What we have not yet raised, however, are the intellectual antecedents of the left-hand column in Table 3.3 representing the emerging paradigm, which, as that table suggests, contrasts so strikingly with the prevailing approach. It is to this issue that we accordingly now turn.

### *Commodities and capabilities*

Arguably the most fundamental theoretical antecedent of the new paradigm, is Sen's (1985) book entitled 'Commodities and Capabilities',

since, in stark contrast with the traditional theory of consumption, Sen argues that it is not the ownership or presence of goods and services that matters to individual or societal well being, but rather what is actually done with the characteristics embodied in those goods and services (traditional theories of consumption tend to take the point of purchase as the revelation of preferences and what occurs thereafter is usually entirely ignored). Thus, for Sen (1985: 9)

> if a person has a parasitic disease that makes the absorption of nutrients difficult, then that person may suffer from undernourishment even though he may consume the same amount of food as another person for whom that food is more than adequate. In judging the well-being of the person, it would be premature to limit the analysis to the characteristics of goods possessed.

Or again (p. 10):

> A bicycle is treated as having the characteristic of 'transportation', and this is the case whether or not the particular person happening to possess the bike is able-bodied or crippled. In getting an idea of the well-being of the person, we clearly have to move on to 'functionings', to wit, what the person succeeds in *doing* with the commodities and characteristics at his or her command. For example, we must take note that a disabled person may not be able to do many things an able-bodied individual can, with the same bundles of commodities.

Though Sen's theory is entirely general, it applies with particular force, we feel, to the differences in functionings induced by the same good in developed as opposed to developing country circumstances and especially those circumstances prevailing in the predominantly rural areas of the Third World. For, to a large extent, the functionings associated with a particular good depend on a wide range of complementary commodities, which are only available in the markets where the good originates (recall the discussion of this point in the previous chapter under the heading of technology systems). In other markets, the same good may even give rise to a negative effect on individual functionings.

> This distinction is perhaps most apparent, for example, in the case of infant formula, which, among a narrow group of relatively affluent consumers in developing countries, has an impact on infant

> health and nutritional functionings that is very similar to the typical [successful] case in the developed countries. Among the majority of poor consumers in the poor countries, however, the lack of complementary inputs (such as clean water and refrigerators) often tends to engender a negative rather than a positive impact of formula on the health status of the infant (as manifest, for example, in severe diarrhoea and subsequent bacterial infections).
>
> A similar story can be told for modern medicinal drugs in developing countries, which . . . often yield dramatically different effects on individual health functionings, depending upon whether the consumer has access to qualified medical practitioners, whether she can afford an entire course of treatment and whether she is capable of reading and complying with the recommended dosage regimes.
>
> (James 2000: 98–9)

As measured by the differential degree to which the Internet is being used in rich and poor countries and by the literate versus the illiterate in a given Telecentre within the latter (as noted earlier), the data illustrate all too well the need for examining the functionings promoted by the Internet, rather than focusing only on the number of persons with access to this new technology.[5] And as we have argued here in relation to Figure 3.1, a great deal will depend upon the organizational model within which use of the Internet actually takes place (notably, as part of a Telecentre approach, or a model which emphasizes the characteristics of the target population and uses intermediaries to bring the benefits of the Internet to bear on the functionings of that particular group).

### *Appropriate products*

The notion of appropriate products was born out of dissatisfaction with the large-scale importation of Western products into developing countries (Stewart 1977). In particular, it was felt that such imports are likely to embody an excessive ratio of non-essential to essential characteristics, in relation to the relatively low incomes prevailing in the developing countries (non-essential characteristics refer, for example, to expensive packaging, designer labels and excessively stringent requirements for certain goods and services). The problem, so the argument goes, is that either the developed country products are unaffordable to the vast majority of those living in poor countries (whose preferences thus remain unindulged), or, if these expensive products happen nonetheless to be

purchased, the consumption patterns of the poor buyers then become imbalanced, in the sense that less may be spent on food, healthcare and so on. What these people require, instead, are 'appropriate' products that embody a high rather than a low percentage of essential characteristics. (There is no point, for example, in purchasing the latest generation of computers if the uses to which they are put in developing countries are mainly word processing and simple forms of training in schools. For such purposes, second-hand versions of 486 type computers would be more than adequate.)[6]

From the point of view of Internet provision in developing countries, one dimension of product appropriateness may assume particular importance in the selection of the two paradigms portrayed in Figure 3.1. Specifically, that characteristic is concerned with the speed of information exchanged in Internet-based projects. If, on the one hand, the requirement is that poor people be able to receive, research and transmit information as quickly as direct Internet access allows, then the indirect forms of access proposed earlier, will tend to be excluded, since the processes of information exchange based on intermediaries are almost invariably slower. On the other hand, however, there is a need to ask how insistent one should be about the need for equivalent standards in developing and developed countries. After all, we have just sought to show that developed products and standards tend to be overspecified in relation to the low incomes prevailing in the former countries, especially, but not exclusively in the rural areas. And with particular regard to the issue of knowledge exchange, much the same argument applies when one recognizes that the greater the differences in earnings between the rich and the poor, the more sizeable will tend to be the gap in the values attached to time by the same two groups. At its simplest, the argument here would be that the value of an hour is equal to average hourly earnings, so that there is a one-to-one correspondence between earnings and the value of time (Becker 1965). We have already noted in this regard that food preparation in developing countries tends to be far more time and labour-intensive than in societies with high average earnings, where, by contrast, food is often more rapidly prepared with the aid of all sorts of time-saving and capital-intensive goods such as micro-wave ovens and freezers.[7] (The same is true of washing clothes by hand as opposed to expensive washing machines.) As depicted in Figure 3.2, therefore, the conclusion to this line of reasoning is that there is indeed scope (based on the connection between earnings and the value of time) for the less rapid, indirect methods of Internet use.

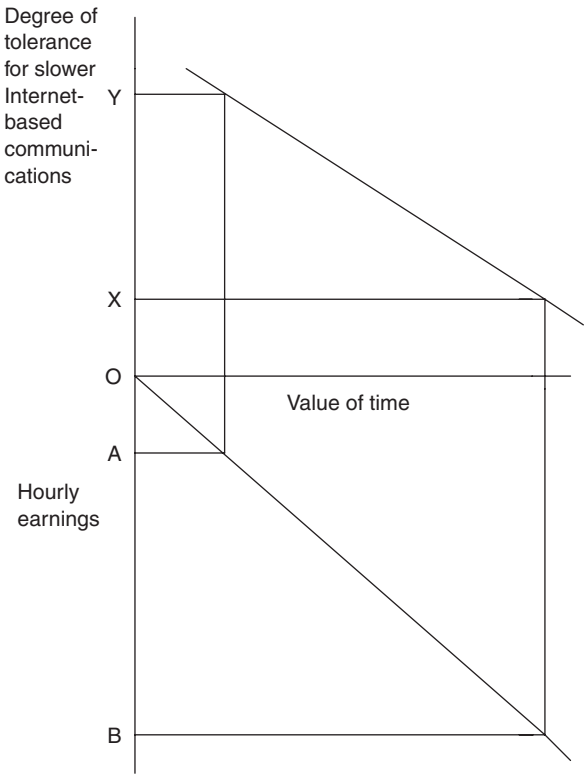


*Figure 3.2* Earnings, the value of time and the degree of tolerance for indirect modes of Internet use.

Thus, beginning with a large difference in hourly earnings (OA versus OB), there is ultimately a much greater degree of tolerance for indirect methods of Internet use on the part of the low, rather than the high earner (OX versus OY respectively).

### *Blending of old and new technologies*

Even among its proponents (Bhalla and D. James 1988) there is agreement that the idea of blending new and old technologies has not, thus far, been defined with any degree of precision. Much of the literature on this

topic, moreover, was written (during the 1980s) before applications of the Internet to developing countries became so fundamental a concern to the international development community. Yet, the concept of technology blending, as enunciated mainly by the International Labour Office, still qualifies as an antecedent of the emerging paradigm of Internet use in developing countries, because of its emphasis on the advantages of combining old and new information and communications technologies[8] and also because of the limitations it associates with attempts to leapfrog directly to the latter (as is the case with the Telecentre-based approach to the Internet in developing countries, which tends to eschew, rather than embrace, the opportunities afforded by older forms of technology). The problem with technological leapfrogging, according to Bhalla and D. James (1988: 34), is that the required preconditions simply do not exist in the majority of developing countries (and especially the least developed of those countries). For example,

> Although the cost of many 'high' technologies is going down, it is still quite high relative to the national per capita incomes and foreign exchange availability in most developing countries. As long as the infrastructure and software requirements in these countries are not met, the 'high' technology hardware will remain too sophisticated to be used efficiently and at full capacity.

The same authors also draw specific attention to the crucial requirement that 'existing technological capability is already at a level at which "high" technology can be assimilated and efficiently utilized' (Bhalla and D. James 1988: 34). Technological blending, on the other hand, embraces, rather than displaces, older forms of technology, so that one can speak of a co-existence between these and newer technical variants. As such therefore, blending avoids the loss of skills, knowledge and traditional values, that occurs when older technologies are entirely supplanted.

> Furthermore, the introduction of new technologies that blend and interact fruitfully with traditional sectors has better prospects for local improvements, adaptations, experiments and innovation than do self-contained, turn-key technologies that allow narrow scope for local learning and for the development of indigenous capacity. And, although the introduction of new technologies inevitably involves readjustments in work habits and routines, life styles and other socio-economic institutions, technological progress is more likely to

> be tolerated and accepted through integration rather than disintegration. Finally, considering the severe resource constraints of Third World countries, blending offers an avenue for spreading the benefits of the newly emerging technologies *in a more egalitarian and participatory fashion* than does the introduction of a necessarily limited number of enclave-like, capital-intensive, large-scale facilities. The spread of frontier technologies to more users in the Third World is then a real and abiding component of the blending strategy.
>
> (ILO 1984: 24–5, emphasis added)

As noted earlier, the literature on blending largely predates the emergence of the Internet as a policy issue. One cannot help but be struck, however, by the degree to which the arguments cited in the previous quotation about blending in general, also support the case for combining the Internet with relatively dated communications and other technologies, if the goal is ultimately to reduce rural poverty effectively.

### *The diffusion of innovations to rural areas*

Blending does pay some attention to the needs of the rural sector. However, this is not an issue that features prominently in that literature and there is little if any attempt to draw on the more general line of research dealing with the diffusion of innovations in the rural areas of developing countries. Our final task in this chapter is to set the use of Internet in this broader context, in the belief that important lessons can be learnt from the very large body of literature that seeks to identify the factors which best discriminate between cases of successful diffusion of innovations and those that can be described as failures. It is not our intention, however, to describe all the determining factors that have been described in the literature on diffusion and adoption (itself a formidable task). Rather, our goal is to focus on the particular variables that bear on the choice between the alternative modes of Internet delivery to the rural poor, shown in Figure 3.1 (i.e. the Telecentre-based model and the indirect, intermediary-based approach).

One lesson that is especially relevant to unusually high-cost innovations such as the Internet in the context of poor, rural areas is the urgent need to rely on *existing* resources wherever possible (a hallmark characteristic, one should emphasize, of the *indirect* mode of Internet provision). Existing resources may include for example the efforts made by the intended beneficiaries themselves.[9] In this regard both the Indonesian

Population Programme and the Chinese Public Health Programme are useful examples. For, in both cases, circumstances were such that a 'highly cost-effective' delivery service was needed if the benefits were to be widely diffused (James 1989: 86). And in both cases, it was fortunate that systems of local organization were already in place 'and the intensive use of these "readily available resources" constituted a highly cost-effective solution to the delivery problems' (p. 86). More generally, James (p. 87) concludes that 'where they exist, local organizations can and should be considered as a resource to be exploited in the interests of achieving maximum diffusion benefits from a given level of costs'.

No less important a finding from the literature on adoption and diffusion in rural areas of developing countries is the overriding role played by understanding user needs in discriminating between cases of success and those of failure. This finding is crucial for our purposes, since it bears on the distinction between 'top-down' models of diffusion (such as Telecentre-based approaches to Internet delivery) and those that are referred to as 'bottom-up' (which more accurately reflects the attempts made by the intermediary to discern user needs in the indirect model of Internet delivery). Nowhere is this point made more forcefully than in a World Bank Report prepared by the Information and Development Program (2000: 23–4). Under the heading of rural ICT access programmes, the Report concludes that

> Whenever possible, ICT initiatives should attempt to be directed from the bottom-up rather than the 'top-down', and strive to fulfill the needs and demands of their users, rather than those of their donors. Initiatives which neither meet the needs and demands of their communities, nor involve these communities in the project planning and implementation phases, are unlikely to succeed in contributing to sustainable development. Projects which successfully contribute to rural poverty alleviation and rural socio-economic development are more often than not those that are demand-driven. In following this demand-driven philosophy, ICT proponents should incorporate user-friendly technologies to ensure that potential users will not only be comfortable with the ICTs, but also have an interest in what they can reasonably provide for them.
>
> Moreover, rural ICT initiatives should make efforts to include the participation of intermediary organizations, which have the capacity to utilize ICTs and serve as linkages between the technology and rural inhabitants. These intermediary organizations are able to use

ICTs to assist rural communities in meeting their information needs, without the communities having to learn the technologies themselves.[10]

## Conclusions

This chapter has outlined the general characteristics of a new paradigm for introducing the Internet in rural areas of developing countries and a comparison has been made with the dominant approach to the same policy problem described in the previous chapter. Arguably the main difference between the two, is that the former provides knowledge about issues that villagers themselves regard as important and in a form that they can comprehend, as compared to the latter, which provides direct access to a vast amount of information, whether or not it is actually useful to the target group of beneficiaries. And just as the previous chapter has shown that Telecentre-based approaches to the Internet can be interpreted in terms of earlier debates in development, so too has this chapter sought to demonstrate that the constituent parts of the emerging paradigm (if not the paradigm as a whole) are rooted in previous development literatures, having to do, for example, with functionings and capabilities, appropriate products, technological blending and the diffusion of innovations in rural areas of developing countries. But whereas the literature referred to in the previous chapter was generally highly critical of the assumptions on which the dominant paradigm rests, the concepts and empirical evidence cited in this chapter lend strong support to the approach we are advocating. Indeed, we shall return to this latter literature in subsequent chapters of the book, which present case studies that 'fill in' the details of the general model depicted in Figure 3.1.

# Part II

# Radios, telephones and Internet access

# 4 Community radio and the Internet

The purpose of the previous chapter was to suggest, in rather general terms, that the approach there advocated, would tend to be associated with a high ratio of benefits to costs, relative to other attempts to use the Internet for the benefit of rural communities in developing countries. We now seek to situate this general hypothesis in the narrower context of community radios, with the aim of examining the concrete mechanisms through which the benefits of the Internet are conveyed to the local community in question. For this purpose we focus on the pivotal role played by the community radio station in its function as a gateway to the Internet for the community it serves. Let us begin with the Kothmale Internet Project in Sri Lanka, which, according to Girard (2001: 8) 'is one of the best known examples of a radio station adopting the role of a gateway or community intermediary between its listeners and the Internet'.

## The Kothmale Internet Project

The history of community radio in Kothmale helps us to understand the crucial intermediary role played by the radio station in the Internet Project begun there in 1998, under the auspices of UNESCO and a group of Sri Lankan and international agencies that were concerned to bridge the digital divide in the period when the problem was just beginning to be discussed.

### *Kothmale community radio*

Community radio in Kothmale began some 20 years ago in a country which enjoys the distinction of being the first in South Asia to introduce

non-government radio 'and predating that by more than a decade, the first to introduce any sort of community radio' (Pringle and David 2002: 2). For our purposes, however, what matters is not the early introduction of community radio *per se*, but rather the impact that this has had on the success of the Kothmale Internet Project. Hughes (2003: 43) for example, has emphasized that the long history of community radio in Kothmale bore heavily on the ease and speed with which the new technology was able to be introduced. In particular, the fact that the Internet was

> built into a well-established community radio station with a core professional staff and experienced grassroots volunteer staff meant many development topics were already covered regularly on air and in ways that sought systematically to convey locally – relevant information in context and with a degree of interactivity between listeners and programme makers. Local resource persons with a traditional role as 'knowledge-brokers' for the local community had already been identified and mobilised to participate in community broadcasting. Well-adapted local programming by trusted and familiar broadcasters offered an excellent foundation for the introduction of new ICTs.

These favourable pre-existing circumstances, one should note, not only helped to facilitate the introduction and functioning of the Internet in Kothmale (as just described), but they also played an important role in reducing the costs of the project. In particular, 'The existence of a well-equipped community radio in Kothmale reduced the project costs, as there was no need to incur expenditure on broadcasting production and transmission equipment' (Jayaweera 2001: 4). In the light of our emphasis in the previous chapter on the need for exploiting existing resources as fully as possible and given what one assumes were rather large savings from the prior existence of the equipment just mentioned, the history of community radio in Kothmale provides much that is relevant to the goal of this chapter. Let us now consider the ways in which the radio station – in its gateway function – appears to have had so dominant an influence on the outcome of the Internet project.

Before that, however, let us note that the Kothmale model does not entirely exclude elements of the contrasting Telecentre-based approach. For, at the station itself, were two Internet computers available for community use in analogy with the hardware established at telecentres.

Unlike the latter, however, the computers at Kothmale were closely incorporated into and formed an integral part of the technology blending approach that we now seek to describe.

### *The radio station as Internet gateway*

Recall from the previous chapter the schematic diagram (Figure 3.1) showing the flow of information to and from the intermediary, in its function of serving the local community by means of knowledge gained from the Internet. That diagram, however, contained no information about *how well* the intermediary (in this case the radio station), performs this function. Yet, it is precisely such information that, to a large degree, determines the outcome of the project. In particular, one needs first to assess the role played by the radio station in influencing the demand for knowledge derived from the Internet and information about the technology itself. One needs then to assess the browsing function of the station as it seeks knowledge to convey to its listeners. The point here is that there are any number of ways that this function can be performed and whereas some forms may engage the community in the process, others may not. Finally, there are judgements to be made on the effectiveness with which information derived from the Internet is actually communicated to the listeners of the radio. Even highly useful information, for example, will fail to reach the target group if it is presented in a form that that group perceives to be irrelevant. Conversely, information that meets the linguistic and other demands of the community is more likely to yield positive effects for the programme as a whole.

Notice that while these stages of the process have been independently described, they are in fact sequentially related. If, for example, the community is uninterested in deriving knowledge from the Internet, the effectiveness of the supply side becomes to a large degree irrelevant. Or, even if a large potential demand exists, ineffectiveness in the way that knowledge is transferred to the community can undo the large amount of work that went into creating a group of listeners with an interest in new IT in general and the Internet in particular. From a policy point of view, therefore, careful attention has to be paid to each and every phase of this sequential process.[1] Let us now examine the way in which each phase was dealt with in the Kothmale Internet Project. Following the discussion above we shall refer to these three categories as demand and awareness, Internet browsing and delivery of knowledge to the local community.

***Demand and awareness***

I stressed in the previous chapter that understanding the needs of potential users was a key component in the acceptance of a new technology in rural areas (as indeed elsewhere). In the case of the Kothmale Internet Project there were certainly

> non-technical initiatives to assess the information and communication needs of the community. A field study for the initial needs assessment was conducted by project and station staff, giving them first hand knowledge of how the community perceived computers and internet as well as an opportunity to find out what they expected from the project.
>
> (Pringle and David 2002: 4)

There was also a very clear recognition on the part of those who conceived the project, that awareness of the Internet was a necessary precursor of raising the demand for its services. Indeed:

> The design of the Kothmale project takes as a starting point that awareness is an integral part of the process of motivating members of a rural community to use ICTs. Awareness leads to access, . . . and to demand for locally appropriate content and an increase in local content production.
>
> The critical lack of awareness as to the uses and benefits of information and communication technologies is evident not only in rural areas, with farmers and labourers, but also with the implementers of development programmes, from NGOs to local and district governments. Even where the technologies are available in developing countries, the majority of people, besides the problems of affordability, do not use the internet because they feel uncomfortable using it or are unaware of its utility.
>
> Before a person will use the internet, they must have a sense of what it is. Before they can use it productively, they need to have a sense of what it can do. While this is true everywhere in rural areas of regions like South Asia basic awareness is a formidable barrier, especially given the absence of factors that in other areas have established a foundation upon which ICT use has mushroomed.
>
> (Pringle and David 2002: 5)

Part of this citation, we should note, is especially relevant to our critique of the Telecentre model in the previous chapter, where we referred to the survey results of studies in several African countries, that revealed very low Internet use even though the facility was available. In any event, the Kothmale project did not suffer from any lack of awareness on the part of the local community, because a number of policies were undertaken specifically to address the problem. Even before the Internet project was formally inaugurated, for example, much had been done to begin the process of introducing the new technology to the local community. Apart from the fact that the inaugural (music) event itself was attractive enough to draw an audience that ran into the thousands,

> the project staff had visited schools, temples and government institutions to talk about the merits of new communication technologies. They used the radio to introduce computers and the internet to listeners. As it got off the ground, the project received a lot of attention and its profile was high in the community.
>
> (Pringle and David 2002: 5)

What seems to have been most influential as a policy tool, however, was what the same authors (p. 5) refer to as

> the concept of 'radio web browsing', an innovative tool that has been successful not only in addressing information needs, *but particularly in terms of raising awareness*, a factor that the project has correctly identified as a pre-requisite to addressing information needs through access or content development. Radio web browsing has opened a window onto the Internet for the local community. By linking media, a single computer with access to the Internet reaches thousands of people.
>
> (emphasis added)

The increased awareness thus engendered[2] may have helped to encourage the use of computers at the radio station. One survey of those users, for example, found that 48 per cent of the sample had heard about the project's Internet access through the radio, while almost all the sample users listened to the station's Internet radio programmes (albeit with varying degrees of frequency).

If browsing the Internet through radio appears to have been a successful way of raising awareness and demand at Kothmale, it also plays a crucial role in the other functions of the radio station noted above, namely, the search for knowledge on the Internet and the ways in which such knowledge is communicated to the listening public.

### *Searching the Internet for knowledge*

What is at issue under this heading is the *way* in which the Internet is actually used by the radio station. The reason why this phase in the overall process is important has mainly to do with the degree of community involvement that the search procedure manages to elicit. And it is far from certain that a high degree of involvement will actually occur. If, for example, the community feels isolated from, rather than a participant in, the search procedure the less likely are its members to tune into programmes that address the benefits available from the Internet in particular and information technology in general (it is not a coincidence, in this regard, that media producers in general often foster direct audience participation, in the form, for example, of voting for individuals or issues, nor is it that such programmes tend to be especially popular among viewers or listeners). One major factor that seems to determine listener engagement in the context of Internet search via intermediation, is whether the process is undertaken at the radio station entirely 'out of view' of the audience, or whether, by contrast, it provides some degree of insight into the way the technology actually functions in this capacity. In both cases the knowledge generated may be the same, but the viewing audience may very well be higher in the latter case. The point is thus that the search process has value in and of itself, beyond the outcome (in terms of knowledge) that it ultimately produces.

In the Kothmale case, one needs to focus on the 'radio browsing' formula in order to discover how this particular stage of the process has been handled. In part, the very definition of 'radio browsing' as a programme in which the station's staff members search the Internet live on the radio, indicates that it is not conceived as a model which excludes the community from the process. The Internet, that is to say, is not

> used simply as an additional tool for programme research. ICTs and the web become the focus of the programme in terms of both content and format – the shows are essentially live web-browsing telecasts. Nor is the programming isolated in the broadcast week. Radio web browsing is a one-hour daily programme block. The

> radio browsing programmes combine surfing the web for specific information with learning about the Internet itself. There are a variety of mechanisms for listener input including postcards and drop-in visits, connections with local schools and community centres.
>
> (Pringle and David 2002: 5–6)

To these various characteristics of 'radio browsing' at Kothmale should be added several more, which also seemingly bore on the popularity of the broadcasts. One is that, in addition to being transmitted daily, radio browsing also occupied a prime time slot, thus making it accessible to a wider group of potential viewers (and hence, with all else remaining the same, more likely to elicit a broader appeal among the listening public). Participation, moreover, was not confined only to the mechanisms described in the previous citation. Indeed, much of the dialogue between those who appeared on the programmes and the community at large, seems to have occurred *off*, rather than on the air.[3] Regular guests on the programme, such as teachers and doctors, for example, would often be approached outside the studio by listeners who had comments and questions about previous broadcasts and suggestions for the future (as when, for example, a community member suggests to someone connected with the programme, that the broadcast on the theme of health, should focus specifically on the problem of malaria). Informal dialogue of this kind thus tended to supplement the more formal interaction, which took the form of answers to specific listener questions during a designated portion of the daily broadcast.

One final observation is concerning what we have described as the second phase of the Kothmale Internet Project and it has to do with our insistence in the previous chapter on the need to lower costs by drawing on existing resources. We have already referred in this chapter to the advantages that accrued to the project from the prior existence of a well-functioning community radio station. However, there were also gains from the use of existing resources (such as postcards and the community telephone), on which viewers could rely in communicating with the presenters of the 'radio browsing' programmes. The latter, in turn, were able to rely on volunteers, such as community doctors and teachers, in the presentation of broadcasts on specialized topics such as health and education.

### *Radio browsing and the delivery of knowledge*

It is one thing to raise awareness about, and demand for, the knowledge that the Internet can provide. It is another thing to engage a large

proportion of the local community in the idea of browsing the Internet live on the radio. It is yet another thing to supply the information thus gathered, in a form that is accessible to and relevant for, the local community and it is to this last issue that we now turn in the context of the Kothmale Internet Project and to its radio browsing feature in particular. Arguably the single most important problem that the radio browsers had to confront lay in the fact that sites on the Internet are overwhelmingly designed for English speaking users in the developed countries, especially the United States of America. The knowledge conveyed on these sites, moreover, tends thus to fit into the broader technological systems embedded in the originating countries, as described in Chapter 2. What needs to be recognized in this regard is that international technological dualism applies not only to global information flows, of which the Internet now forms an important part. Most health information on the Internet, for example, presupposes that the patient is in possession of all the complementary factors (such as literacy, refrigerators, clean water, etc.) that are required for medicinal drugs to be used correctly (and thus enhance, rather than damage the functionings of the individual).

Of the two specific problems associated with the general bias in information flows described in the previous paragraph, the language problem was perhaps the more easily dealt with by those involved in the radio browsing broadcasts at Kothmale. In particular, among those involved were (as noted earlier) volunteers drawn from the professional classes such as doctors, lawyers and teachers, who were able not only to translate information from the Internet into local languages, but also to present the material in a form that they feel will be most accessible to the local community, (unfortunately, the available literature contains no specific examples of what is referred to as the 'contextualization' of information). From all that has been said in this chapter, it does seem difficult to overestimate the positive influence exerted on the Internet Project by these highly educated guests on the radio browsing broadcasts. For, not only do they maintain a dialogue with the community off the air, but they also provide free expertise of various kinds on the programmes. Community radio that is linked to the Internet via some kind of browsing, should, accordingly, be concerned not just with the involvement of the target group of listeners, but also with the participation of the most educated members of the community.

With regard to the second problem noted above, of finding relevant Internet sites, at least some progress appears to have been made by focussing on other developing countries (especially those in the same

broad geographical location).[4] For, although the vast majority of information on the Internet emanates (as noted above) from developed countries, there are exceptions to this general rule, many of which seem to occur in the more IT oriented parts of the developing world. One such example is best recounted in the words of the narrator himself.

> I own a small tea plantation and as that brings me some income, I can devote some time for KCR [Kothmale Community Radio] as a Tamil presenter. First of all, I learned a lot about tea plantations in other countries from the Internet. An Indian web site visited advised that tealeaf should not be crushed because it degrades the quality of the final product. I checked it with the experts and they confirmed it. I was able to share this information with my listeners.
>
> (Pringle and David 2002: 11)

Bamboo is another product that is widely cultivated in Kothmale and the production of this commodity has also benefited from relevant sites in the Asia region. In particular, 'new uses for bamboo were introduced to Kothmale after a programme browsed a website in the Asia region and found new crafts using bamboo' (Hughes 2003: 3). Beyond these few examples, however, it is difficult to assess just how far 'radio browsing' at Kothmale, has been able to tap into other developing country sites for information that would turn out to be of value to the local community. What is certain, however, is that a computer database has been established, based partly on the questions posed by community members and much of which is available in local languages. With the use, partly, of its 'radio browsing' innovation the Internet project at Kothmale seems to have overcome some of the most intractable problems that are associated with the Telecentre model, namely, the language barriers in using even affordable Internet services; a lack of locally relevant information that addresses the needs of the poor; lack of awareness about what the Internet can actually deliver and relatedly, a lack of motivation to use a new, unfamiliar technology. Such barriers were overcome, moreover, at a remarkably low cost, mainly, it seems, because of the intensive use of already existing resources and institutions (such as an already well-functioning community radio station, and the heavy reliance on volunteers). Indeed, in the light of these very real achievements, one might be hard put to come up with better examples than Kothmale, of how the emerging paradigm could work in practice as a substitute for the Telecentre-based approach to Internet use in rural areas of developing

countries (bearing in mind that in our framework, the ultimate outcome is a sequential, rather than an additive product of each phase of the process).

It is not that there are no other similar types of projects in the developing world. Radio Sagarmatha in Nepal, for example, has attracted a good deal of attention precisely because of its attempt to use the radio as an interface between the Internet and rural Nepalese.[5] In Brazil a community radio project financed by the World Bank (2002: 2) to improve education on gender is notable partly because it is explicitly viewed as an alternative to existing telecentre models, with their 'Obstacles of cost, language, local relevance of content and distance limit access for poorer residents – especially those in remote rural communities.' Radio Yungas in rural Bolivia is yet another example of how questions sent in by listeners are answered by browsing the Internet (rather than the aged encyclopaedia in the town library).[6] The problem with these examples, however, is that information about them is insufficient to allow even an analysis of how the procedures adopted with respect to the flows of information to and from recipients, are likely to bear on the amounts of social costs and benefits per project. (Such an analysis, by contrast, was possible, at least partly, in the Kothmale case.)

## Conclusions

The Kothmale Internet Project represents a particularly good example of an alternative paradigm in which existing resources (including a local radio station) can be used in conjunction with the Internet, as a means of reducing the costs and increasing the benefits of this technology in rural areas of developing countries. Although it does not entirely eschew the more traditional notion of locating computers at a central location in a target area, the distinctive rationale of the Kothmale project is to use intermediaries as a means of accessing knowledge that is relevant and accessible to the local community (which, in the case of the Kothmale radio station is around 200,000 people). Using an analytical framework that emphasizes the sequential (and hence multiplicative) influence of individual project components, we suggested, tentatively, that the Internet Project appears to represent a cost-effective mode of using the Internet for the benefit of the rural poor.[7]

It is encouraging to us therefore, that UNESCO is following up its initial involvement in the Kothmale project with similar endeavours in other parts of the developing world. More specifically, in the form of so-called 'community multimedia centres', the integration of local radio

stations with the Internet is being developed in African countries such as Tanzania, Mozambique, Uganda and Burkina Faso (UNESCO 2003).

It is also encouraging that in regions such as South Asia, where governments remain notoriously hostile to community radio stations, certain exceptional cases have emerged. Radio Sagarmatha in Nepal, for example, has given rise to more than five community radio stations across the country, while 'The Philippines has taken community radio to new heights' (Noronha 2003: 2168).

# 5 Basic telephony and the Internet in rural areas

In the previous chapter I argued that community radio, as practised in the case of the Kothmale project in Sri Lanka, embodies almost all the elements of an alternative, low-cost approach to making the Internet available in rural areas (as this alternative was described in Chapter 3). I also noted, however, that in many developing countries, mainly, but not exclusively in South Asia, this type of broadcasting was not yet accepted by the authorities of the state. For this reason (and in circumstances where information needs to be transmitted over distances that fall outside the reach of community radio), an alternative mode of access to the Internet is required. Basic telephony is the obvious candidate, partly because it requires no greater number of user capabilities than the radio and partly because it is accessible to the majority of the population in countries such as India, if, that is, one can believe the estimates provided in Chapter 3. As noted by Richardson (2000) however, the scope for combining basic telephony with the Internet in rural areas has as yet scarcely been realized, even with respect to basic extension activities in developing countries. Yet, as he rightly suggests (2000: 19), this

> is an area where the telephone can be married with Internet tools very effectively … For example, a handful of trained extension experts, backed by agricultural researchers and networks of input suppliers, marketing organizations and others …, could provide prompt and accurate voice answers to questions they receive from farmers over the telephone. Initial agricultural knowledge and information needs assessments could determine key information needs and knowledge gaps that would generate frequently asked questions. Well-researched answers to probable frequently asked questions could be present in an on-line web-based database available to the

> extension experts, regardless of their physical location. As such a service develops, frequently asked questions can be tracked and additional researched answers added to the database. Very specific questions with answers not in the database would be referred to other extension experts or the agricultural research community for follow-up and reply to the information requestor. An on-line list of experts, their specific fields of expertise, availability for fielding questions, email addresses, fax numbers and telephone numbers would be instantly available to information providers through the database.

What do exist, however, are telephony-based innovations that would benefit the rural population by providing web-based information in other ways than through the intermediation of extension agents. Each such case, we should note, has been designed explicitly for developing countries (as was also true of the radio browsing feature of Kothmale radio, described in the previous chapter). In each case, moreover, the technological complexity resides in the way that information is conveyed, rather than in the task of the individual, which remains no more complicated than seeking information over the telephone (as opposed in the telecentre model to the relative complexity of browsing the Internet directly on a computer). There are, however, differences in the scope of projects that connect basic telephony to the Internet and we shall begin with the case that offers the broadest range of information to its participants.

## Browsing the Internet by telephone

Under this heading I will first discuss 'Vaachak', an innovation that was designed by an Indian firm, Prologix with the goal of bringing the Internet to anyone with access to a telephone, whether or not the caller is literate in English and capable of using a computer.[1] The potential reach of 'Vaachak' is thus far greater than the approach taken by the government which 'has so far sought to take the information revolution to rural India through IT kiosks. However, this has been based on the premise that villagers are literate, know English, and have the time and money to access the Internet at such kiosks' (D'Souza 2002). Given the negative stance adopted by the government towards community radio, moreover, the telephone appears to be the only medium through which mass access can be achieved in rural India.

How then does the product called 'Vaachak' make it possible for rural villagers to gain Internet access merely on the basis of a telephone? In essence the answer turns on technological change in interactive voice

response (IVR) systems, which has led to a new generation of these systems (the previous generation, one should note, was capable only of responding to punched digits on the telephone with recorded prompts).[2] Next generation IVRs, by contrast, can be used as a means of interaction with users for information collection and delivery on the basis of speech recognition and text to speech engines. These IVRs, moreover, are being designed with the capability of running the same type of query scripts through which the Internet runs via programming languages such as Voice XML. These features make it possible to design an IVR system that in effect functions as the telephonic version of the familiar Internet browser. Users, that is to say, acquire the ability to access information from the Web using a telephone to announce their requests for information, which are returned in speech form with the aid of a text to speech engine (that is able to transform Indian text to speech in no fewer than 18 different languages). Imagine, for example, a Web portal (defined as a site listing commonly used services, which serves as a starting point and frequent gateway to the Web) that provides information that would be particularly relevant to farmers, such as updated weather forecasts, agricultural news and local prices of commodities in central marketplaces (known as 'mandis' in India). Even with access to telecentres, however, this portal would be unavailable to most of those living in rural India, who are illiterate in English and lack Internet user capabilities. To what extent 'Vaachak' will overcome these problems and achieve widespread rural adoption is as yet uncertain, since the new technology is only at an early trial stage.

As regards developing countries other than India, it is encouraging that an NGO called 'WorldTalk' is testing a technology similar to that which has just been described, with the intention of providing 'on-demand and interactive information and messaging services to people in poor countries' (Project WorldTalk 2003).[3] This will be achieved, according to the organization, by creating 'a technology platform that can be replicated in many different countries. Applications will be developed by local teams in these countries to create new services and these new developments will be shared across all the WorldTalk countries' (Project WorldTalk 2003). Richard Tarboton (2001: 1) has argued that Africa is particularly well suited to telephony as a means of access to the Internet. The reason, as he sees it, is that

> Across Africa there is a strong tradition of verbal communication and a richness of sound and rhythm. This cultural factor drives the need for Internet services in an audio format. Programmes to build

out telephone communications across Africa are currently underway in fixed, mobile and satellite formats. The challenge is to leverage these networks with voice services that enable people to catch up to the Internet revolution and realise the benefits within the current generation. This will be possible if the telephone becomes the primary device for people to use the Internet.

Strengthening this line of argument in favour of using the telephone as a mode of Internet access in Africa, is the fact that numerous countries from sub-Sahara have adult literacy rates below even the average of countries described as 'low-human development' by the UNDP, as shown in Table 5.1 (In 2000 this average figure for these countries was 41.7 per cent.) The point being, of course, that the use of PCs requires, among other things, literacy and in the absence of high rates of literacy countries cannot achieve widespread levels of Internet penetration (unless there are sufficient numbers of local radio stations which are also based on audio rather than visual channels of communication).

*Table 5.1* Adult literacy rates, selected African countries, 2000

| *Country* | *Adult literacy rate (%)* |
|---|---|
| Sierra Leone | 36.0 |
| Niger | 15.9 |
| Burundi | 48.0 |
| Mozambique | 44.0 |
| Burkina Faso | 23.9 |
| Ethiopia | 39.1 |
| Guinea-Bissau | 38.5 |
| Chad | 42.6 |
| CAR (Central African Republic) | 46.7 |
| Mali | 41.5 |
| Gambia | 36.6 |
| Benin | 37.4 |
| Cote d'Iviore | 46.8 |
| Senegal | 37.3 |
| Mauritania | 40.2 |
| Guinea | 41.0 |
| Angola | 42.0 |

Source: Human Development Report (2002: 151–2).

Tarboton (2001) also emphasizes the importance to Africa of the messaging component embodied in voice portal technology. For, as he rightly indicates, the family unit in rural villages is constantly in flux, partly because of the migration of some family members to the cities in search of jobs and partly by the frequency of civil wars, which separate those involved from the remaining family members. One way of allowing these geographically dispersed people to communicate, is through the model adopted by the Grameen Bank in Bangladesh, which is based on the 'sale' of telephone time by the owner of a cell-phone in each village.[4] (Such persons, we should note, have an obvious financial interest in offering this service for as many hours as they can.) When incoming calls are received at a kiosk where the phone is usually located, the villagers to whom the calls are directed, are informed by a messenger (who more often than not belongs to the family of the kiosk proprietor). As such, therefore, the Grameen model comes to resemble (albeit only approximately) the facilities offered by individual ownership of a telephone. Village payphones, on the other hand, bear little or no such resemblance since incoming calls are likely to just go on and on ringing, unless, by good fortune, the call is answered by another villager, who is prepared to contact the intended recipient via a string of verbal messages in the village.

It is in this context that the messaging dimension of a voice portal has so much potential in Africa and indeed most other developing regions as well. In particular,

> A voice portal will allow people to share a pay phone in a community but still have their own telephone number. If they're not standing at the phone or someone else is on the phone, the caller can leave a message. They can reply to the message with either a return call or their own message. In fact, what is taking place is e-mail in voice format and the technology handles voicemails as audio attachments to email messages in the user's inbox.
>
> (Tarboton 2001: 2)

In this, as in other examples of combining telephony with the Internet (described earlier) it might seem as if human intermediation as practised for example by radio presenters in the Kothmale case, is unnecessary since the essence of this technology is to provide information directly to the caller. This, however, would be an incorrect conclusion, with potentially serious effects on policy. Some of the reasons why intermediaries

*are* in fact going to be necessary, can also be found in the Kothmale Internet project and require, as in that case, persons who are familiar not only with the community but also the technology.

Awareness of the new technology, for example, will, in all likelihood, be no less of a problem in the case of telephones as it was with the radio, and it can best be fostered by local intermediaries who are best placed to explain what the technology offers and how it works. Without such efforts, the vast range of opportunities afforded by telephone links to the Internet might then go largely unexploited, even among the so-called 'modern' inhabitants of rural areas, who, in contrast to their more 'traditional' counterparts, believe 'that modern learning and even science are not intrusions into a sacred realm, which should be left a mystery or approached only through religion, but rather that science and technology will benefit mankind by providing solutions to pressing human problems' (Inkeles 1983: 39). In any event, moreover, intermediaries will almost certainly be required to assist users in getting acquainted with selecting the options available at differing stages of the voice-based technology and in navigating their way through a series of commands. For while the population in developed countries is generally well versed in these types of requirements, this is certainly not the case with those living in rural areas of developing countries.[5] Such capabilities will therefore need to be acquired with the help, among other possibilities, of intermediaries who can provide the appropriate forms of capability building (recall, in this regard, that the acquisition of technological capabilities was an explicit goal of the Kothmale Internet project and was met, among other ways, by the contents of the 'radio browsing' programmes, which helped to familiarize listeners with the basic requirements for Internet use).

## Telegrams by telephone

Unless the intended recipient of a telephone call happens to own one himself or herself, has access to voice mail, or belongs to a Grameen Bank type of organizational system which notifies him or her of incoming calls, contact with the recipient within a relatively short period of time is clearly difficult to effect. The obvious solution might seem to be the transmission of telegrams through post offices (which, in India, number more than 100,000). If, however, the recipient is illiterate, as is most often the case in rural areas, this will not solve the problem.

In recent years a new Internet-reliant technology has emerged in India, which would allow telegrams to be in the form of voice rather than

speech. Originally developed at the Indian Institute of Sciences, the technology is now in the hands of a firm called ILI Technologies, which is based in Bangalore. As it was first conceived, 'VoGram' was based on the idea of call centres, as the following description of that conception clearly indicates. In brief, as one observer then described it

> 'VoGram' could change the communication scene by connecting India's largely rural and illiterate masses. The application is a marriage of speech compression, Internet and store and forward messaging ideas. All a person needs to do is to call up the VoGram call centre, record a voice message using a simple card that compresses the voice message. The compressed file is sent through the Internet to the post-office close to the recipients' address. The post-office could either print and deliver the message to the recipient or the receiver could call up a local number free of charge, use an access code given by the postman and hear the VoGram. Or, better still, if the postman has a Simputer [an ultra-cheap portable computer made in India] he could play the voice message to the recipient at home.
>
> (Bytes for All 2002)

More recently, however, ILI Technologies has been considering other possible applications, partly because the call centre approach appears not to be cost-effective. One such alternative is to rely instead on the post office, an institution which already exists (and pervasively so in India), and thereby can circumvent the expense of setting up and running a new institution, namely, the call centre.

Another scheme known as 'e-Post' is worth considering in this regard, not because of its use of telephony and voice messaging, but because it relies entirely on the existing resources of the 150,000 odd, post-offices in India to send ordinary letters in the form of e-mails and as such represents not only an excellent case of how costs can be minimized by the use of available rather than new resources, but also because it constitutes another good example of technological blending. What is blended, in particular, is snail-mail technology on the one hand and electronic communications technology on the other. 'e-Post' is in fact remarkably simple, for what happens is essentially that customers

> hand a postal worker a message meant for a snail-mail address. The postal worker types the message into a computer and e-mails it to the post office nearest the intended recipient, where the message is

> printed out, placed in a sealed envelope and delivered by a carrier. Since its introduction [in 2001] . . . the service, which costs 10 rupees [21 US cents] a message has become popular in relatively remote locations . . . where home computers and Internet access are not common.
>
> (Rai 2001)

It is also worth noting how well this example illustrates the theoretical discussion in Chapter 3, regarding the time dimension of the appropriate products approach. For in that chapter, we argued that, if the poor require information to be transmitted as quickly as direct Internet access allows, then indirect modes of access will be precluded, since the use of intermediaries is bound to lengthen the process. However, we also made the point there, that since the value of time is likely to differ between rich and poor (with higher incomes tending to raise the value), the scope for indirect modes of transmitting information is likely to remain relevant to the rural poor in developing countries. Thus, in the case of 'e-Post', the sender of mail does not enjoy the instantaneity that goes with owning a computer, but does nevertheless benefit from a slower mode of transmission at a very low price (an option that lies in effect between direct e-mail on the one hand and snail-mail on the other).[6]

## Technology blending applications to the health sector

It is still common for aid donors, international institutions and the lay public, to pose the question of whether developing countries should allocate their very scarce resources to the provision of information technologies or to the satisfaction of more basic needs such as hunger, disease, literacy and so on. In fact, however, this way of posing the question is misconceived[7] since information technology can and does help the poor in many of these same areas (e.g. via satellites that allow physicians to communicate more easily with distant colleagues, or software programs that provide updated information about food prices over the telephone). Recently, moreover, a new application of the telephone to the health sector, further strengthens the argument that information technology can benefit even remote rural areas in developing countries. I am referring here, to a US based firm called 'Voxiva', which, by 'Using the power of the Internet and the reach of the phone . . . has developed a revolutionary new way to use technology to address some of global health's

most pressing challenges' (Voxiva 2003). That is to say

> With concerns rising over the spread of infectious diseases, the growing Aids crises, and the increasing threat of bio terrorism, the need for timely health information has never been more pressing. Yet health officials in developed and developing countries alike face serious obstacles in collecting and communicating essential information on a timely basis. Because Internet penetration is limited and data collection systems are often paper-based, weeks can pass before decision makers have access to the data they need. Voxiva changes this equation.
>
> (Voxiva 2003)

Briefly stated, this change is effected by extending the range of data collection and communication to include remote rural areas and by increasing the speed with which health data are communicated between all parties, thereby enabling the authorities to respond more effectively to the outbreak and surveillance of disease in remote rural areas. (This, in turn, will help save the lives of people living in those areas.) In somewhat more technical language

> The system allows frontline health workers to interact with regional, national and other health providers from any telephone or Internet access device. Once logged-in to a Voxiva server, they submit individual case histories and other data through tailored menus; retrieve information in the form of targeted data or macro trend analysis; visualize the data with integrated geographic information systems (GIS) mapping applications; and communicate directly with central authorities of peers throughout the network. Data entered is written directly into the health department database. When specific diseases are reported, the system generates emergency notifications via email, voicemail, pager and text message according to dynamic parameters. Voxiva's technology was first deployed in Peru for the Ministry of Health under a grant from the World Bank.
>
> (Humanitarian Information Network 2002: 3)

In the Peruvian field trial, the inclusion of hitherto neglected rural physicians from the high Andes and the Amazon Basin, resulted in the entry of no less than 26,000 reports of diseases and disasters during

(most of) 2002. These reports were automatically entered into a database and became available to Health Ministry workers in real-time via the Internet. What is also noteworthy from our perspective is the use of telephony for data entry, as opposed to investing in new computers with Internet connectivity. Here again, that is to say, we have an example where project costs are lowered by the use of available resources, one of the key elements of the new paradigm described in Chapter 3 as an alternative to the telecentre approach (which makes little or no use of local or otherwise available inputs). Note that in the use of telephones, voicemail plays a key role in the Voxiva system. As the Boston Consulting Group put it in early 2002,

> At the moment, most communications [in developing countries] take place person-to-person or on paper, making critical information flows slow, expensive, difficult or even impossible. Now a U.S. company, Voxiva, has solved this problem by extending the reach of voicemail . . . to anyone with access to a telephone.
>
> (Boston Consulting Group 2002: 8)

Given that the basic aim of the project was to improve the functioning of the health system, the trial in Peru allowed one to gauge at least one dimension of its effectiveness, namely, the reduction in time that health authorities take to learn about and respond to outbreaks of disease. According to one estimate, officials in Peru 'have been able to learn about cases and respond in a matter of hours and days instead of weeks' (Johnson and Rodriguez 2003: 2). And given their view of the project as 'largely successful', these same authors argue that 'The most important success factor [in Peru] was the recognition that it is possible to achieve high degrees of access to real-time and accurate information by combining the Internet and the phone in a unified application' (p. 2).

At a more specific level, however, I cannot but single out the provision of voice mail to the rural population, who otherwise are difficult, if not impossible to reach, even where a village payphone exists. For, as noted earlier in this chapter, it is one thing to make telephone calls from a payphone, but quite another to receive them. Yet, the latter, no less than the former, is necessary for improved communications within the health sector of developing countries, since such a high proportion of the poorest deciles live in isolated rural locations. In particular, improved communications allow for a faster response by health officials to disease outbreaks and new modes of disease and patient surveillance. Ultimately,

therefore, the provision of voice mail to outlying communities plays a vital role in saving lives via an improved health system (even if, as yet, no estimates of this effect are available). More generally, by greatly enhancing the density of communications with and within the rural sector of developing countries, voice mail would seem capable of revolutionizing the opportunities traditionally offered by payphones. In an interesting application of this idea, an American firm installed hundreds of wireless payphones in Tanzania, which enabled individuals to obtain low-cost beepers connected to voice mailboxes. The customer's beeper would then alert him or her to voice mail messages that could be retrieved at the nearest wireless payphones.[8]

## Conclusions

Compared to the use of community radio as a means of bringing the Internet to rural areas of developing countries, the telephone has been relatively neglected. Yet, as this chapter indicates, the latter mode of communication has potentially major implications for developing countries (not least because most data on telephone availability in those countries tend to ignore the frequent use in rural areas of sharing telephones and tend therefore to underestimate the extent of access, as opposed to ownership of these products). So far, however, we could find only a handful of attempts to use the telephone as a means of Internet access and of those, with the partial exception of Voxiva, the process of development and diffusion is still at an early phase. The extent to which telephones will be exploited as a mode of access to the Internet thus depends partly on the success and subsequent replication of the examples we described in this chapter. It will also depend on whether the telephone and Internet can be combined in such basic agricultural activities as extension services, which, hitherto remain untouched by the new possibilities. In terms of policy, one needs to recognize that if the telephone is to become an effective means of communication in remote, rural areas, much more attention will need to be paid to incoming, rather than outgoing calls.[9] In this regard, voice mail seems to offer particular promise, as indicated by several of the cases described earlier (and perhaps nowhere more forcefully than in Voxiva's attempt to improve the health sector in Peru).

If one is to consider *both* chapters in Part II from a policy standpoint, what is arguably most striking is that all the initiatives described in those chapters (4 and 5), were conceived specifically for the complex

circumstances prevailing in rural areas of developing countries. As such, they do not form part of the Telecentre-based approach to the Internet in such countries, which, we suggested, is philosophically akin to the technology transfer paradigm of the 1970s and 1980s (with its emphasis on the mere transplantation of Western technologies to the developing countries). Thus, although we did not decide in advance to discuss cases according to the type of market for which they were intended, the outcome reflects a pattern that is quite the opposite of what would be predicted by the Telecentre-based approach. Interestingly, though, the case studies do not all originate in and for the same developing countries. Most notably, for example, the best-known community radio stations (from the point of view of browsing the Internet) were found to be in Sri Lanka and Nepal, whereas most telephone initiatives originate in India.

# Part III

# Rural Internet access

## Alternatives to radios and telephones

# 6 The need for alternatives

If the Internet could be widely and rapidly dispersed across rural areas of developing countries purely on the basis of radios and telephones (described in the two previous chapters), there would be no need to seek out alternative mechanisms that are not based on these traditional modes of communication. In this chapter, however, we suggest that even in the medium run (defined as, say, the next decade), radios and telephones cannot realistically be expected to shoulder more than a relatively small part of the overall connectivity burden and consequently that other methods need to be sought. The following chapter deals, accordingly, with a variety of such alternatives that have in common the use of intermediaries to access the Internet on behalf of the intended beneficiaries and the absence of radios and telephones in the process of intermediation. What we are ultimately concerned to show in Part III is that widespread access to the Internet in rural areas requires as many models as possible, since circumstances vary so sharply between different parts of the Third World, and since the overall size of the problem is so pronounced.

## Radios, telephones and the burden of rural connectivity

It is useful, I think, to discuss the limits of radio and telephone-based approaches to rural connectivity under three headings, namely, the uneven patterns of village pay phones and community radios across countries; the stage at which innovations in the two previous chapters can be said to have reached and the replicability of those same innovations in and between countries.

***Uneven access to village payphones and community radios***

In Chapter 3 we have already made the important distinction between universal access and universal service, or put another way, the difference between owning and using a telephone that is accessible within a certain amount of time, distance and so on. That same chapter showed, as expected, that universal access in at least one developing country, was about twice as high as individual ownership. What was not discussed there, however, was the same distinction in the *specific* context of rural areas of developing countries.

Unfortunately, information on this issue is notoriously hard to come by, partly because of the problems of data collection in isolated villages and partly because of the strong urban bias (Lipton 1977) that pervades telecommunications as indeed most other sectors where the state is heavily involved.[1] Such difficulties notwithstanding, I was able to find village data for a small sample of South Asian countries, as shown in Table 6.1.

From our point of view, the most striking aspect of the table (in terms of both villages and village populations), is the variance in access to telephones on the part of the countries listed there. Thus, while India, for example, is relatively well-equipped for telephone-based means of access to the Internet, the same certainly cannot be said of Bangladesh

*Table 6.1* South Asia's villages and phone access, 2002

| | *Villages* | | | *Village population* | | |
|---|---|---|---|---|---|---|
| | *Number* | *Number with phone service* | *% with phone service* | *Total (000s)* | *Total with access to phone (000s)* | *% with access to phone* |
| Bangladesh | 86,000 | 12,568 | 15 | 103,441 | 31,420 | 30 |
| Bhutan | 6,000 | N/A | N/A | 636 | N/A | N/A |
| India | 607,491 | 468,016 | 77 | 741,660 | 726,827 | 98 |
| Maldives | 200 | 200 | 100 | 196 | 196 | 100 |
| Nepal | 3,914 | 1,761 | 45 | 19,457 | 8,754 | 45 |
| Pakistan | 125,083 | 12,000 | 10 | 97,855 | 29,357 | 30 |
| Sri Lanka | 23,000 | 2,475 | 11 | 13,113 | 9,834 | 75 |
| Total | 851,688 | 497,020 | 58 | 976,358 | 806,388 | 83 |

Source: Minges and Simkhada (2002).

or Pakistan, whose village populations with access to a telephone amounts to only 30 per cent. In order to understand how India has attained such a high level of rural telephone access in relation to the other countries included in Table 6.1, one needs to recognize the changed view on the part of the state towards the role of the telephone in economic development. Whereas, that is to say, the telephone was long regarded as a luxury good, unworthy of state support, 'This mistaken perspective was replaced, beginning in the 1980s, by a view that telecommunication services are essential for business, industry, and economic development' (Singhal and Rogers 2001: 184). Spurred on by supportive policies during the mid-1980s and 1990s, this sea-change in government policy towards telecommunications rapidly spread to India's villages, which, as shown in Table 6.1, now enjoy almost total access. In the absence of comparable data for other continents, one cannot confirm that the uneven pattern of village access described here also holds for other continents. What one can suggest, however, is that India's exceptional position in South Asia, seems to be matched (or even surpassed) in Africa by the dominance of a single country, South Africa. It is relevant in this regard to consider the results of a recent survey, which found that some 42 per cent of people in South Africa have fixed telephones and/or cell phones in their house (universal service). Universal access, measured as less than a 30 minute walk to the nearest phone, has increased sharply with 80 per cent of all households now having access, largely it seems because of the network of over 100,000 public payphones (ITU 2001). If, therefore, the availability of payphones is so powerful a determinant of universal access, it is useful (in the absence of standardized data across countries) to examine, as in Table 6.2, the relative numbers of these phones among other countries in the Africa region.

And as shown in Table 6.3, the number of payphones in South Africa represents more than half the number for the continent as a whole. Using these payphones as crude proxies for universal access, it seems thus that South Africa is a clear exception to the other countries in the region. And no less than in the Indian case described here, government policy in South Africa has clearly played a crucial role in this exceptional performance.[2]

### *Uneven access to community radio*

It is worth re-emphasizing under this heading the *special* role of community radio as a means of engaging those living in isolated rural areas

*Table 6.2* Telecommunications usage in Africa, 2001: selected countries

| *Country* | *Public telephones (000s)* |
|---|---|
| Botswana | 3.00 |
| Côte d'Ivoire | 1.93 |
| Egypt | 21.99 |
| Ghana | 3.18 |
| Kenya | 9.03 |
| Morocco | 46.84 |
| Senegal | 13.49 |
| South Africa | 178.11 |
| Tanzania | 0.72 |
| Uganda | 1.38 |
| Zimbabwe | 3.23 |
| Total | 282.90 |

Source: Jensen (2002–3: 89).

*Table 6.3* Public telephones in South Africa and Africa, 2001

| *Country* | *Public telephones (000s)* |
|---|---|
| South Africa | 178.11 |
| Africa (incl. N. Africa) | 346.67 |

Source: Jensen (2002–3: 89).

of developing countries. As Walker and Dhanarajan (2000: 1) put it, in the context of education

> Community radio is an immensely powerful technology for the delivery of education with enormous global potential reach. Creating opportunities for communities to utilize this delivery system will enable disadvantaged groups to engage in a development agenda, sensitive to their needs and aspirations. In order to serve the underprivileged and rural poor, mass media such as radio must create conditions and mechanisms that provide people with genuine access to useful information. Such mechanisms will offer ways in which people can express their sentiments, opinions, views . . . and, of course, their ideas for development.

Yet, despite this potential and the amplified opportunities afforded by the blending of community radio and the Internet, one finds in practice a highly diverse pattern of exploitation of community radio in general and technological blending in particular. And no less than in the previous section on differential telephone access across countries, the observed patterns have been heavily influenced by the role of the state. What is interesting in this regard, however, is that the policies of governments in different regions are different to what one might have expected on the basis of the findings reported in the previous section.

Consider, for example, the case of India, where, as just noted, great strides have been made by the state in installing public payphones in rural areas. Yet, with regard to community radio quite the opposite has occurred in so far as the Indian state has signally failed to stimulate any degree of true autonomy at the local level (Page and Crawley 2001). In fact, this particular policy stance by the government is not peculiar to India alone, but extends to most of South Asia as well, with implications that are clearly described by David Page (2002: 4). He points to the

> extraordinary fact that for almost fifty years after independence from colonial rule, India, Pakistan and Bangladesh, the three largest countries in South Asia, with a population of 1.3 billion people and more diverse cultures than almost any other region of the world, had relied exclusively on a centralised system of state broadcasting and had not permitted any real media decentralisation or diversity. Even today, much that is called community radio is conducted under the auspices of national broadcasters or other national institutions.

On the other hand, as Page (2002) goes on to indicate, there are exceptions to this general characterization of the South Asian experience, the most notable of which, in his view, is Nepal. What is distinctive about that country is that 'independent local radio – both community radio and commercial radio – has grown dramatically in recent years. In the five years since the founding of Radio Sagarmatha, five other community radio stations have been started' (Page 2002: 4). The obvious question that arises from this exceptional case is this: how was the Nepalese state induced to behave differently from the typical attitude towards community radio that prevails in South Asia?

One seemingly plausible hypothesis is that

> Nepal has community radio because there was a committed and determined group of people and organisations with enough political influence to push the government onto a course that led to something like community radio. The timing was also right: Nepal had recently changed its system of governance and along with it came a new Constitution followed by new policies and legislation with respect to communications and broadcasting. It is also important to keep in mind that Nepal is a small country.
>
> (Pringle 2001)

Regardless of how many community radio stations are spawned by these fortuitous political circumstances, however, the effect on the region as a whole will be minute without a major policy change in the *large* countries of the region. Indeed, as matters now stand, South Asia is lagging behind both Africa and Latin America in regard to the progress being made by the community radio movement (Panos 2002). The African experience has been particularly dramatic since the mid-1980s as the following numbers clearly demonstrate (in spite of the poor performance of the region in most other respects).

> In 1985, there were just ten independent radio stations in the whole of Africa. Today, dozens of radio stations are being created and, in some cases, this growth is turning the national media arena upside down. Currently more than 500 community radio stations are broadcasting throughout the African continent.
>
> (Radio Robin Hood 2000)

Predictably, the rapidity of this growth had much to do with political change in the region and perhaps most importantly, the shift from one-party to more 'pluralist' political systems, exemplified and stimulated by the post-apartheid elections in South Africa. Accompanying and indeed driving this new political climate were

> popular movements seeking greater freedom of expression, information and association. The impact of these movements was also reflected in the region's media, which, until the 1990s, had been largely either ruling party or government owned and managed. The 1990s thus witnessed the birth of more independently owned and managed media.

> At the same time, the principle that deemed participation in decision-making a requisite basis for successful development was gaining ground.
>
> (Wanyeki 2000: 25)

If therefore it is now obvious that major limits exist in the degree to which certain developing countries seem able to benefit from the innovations described in Chapters 4 and 5 (dealing, respectively, with various ways of blending radio and telephony to the Internet), it is also far from certain that even the most admired and extensively tested of those innovations can be widely replicated within and between particular countries in the Third World. It is to this important issue that we now turn.

### *The replicability of prominent attempts to blend radio and telephony with the Internet*

Radio Kothmale is almost certainly the best-known attempt to bring the Internet to rural inhabitants via 'radio browsing' rather than (or, in addition to, direct contact with computers). On the face of it, this innovation seems remarkably simple and readily replicable in other locations. Yet, on closer inspection, there may have been special circumstances that were crucial to the success of Kothmale Radio in general and 'radio browsing' in particular. When such circumstances are absent or less prominent elsewhere, however, the replication may be much less effective or even entirely unworkable. (Note that the point I am trying to make here is not that replicability on a wide scale is never possible; the point rather is that it may often be more difficult than is often assumed.)

Consider, for example, the observation made recently by Slater *et al*. (2002: 30) who studied many aspects of the case that are usually overlooked by other observers. In particular, they find that

> The most outstanding fact about KCR [Kothmale Community Radio] was the level of commitment, loyalty, enthusiasm and effort it inspired. Put simply . . . active participants felt an often-painful degree of commitment and love for the place and their life in it. This was evident in the range of users and volunteers it attracted and retained but most impressively in the role of the 'relief announcers'. The 11 relief announcers had been working at the station for anything between one and ten years, often living at the station for long periods and working very long hours, often at considerable cost to

> family and personal life. They were highly professional in the sense of demonstrating high levels of skill, self-discipline, motivation and initiative.

So pronounced a degree of commitment in turn is no doubt related in some degree to the whole concept of 'community' in Sri Lanka, where the 'rural village is seen as the moral core of the nation, which is defined as a "nation of villages" ' (Slater *et al*. 2002: 5). This idealized view of the community, in turn, 'is closely identified with Sinhalese Buddhist nationalism, . . . and produces a strong language of loyalty to the community' (Slater *et al*. 2002: 5). From the point of view of replicating Kothmale in other countries, an important question, then, is whether so deep a sense of commitment can be elicited in those localities and if not, how much might be lost in terms of the ultimate impact of the replica on rural inhabitants. Given the large amount of attention now being paid by UNESCO to initiate 'radio browsing' in Africa and elsewhere, it will hopefully not be long before this and related questions regarding replicability can be answered.

Turning now, finally, to attempts to blend basic telephony with the Internet (as described in Chapter 5), Voxiva represents perhaps the most advanced of the models described there. And as with Kothmale Radio, replicability is likely to be problematic, to at least some degree. The problems in question may arise for reasons that are common to many so-called 'demonstration projects' in developing countries, namely that they are designed to promote, rather than test promising innovations. The problem with the former objective is often that its managers become subject to a 'compulsion' to do everything possible to ensure the success of a project (James 1989). This type of bias manifests itself, for example, in the choice of favourable initial conditions, the use of staff more intensively than usual and so on. The problem is that while the project may indeed attract attention and thereby become more attractive to aid donors, its replicability may in the process become lessened when circumstances are less favourable.[3]

In the specific case of Voxiva, this particular danger may arise, among other reasons, from the need for an initially well-functioning health care system, a consideration, which in part accounted for the choice of Peru as the site for the demonstration project. In most other developing countries, however, which do not enjoy such an initially well-functioning health-care system, one has to wonder how effectively the Voxiva model will then actually work. More generally, it is important for policy

purposes to differentiate between demonstration and pilot projects. The latter, in contrast to the former, 'is *not* to prove that an innovation can be made to work: the goal, rather is to secure a project design which is such that *if the pilot turns out to be successful, one can be confident, within reasonable and known limits, of its replicability on a wide scale*' (James 1989: 92).

## Conclusions

The goal of this chapter was by no means meant to disparage the highly original and promising innovations described in Chapters 4 and 5. The aim, rather, was to suggest that for a variety of reasons, community radio and telephones cannot be expected to shoulder more than a small share of the overall attempt to bring the Internet to rural areas of developing countries, by means other than the establishment of large-scale telecentres.

The next chapters, accordingly, describe more direct forms of intermediation, with particular reference to the case where transactions are conducted on a person-to-person basis in rural Internet kiosks.[4]

# 7 The role of rural Internet kiosks: Gyandoot

For the reasons set out in Chapter 3, the role of intermediaries lies at the very heart of the new paradigm that this book is seeking to articulate. In Chapters 4 and 5 we examined cases where Internet intermediation could take place indirectly via the distance-shrinking effects of radios and (public) telephones in the rural areas of developing countries. What we have not yet considered, however, is the range of possibilities that arise in the absence of these mass-communication technologies. It is our goal in this chapter, accordingly, to fill in one example of the remaining category of mechanisms through which the Internet can be brought to rural areas by intermediaries of one kind or another (though, by no means, do we attempt a survey of the very large number of possible cases).[1] The following chapter then deals with another, somewhat different project.

This new category, moreover, is worth our attention not merely for the sake of analytical completeness. On the contrary, it usually denotes an important shift towards the provision of services to rural inhabitants, with important implications for their well-being. Recall, in this regard, the 'e-post' initiative of the Department of Posts in India, which enables customers to avail themselves of a new service, through the intermediation of a postal worker. In particular, customers supply such workers with a message destined for an ordinary 'snail-mail' address. The message is then typed and e-mailed to the post office nearest the recipient, where it is printed out, placed in an envelope and delivered by courier (James 2003).

Let us now consider the intuition that underlies the more general trend towards services as the relationship between the two transacting parties becomes so close geographically (usually in so-called rural Internet kiosks).

## The shift to services

This issue is best approached, we feel, by making a distinction between *general* information meant for a wide audience and customized transactions that are geared instead to *individual* needs. The distinction is important, among other reasons, because the former mode of intermediation is (mostly) best suited to situations where information can be broadcast to a large and geographically dispersed audience (using, say, community radio as in the Kothmale case); the latter model, almost by definition, requires the transacting parties to be at close geographical quarters, such as, and most typically, in rural Internet kiosks. Or, looked at from another conceptual point of view, whereas the provision of generalized information such as weather forecasts, can be thought of as a *uni-directional* flow of information, the customised mode of intermediation is based on a *two-way flow of information* between the intermediary and his or her client (where the information does not need to be verbal, but can also be contained in documents that the rural inhabitants provide to the intermediary).

How then, do these distinctions bear on the shift to services that accompanies a form of intermediation not yet covered in this book, namely, one where the parties transact at close, rather than distant quarters? Simply put, the answer is that services correspond best with the need for customized, two-way flows of information that are satisfied most efficiently in rural Internet kiosks.[2] Thus, as we turn now to consider this last form of intermediation, there is, according to this logic, an inevitable shift towards services, not yet described in earlier chapters. (Note, however, that the conceptual distinctions we have drawn are far from being entirely free of exceptions. Consider, for example, the case of Kothmale radio, which, in addition to broadcasting generally useful information, also deals with two-way information flows between a listener who asks a specific question and the expert who provides the answer on the programme itself. Similarly, the category dealing with transactions at close quarters, which has just been introduced sometimes includes cases where the intermediary is asked to provide general information that is relevant to an entire group rather than only an individual.)

These exceptions apart, what next needs to be addressed has to do with the *type* of services that will most be favoured in the rural Internet kiosk. This will obviously be shaped by the goal of the kiosk in question; whether, for example, it is publicly or privately owned. In the case of the Gyandoot project considered in the next section, which was conceived and implemented by the district government, one would suggest that the most compelling requirement of rural inhabitants for assistance from

intermediaries would be the *compulsory* documents that need to be submitted and collected from government institutions. Instead of travelling long distances and encountering long waiting lists, such documents can often be dealt with instead by the intermediary who can download, fill in and submit the same paper-work in a fraction of the time that would otherwise be spent. This service, we should note, is customized and interactive in so far as the intermediary carries out his work on the basis of information submitted to him or her by the clients themselves.

Note in passing that other transactions in rural areas can be concluded by the parties themselves, without the need for intermediation (labour market contracts between employers and employees, e.g. would often fall into this category). Then again, there are services that could, in principle, be used to satisfy the particular needs of a client, but which, in practice, exceed the capabilities of the intermediary (who, in the majority of cases, possess only a high school diploma and a basic training in computers). Thus, for example, interpreting medical information from the Internet in the light of the particular ailments of a client, is well beyond the capabilities of a typical kiosk operator.

In its simplest form, then, the distinction between distant and close forms of intermediation can be presented in a two-by-two matrix, as shown in Figure 7.1.

The diagonal running from the bottom left entry to the top right-hand corner thus represents the nature of transactions in rural Internet kiosks, while the other diagonal crudely represents long distance forms of intermediation, such as the Kothmale radio browsing formula (we have already stressed that this characterization admits of a number of exceptions, so that it should be interpreted as a tendency rather than a mutually exclusive distinction).

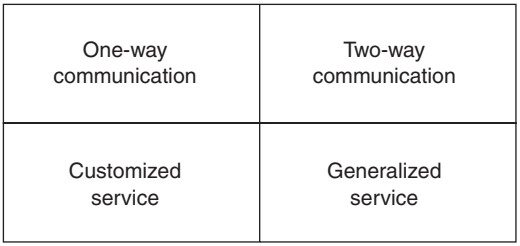


*Figure 7.1* Intermediation at distant versus close quarters.

The basic framework presented in the previous discussion will now be illustrated in practice, by studying one of India's best-known projects that embodies rural Internet kiosks, namely, Gyandoot in Madhya Pradesh (though we in no way wish to imply that this project is representative of the many other examples that exist in India and elsewhere in the developing world). As already noted this project was formed in order, specifically, to improve the functioning of local government and thereby foster economic development in the area.

## Gyandoot

'The Gyandoot project was launched on January 1, 2000 with the installation of a low cost rural Intranet covering 20 village information kiosks in five blocks of the [Dhar] district [in Madhya Pradesh, India]. Later, 11 more kiosks were set up' (Bhatnagar and Vyas 2001: 1). With its avowed goal of establishing 'community-owned, technologically innovative and sustainable information kiosks in a poverty-stricken, tribal dominated rural area' (Bhatnagar and Vyas 2001: 1), the Gyandoot project was soon being hailed as nothing less than a paradigm shift,[3] which allows poor and marginalized segments of rural areas to gain, for the first time, access to knowledge with minimum investment. Certainly, there are numerous key respects in which Gyandoot conforms to the previous examples we have cited in support of an emerging paradigm for bringing the benefits of the Internet to rural areas. In the rest of this chapter, we shall focus mainly on the ways in which Gyandoot conforms to certain features of the emerging paradigm and to a lesser extent, on the nature of the transactions in rural Internet kiosks, that we speculated about earlier in the chapter. Let us begin at, arguably, the most crucial stage, where the project was being designed.

### *The elicitation of user needs*

Relying again on the paper prepared by Bhatnagar and Vyas (2001: 1) for the World Bank, it appears that

> The goal of the Gyandoot project has been to establish community-owned, technologically innovative and sustainable kiosks in a poverty-stricken, tribal dominated rural area of Madhya Pradesh. During the design phase of the project, meetings were held with villagers to gather their input. Among the concerns highlighted by villagers was the absence of information about prevailing agriculture produce auction

> centre rates…Copies of land records also were difficult to obtain. A villager had to go out in search of the *patwari* (village functionary who maintains all land records), who often was difficult to get hold of as his duties include extensive travel. To file complaints or submit applications, people had to go to district headquarters (which could be 100 miles away), resulting in a loss of wages/earnings.

What emerged, then, was a list of problems that were regarded by the villagers themselves as being most in need of attention, within the context of rural Internet kiosks. As expected there is a marked prevalence of governance issues in this list, as there is a need for specific information about farm prices, on the part of those lacking access to radios or payphones. (Indeed, even in the presence of these media, the information may need to be customized to a degree that those media do not usually provide.) Let us now turn to the operation of the Internet kiosks, with particular reference to the intermediaries, who use the Internet to sell information and other services to local villagers.

### *The operation of rural Internet kiosks*

Whereas the buying and selling of goods and services may often take the form of an 'anonymous' transaction between the two sides, this is certainly not likely to be true of a situation in which the potential buyers are illiterate and poorly informed about how the Internet can in fact be useful to them. (Note, that the users in Gyandoot pay a different price for each of the services on offer.) In such cases intermediation is clearly needed, especially, when, as in Gyandoot, the services comprise mostly government regulations and obligations that are relatively complex.

The *need* for such intermediation, however, does not say anything about how well the function is actually performed and though there are of course many factors that bear on this crucial question, we are mainly interested in the role played by the nature of the transactions between the parties, as this is conditioned by the project design. It is not at all difficult, for example, to conceive of a form of intermediation based on incompatible relationships (due say to powerful linguistic or cultural differences between the parties, or a lack of local knowledge on the part of intermediaries drawn from areas outside the one in question). Indeed, the entire development literature is replete with many such examples of communication failures between those seeking to benefit the rural poor and the target group of beneficiaries itself. Projects based on the introduction

of new technologies to potential rural users, are by no means exempt from these problems and if anything most clearly illustrate them.

In Gyandoot, by contrast, a series of decisions were taken by the project managers, which, one can reasonably surmise, fostered rather than alienated the kiosk owners from their clientele, or indeed from local problems. Most such decisions may have had this effect by making the project, as far as possible into a *local* endeavour. 'It was collectively decided', for example,

> that the network would be community-owned to encourage the increased involvement and participation of the community in maintaining and further developing the network.
>
> The chosen language needed to be understood by everyone. It therefore had to be Hindi, the local language, thus inducing a higher level of confidence in the system among villagers, enabling them to see and understand what was happening. The operation of the kiosk was assigned to a local youth. The selection process involved three stages. In the first stage, the village council selected three persons from those living in the same council of villages. The minimum qualification required was tenth grade high-school graduation. The selected candidates were then given computer training at the district council which then selected the best candidate as the kiosk manager [though in any event the winner would be familiar to the kiosk users].
>
> (Prakash 2002: 45)

Unfortunately, very little has been written either about the ensuing relationship between intermediaries and kiosk users, or even about the extent of help that is provided for the different services on sale in Gyandoot Internet kiosks. (This is plainly an area where a good deal of field-research could usefully be conducted.) What have been collected, however, are data regarding user perceptions of the services provided by the kiosk owner (though, one should note, only 32 responses were reported). The results of the survey are both consistent and telling, inasmuch as

> All the surveyed users are quite satisfied with the behavior and attitude of the soochaks [kiosk owners]. The soochaks are cooperative, helpful and polite, according to them. Many young men and women are eager to be soochaks, as they are seen as extended arms of the government, enjoying a special status in the community.

> Respondents of villages . . . where the soochak is dynamic and result-oriented felt that having an educated and enterprising soochak by their side, when they go to pick up the certificates from the government office, is a big help. Normally, over a period of time, the soochak would have got familiarized with the government processes and at times may even have built up a good rapport with some departments.
>
> (Indian Institute of Management 2002: 14)

Not least because this positive image of the kiosk-owners is *unanimously* held, one may reasonably conclude from the quotation given here that the processes mentioned by which these actors were selected, trained and enabled to use the local language, enabled them to form productive working relationships with their clients. And although it is very clear from the following examples that use of the Internet in the realm of e-governance offers substantial gains in time and costs to users, it is impossible to determine how far this favourable relationship between the two parties actually contributed to the overall success of the project (about the definition of which see here).

As a first example, consider the gains that may arise from on-line registration of common applications.

In particular,

> Villagers had to make several visits to the local revenue court to file applications for obtaining income/caste/domicile certificates. Now, they may send the application from a kiosk at a cost of only Rs. 10. Within 10 days, notification about the readiness of the certificate is sent via e-mail to the relevant kiosk. Only one trip is needed . . . to collect the certificate.
>
> (Bhatnagar and Vyas 2001: 2)

As a second example, consider the 'online complaint service' which is regarded by one author as 'an especially valuable component of the Gyandoot project, and one that has had an important impact on villagers' lives' (Warschauer 2003: 179–80). Complaints range from problems about drinking water and nonpayments to the absence of a veterinarian or schoolteacher and reactions thereto are required within 7 days (this service costs Rs. 10).

Although these and other services have been very widely used, 'Some of the major problems faced by the project have been related to technology'

(Prakash 2002: 50). And what is important from our point of view, is that Gyandoot took specific steps to redress these problems, which, no less than the localization endeavours described earlier, are representative of the emerging paradigm described in Chapter 3.

### *The choice of technology*

It comes as no surprise in the context of rural India, that 'Connection problems due to errant or nonexistent telephone lines, lack of optical fibre cable (OFC) in some areas, and lack of electricity have all been major determinants in the expansion of the Gyandoot Project' (Prakash 2002: 50). Less predictable, however, was the way in which the management of Gyandoot went about addressing these connection problems. For, in attempting to expand connectivity in the project area, beyond the limits set by the factors just mentioned, the choice of expensive, Western forms of information technology was eschewed in favour of a much cheaper, more suitable, Indian innovation known as corDECT. (Indeed, Gyandoot has been described as one of the earliest, 'pioneering', adopters of this technology, which emerged from the Indian Institute of Technology in Chennai.) CorDECT is a modification of a technology known as wireless local loop (WLL). 'WLL is a system that connects subscribers to the public telephone network on the basis of radio signals rather than copper wire for all or part of the connection between the subscriber and the switch' (James 2003: 47). Essentially, corDECT is a modification of WLL by Indian scientists who were explicitly concerned to make an adaptation that was cheaper and better suited in other ways to conditions prevailing in rural areas. On the cost side, the engineers were able to effect price reductions that are nothing short of spectacular. In particular,

> By using WLL [wireless in local loop system] technology, corDECT is able to function at a substantially lower cost than conventional telecommunication infrastructures . . . traditionally telecommunication infrastructure costs are around US$800 per line; corDECT has been able to reduce per line cost to around US$225 a year with a deployment cost of US$290 to US$370 per line.
>
> (Huffman 2002: 142)

The existing dial-up lines at Gyandoot have already been supplemented with corDECT technology. Indeed, 'The Gyandoot Project has

found corDECT to be an ideal solution to its rural connectivity problem and a perfect fit for its community-owned rural intranet kiosks' (Huffman 2002: 143). That conclusion notwithstanding, certain limitations of corDECT use at Gyandoot have also been noted (one of them being that the range of the system is insufficient to cover all the kiosks in the project).[4]

## Gyandoot versus Kothmale

Gyandoot and Kothmale are the two examples that have attracted perhaps the most attention in seeking to illustrate the numerous elements of the emerging paradigm. Although the latter is based on distance communication, while the former involves 'face-to-face' transactions between the two parties, the two models nevertheless share some of the key characteristics of the new paradigm, as shown in Table 7.1. Put another way, the juxtaposition in that table helps to confirm the idea that underlies this book, namely, that the Kothmale case is not applicable only to community radio, but can also be generalized to quite different forms of intermediation between the provider and user of Internet services (intermediation by telephone is not included in this discussion, because there is as yet no model in that category which has an equivalent standing to Gyandoot and Kothmale).

Our hypothesis in Chapter 3 was that projects conforming to the emerging paradigm, would, partly on account of the factors described in Table 7.1, tend to have a high ratio of social benefits to costs, as against the aid-financed, top-down telecentres, that are not only expensive in terms of the cost of new hardware and related facilities, but also in terms of the narrowness of use patterns (since the computers in telecentres are barely used, it seems, by the poor majority in rural areas). As yet, however, our hypothesis cannot be resolved by reference to empirical studies, since neither social cost-benefit analysis nor other rigorous forms of evaluation have been brought to bear on intermediary-based projects such as Gyandoot or Radio Kothmale. In fact, according to the UNDP (2001: 18) the same problem also pervades the more general literature on information technology and development, which, over the past decade

> has seen large investments in countless development initiatives featuring new ICTs as either major or minor components. This wealth of experience, however, has yielded relatively scant evaluative

*Table 7.1* A juxtaposition of two models

| *Dimension of new paradigm* | *Gyandoot* | *Kothmale* |
|---|---|---|
| 'User needs understood' | Survey of user requirements undertaken as part of project design | A field study for the initial needs assessment was conducted by project and station staff |
| Role of local language | Decision made to use Hindi, the local language | Volunteers such as doctors, lawyers and teachers, translated information from the Internet into local languages |
| Nature of relationship between intermediaries and target rural groups | Users appear very satisfied with the way transactions are conducted by rural Internet kiosk-owners | Radio presenters and local guests engendered a feeling of trust on the part of the listening audience |
| Blending | Kiosks in the form of public call offices, are the 'traditional technology' that is combined with Internet in newer 'rural Internet kiosks', that is, PCO's have long presence and tradition in India | Combining an 'old' technology (radio) with the Internet to create locally relevant information |
| Cost reducing aspects | Choice of inexpensive wireless local loop technology known as 'corDECT' | Use of volunteers, including skilled professionals, as well as use of well-organized community radio station already in existence |

evidence . . . Rather, the literature is dominated by positive anecdotal stories, or evaluations that focus on administrative and management issues rather than development outcomes . . .

The relative paucity of the existing empirical base is related to the 'newness' of ICTD as a clear development field, inadequate methodologies, the 'expense' of conducting evaluations (meaning they are sometimes seen as 'luxuries') and the tendency to underreport project failures of which there have been many.

Though observations such as these give rise to an almost entirely new area of research, from our point of view, priority should be accorded to comparisons between projects representing the traditional paradigm on the one hand and projects such as Gyandoot and Kothmale which best exemplify the emerging paradigm on the other. For, it is such evidence that will presumably weigh heavily on the fundamental choice between promoting individual access to the Internet or using this technology more realistically to generate and disseminate information and services that are relevant to the local rural community.[5]

In the absence thus far of sound evaluative evidence, what we find encouraging about projects such as Gyandoot and Kothmale, is that they have both been quite widely replicated in and between countries (which should be regarded, we feel, as at least one criterion of success). Indeed, according to one authoritative source on the topic (Rajora 2003), Gyandoot stands as the most replicated model in all of India (covering some 41 districts). Interestingly, moreover, a good part of the replication can be attributed to the efforts made by a private firm called Drishtee Ltd., whose ultimate goal is to replicate the Gyandoot experience across the whole country (thus far Drishtee has established 82 kiosks in five Indian states). The replication of Kothmale, by contrast, has taken place in a variety of different developing countries, especially, but not only in Africa. Indeed 'With the lessons learned from the Kothmale project, UNESCO has now developed a global program to establish similar projects with other community radio stations, some of which are independent and have the operational autonomy to launch their own business plans' (Jayaweera 2001: 5).

To what extent the impressive spread of Gyandoot in India has been accompanied by a reduction in rural poverty has not yet been authoritatively determined (even at a sample of applications). Several observers seem to feel, however, that the very poorest groups have largely been bypassed by the replication of the model.[6] It is all the more necessary, therefore, to emphasize how many are the areas of the Third World (including India), where Internet connectivity is simply not attainable at the present time and where, accordingly, the notion of using the Internet as a mode of delivering information and services to villagers in rural kiosks (as occurs in the Gyandoot model), will need to take a different form. One of the most innovative ways in which just such an alternative is being pursued in India is known as the Computers on Wheels (COW) project. Initiated in 2003, COW can be described as given here.

> A grassroots project that brings Internet services to rural, illiterate villagers in Mahboobnagar, Andra Pradesh, India. COW is a mobile information delivery system involving a trained provider with a laptop visiting villagers on a motorbike to provide support for agriculture management and health. The project has so far reached over 8,000 people in 7 villages . . . Organisers found that in an area constrained by language, literacy, and connectivity barriers, simply installing computer telecentres without providing assistance would be insufficient. To that end, a key programme strategy is response to the needs and circumstances of rural people. A trained agent travels from village to village in the evenings (when farmers have more free time) and demonstrates interactive software and content, which is stored on the hard-drive of a laptop computer.
>
> (The Communication Initiative 2003: 1)

As in the Gyandoot project, villagers served by COW can request services such as government forms, but since there is, by definition, no Internet connectivity in the areas concerned, the request has to be delivered later that day or the day thereafter (rather than instantaneously in the rural Internet kiosks that are the hallmark of the former approach). From the point of view of villagers that would otherwise be left entirely outside the purview of the Internet, however, this lagged response to requests seems like an entirely appropriate form of delivery, lying as it does, between instantaneous responses (where there is Internet connectivity) and no connection at all, which would be the case without the mobile carrier of a computer.[7]

On the technological side too, the COW design incorporates a number of features that can no less readily be described as appropriate. In particular,

> The COW prototype is packed into a weather – and shockproof solar – powered equipment case that carries and recharges the laptop as well as a printer . . . The entire system mounts onto the rear of a dirt bike, which is designed to enable access to villages without passable roads.
>
> (The Communication Initiative 2003: 1)

Perhaps more than most examples of using an intermediary to deliver the benefits of the Internet to the rural poor, therefore, this case emphasizes the frequent need for concomitant innovations in the hardware of technology (as with corDECT in the Gyandoot case, also discussed in this chapter).

## Conclusions

In this chapter we have relied heavily on an Indian project known as Gyandoot, to illustrate a category of intermediation where buyers and sellers transact directly, on a face-to-face basis, in rural Internet kiosks. For, just as Radio Kothmale is often cited as a role model in the use of community radio to bring Internet based information to its listeners, Gyandoot has won prestigious national and international awards and is even said by some to be the most widely replicated model in India.

Having already argued in Chapter 4, that Kothmale seems to correspond in many major respects with what we feel is an emerging paradigmatic shift away from the current approach based on telecentres (and with technology financed, more often than not by foreign capital), part of the chapter was devoted to an analysis of whether the very different type of intermediation found in Gyandoot, would also reflect the shift away from providing rural inhabitants with merely the hardware required for Internet access. What we found in essence is that successful intermediation at close quarters, embodies many of the same features as intermediation that, in Kothmale, has been carried out from afar. I am referring here, for example, to the elicitation in each case of user needs; the role of using local language and relevant content; familiarity of the intermediary (whether a radio announcer or kiosk-owner) with the local community and vice-versa; attempts to reduce project costs by technological and other means. Although such features would surely tend to raise the ratio of benefits to costs, as compared with the prevailing paradigm, there are unfortunately no rigorous cost–benefit analyses, or other evaluative methods, on which one can rely in order to provide empirical support for this hypothesis.

# 8 The role of rural Internet kiosks: n-Logue

Gyandoot, as noted in the previous chapter, is a government-owned Internet project that seeks to improve governance at the district level. The purpose of this chapter, on the other hand, is to describe a privately owned enterprise in India, which is also based on rural Internet kiosks and is known as 'n-Logue'. In its quest to bring Internet to the rural population along commercial lines, this firm relies on two dominant principles. The first is to sell rural Internet kiosks to prospective rural entrepreneurs at a price that reflects the spectacular cost reductions from the inclusion of corDECT in the kiosk package (as mentioned in the previous chapter this is a local innovation based on WLL technology that enables rural entrepreneurs to purchase an Internet kiosk from n-Logue for under $1,000). The second guiding principle on which the enterprise is based, comes into play only when a kiosk package has actually been purchased. For it is then assumed that the kiosk-owner will use his or her knowledge of the local community to exploit the product as profitably as possible.

In order to avoid misunderstanding, it is important to recognize that we are not seeking in any way to compare the performance of Gyandoot with n-Logue and thereby to infer anything about the relative merits of private versus public ownership. For, among other reasons, the two projects were not conceived to attain the same goal, which would be a necessary condition of any attempt to compare different forms of ownership (quite apart from the large number of variables that would need to be controlled for in any such evaluation). Our purpose, rather, is to demonstrate that there is another important mode of bringing the Internet to the rural population on the basis of low-cost local kiosks, rather than in the form of telecentres with all their blatant flaws. (Like Gyandoot, moreover, this alternative mode has received much acclaim in the international community.)[1]

It is also important to recognize that the two commercial principles on which n-Logue is based, are interdependent rather than independent and we shall seek first to explain this relationship briefly before examining each principle independently of the other. The interdependence between the two aforementioned principles of the n-Logue business philosophy, arises from the fact of their sequentiality: the outcome of the stage when kiosk-owners try to attract customers, that is to say, depends, among other things, on the first phase, during which the enterprise actually seeks to sell its Internet kiosks. Looked at this way, the price appeal of these kiosks, based as it largely is on corDECT technology, assumes greater (favourable) importance than would be the case if the two guiding principles were independent of one another.

## The sale of Internet kiosks to rural entrepreneurs

The history of n-Logue is closely bound to the efforts being made at the Indian Institute of Technology in Chennai, to develop indigenous low-cost information technology specifically for the geographical and socio-economic conditions in India. Indeed, according to the company profile of n-Logue, the firm

> has been established under the aegis of the Telecommunications and Computer Networks (TeNeT) Group of IIT, Madras [now Chennai], which is dedicated to evolving technically superior and cost-effective solutions for countries such as India. The TeNeT group has carried out extensive research on the issues associated with providing connectivity in small towns and rural areas, and it has set up n-Logue with the mission of providing Telecom and Internet services in such places…N-Logue will use the corDECT WLL technology developed by TeNeT group to provide the access.
>
> (TeNeT 2001)

To that end, n-Logue first attempts to sell Internet kiosks based on corDECT to promising rural entrepreneurs. More specifically, for around $1,000 such persons can purchase a computer, printer, battery backup, the corDECT wireless system and local language software. n-Logue also assists purchasers with financing and training (the former is paid back with revenues from the kiosks themselves). Thus far, more than 500 kiosks have been established in Tamil Nadu and other Indian

states (with a target of 10,000 by the middle of 2004), while the corDECT system alone has been exported to a diverse range of developing countries such as Madagascar, Kenya, Nigeria, Tunisia, Iran, Argentina, Brazil and Fiji (Howard *et al*. 2001).[2]

These very substantial achievements can readily be cast in terms of the notions of appropriate or pro-poor technology, which were mentioned in Chapter 3 as being one conceivably important component of an emerging paradigm. In particular, the emergence of corDECT and other innovations from TeNeT, represent what proponents of a Third World technology have long been advocating. As far back as the 1970s, for example, it was argued by a leading scholar in the area (Stewart 1979: 100) that local technological capabilities are necessary in developing countries, among other reasons, because

> it is necessary to generate appropriate technical change. While there appears to be a certain amount of technological choice today, the continued concentration of technical change on advanced country technology is likely to result in increasingly inappropriate techniques. Unless developing countries undertake R&D in alternative directions, the choice of technology available in the future will be increasingly circumscribed, and irrelevant to the needs of the world's poorest. The development of a continuous process of technological change – new techniques and products – in an appropriate direction in the developing countries is essential if the choice is to be widened.

A rarity among developing country research institutes, TeNeT has long recognized the validity of this view and has sought to promote it with as much vigour and success as any group of researchers in the Third World. Perhaps even more untypical is the fact that this technical change is not occurring, as one might have expected, in simple, mechanical technologies, but in such complex and strategic an area as electronic communications systems. And whereas R&D institutions in developing countries are generally not known for their propensity to commercialize the innovations that they create, n-Logue is vigorously pursuing the sale of low-cost rural Internet kiosks based on the CorDECT wireless system. As noted here, however, the sale of such kiosks is only one part (albeit a highly important part) of the firm's commercial strategy, since much then depends on the uses to which the buyer puts his or her acquisition and the success of each such venture.

## Rural kiosk-owners as entrepreneurs

In reposing its faith in the entrepreneurial behaviour of the rural kiosk owners, n-Logue seems to be relying on two basic premises. The first is that in isolated rural settings, local entrepreneurs are likely to operate more effectively on an informal basis with potential clients, than would a more formal approach to the task (for one thing, because the rural kiosk-owners are more familiar with the local area in question). The second premise arises more straightforwardly from the textbook view that the market will reward productive firms and workers more highly than those agents who perform less well in this sense.

The first of the two premises seems to be heavily influenced by the phenomenal growth of the cable television industry in India, that occurred during a very short period. According to Howard *et al*. (2001: 8), for example, with the cable television industry as its inspiration,

> n-Logue aims to utilize the plentiful labor available in emerging markets and the relation-based selling that has been successful in drawing in local subscriber bases. The Indian cable industry grew from non-existence to 40 million subscribers over 8 years due, in large part, to the power of local operators. Operators employ direct sales, billing and collection techniques to establish and retain a customer base. By remaining continuously on-call for customers, operators develop personal relationships and loyalty with subscribers. Because it recognizes that push marketing does not work for dispersed markets with tight capital constraints, n-Logue imitates this decentralized, scalable model.

The importance of decentralization to the level of the kiosk-owner himself or herself is difficult to over-emphasize for all the reasons given in earlier chapters, which intimate that local intermediaries are the most suitable agents for interacting closely with their own geographical peer group. In the case of n-Logue, what deserve particular attention, however, are the advantages that bear on the ability of the rural kiosk-owner to use his or her kiosk in ways that best accord with the needs of the community. (One only needs, for example, to reconsider the advantages that appeared to accrue to those local agents involved in the radio-browsing feature of the Kothmale model.)

Merely listing the wide variety of services that different kiosks provide, obviously cannot throw any light on the degree to which communal needs

are in fact being met by the rural entrepreneurs who run this last stage of the n-Logue model. What does seem noteworthy on perusal of this list, however, is its implication that local needs extend well beyond the usual requirements for improved local governance, agricultural produce rates and so on. For, in addition to these basic services, one finds others that address local entertainment requirements (whether the medium be the computer or the Internet itself). One example of such entertainment-based intermediation is the screening at various times of Tamil-language films, using only the CD-Rom drive of the computer.

Other examples include the creation and sale of CDs devoted to music, computer games and astrology. (In carrying out the last-mentioned activity, the kiosk-owner may, e.g. need to access the 'Astrology' page of a popular Tamil portal. On the basis of a number supplied by the client, a forecast appears on the screen and is then typed out at the going fee.)

Interesting and suggestive as these 'consumer-society oriented' services may be, however, they do not as such help us in assessing the first premise about entrepreneurial behaviour held by n-Logue, namely, that this behaviour is best pursued in the case of owner-operated kiosks and the freedom of these institutions to make independent business decisions without interference from the company itself (however plausible these assumptions may seem to be). The problem with such an assessment is that it comes up against what is known as the counterfactual; that is, an estimation of what would otherwise have occurred. With other things being equal, for example, how much difference, if any, would one find if the kiosk operator was a wage labourer of the company, rather than an owner-operator? A similar problem arises in relation to isolating the value of being allowed to make one's own decisions at the local level, as against various possible counterfactuals that intrude on the sovereignty of local entrepreneurs.[3] (Note that the problem of establishing the counterfactual is a pervasive one in economics. In attempting to determine the impact of World Bank structural adjustment programmes, for example, researchers are confronted with the task of deciding what would have happened in the absence of such programmes. Several approaches are available to aid researchers in this task, though they vary in terms of methodological sophistication, research costs and other factors.)

The second premise held by the n-Logue management, we suggested, is that the market (in its most basic form) rewards economic agents according to the (marginal revenue) productivity of their activities. Kiosk owner-operators, that is to say, will exhibit variations in earnings

according to their productivity differences, as these are defined by the market-mechanism. In their study of the n-Logue model, Howard *et al*. (2001: 18) clearly favour this traditional view of how earnings differentials arise and they cite evidence in support of it. In their own words, 'Pilot projections reveal clearly the degree to which the success of a kiosk depends on its operators' efforts and talents. Operators creatively developing and aggressively marketing their offerings outperformed those who did not by a factor of 2 to 1.'

This estimate, however, is based on seemingly dated information and it also lacks a statement of the methodological details that are necessary for the reader to assess. Given the centrality of this premise to the model as a whole, moreover, there seems to be a rather pressing need for a well-structured study, based on recent data in a sample of n-Logue villages. The goal would be to determine which variables best explain the differential earnings of kiosk owners in the n-Logue system. Is it the case, for example, that the amount of entertainment-oriented services is a statistically significant explanation of these differences in earnings? Or, on the other hand, are the explanations to be found instead in factors other than productivity as defined by the market?[4]

## The political economy of corDECT

Especially because it occurs so early in the overall process of delivering rural Internet service, many would agree that corDECT technology is the main distinctive feature of the n-Logue model (though, as noted earlier, the same technology is also used to a limited degree in Gyandoot). And corDECT, in turn, is remarkable because it is a highly complex innovation designed for the low-income rural majority in developing countries, rather than the high average incomes prevailing in the developed countries.

The political difficulties involved in the local generation and diffusion of so-called appropriate technologies, were recognized as early as the 1970s, by those who foresaw the political counter-pressure that the status quo would generate. One important recognition, for example, was that

> The initial historical bias in technological development towards technology designed for advanced countries thus sets up forces, in poor countries as well as rich, which tend to perpetuate the use of such techniques and discourage the adoption of an alternative

> system of technology. To develop an alternative system . . . requires a redirection of income and investment resources away from those currently benefiting from advanced-country technology, both in rich countries and in poor. Such a redirection is itself very difficult to achieve unless an alternative technology has already been introduced, because the distribution of the income is a consequence of the system in use.
>
> (Stewart 1977: 111)

There was certainly no shortage of attempts to discourage the emergence of corDECT in India. Many arose from within the state apparatus itself, as the following selected examples taken from Jhunjhunwala (2001: 6) clearly indicate. One of them was that

> [Government] Specifications were framed for the Wireless in Local Loop product making it as different as possible from the indigenous product. Competing (and expensive) imported products were given tax concessions such that a locally manufactured product paid more taxes than imported ones. Questions were raised whether the product was really Indian and investigations were started . . .
>
> Large orders were placed for less functional and much more expensive imported products by the state-owned telecom operator. This would help these products to mature, catch up on functionality with our product and eventually compete with us on price.

In spite of these and other obstacles that were placed in the path of corDECT, the sheer persistence of the founders and advocates of this new technology ultimately paid off, as is evident from the earlier discussion in this chapter. Apparently, therefore, even in a country as unfavourably disposed to appropriate technology as India, major technical change in a complex industry can be wrought and used for the benefit of poor rural areas, as opposed to elites in urban areas, or even markets in the developed countries. (Indeed, the achievements of corDECT are made all the more striking when one considers that in the field of information technology itself, Reddy's research (1997: 1828) indicates that 'an overwhelming majority of new technologies firms are involved in developing products for the global markets, e.g. computers, communications equipment, etc.')

It is worth noting in a broader political economy sense that Gyandoot also represents a notable exception to the usual Indian state policy in the

electronics industry. What is remarkable, in particular, is that

> The Gyandoot project was initiated by the district administrative leadership to overcome poverty and social marginalization. Unlike most ICT initiatives in rural India (and other countries), it was initiated neither by foreign donors or international agencies, nor by private business, but by local government officials in an impoverished region. The goals of the Gyandoot project are to provide better governmental information and services toward enhancing economic and social development. Its initiators have targeted the poor and marginalized and have been largely successful in reaching their audience.
>
> (Warschauer 2003: 178)

## Conclusions

India is often rightly praised for the level of technological capabilities it has attained in the electronics and related industries. In a few cases, that seem to have turned on the dedication and persistence of certain charismatic leaders, the capabilities thus acquired have led to innovations with an avowed bias in favour of marginalized rural communities. In general, however, the role of the state (influenced as it surely is by large multinationals), has proven inimical to the generation and diffusion of innovations designed to benefit the poor. If the binding constraint on the growth of such initiatives thus seems to be largely in the political rather than the technological (or engineering) domain, research ought correspondingly to shift from the latter to the former.

Such research would indicate in the n-Logue example, how the enterprise has managed to overcome some of the usual political and bureaucratic constraints, by forging partnerships of various kinds. According to Howard *et al*. (2001: 4), for example, 'n-Logue's success . . . the headway it has made towards resolving national and regional licensing and regulatory issues can be attributed to the strong relationships it established with influence makers, governments, other businesses, and entrepreneurs'.[5]

# Notes

## 1 Introduction

1 According to the *American Heritage Dictionary of the English Language*, 4th edition edited by Pickett (2000), a paradigm is defined as 'A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially, in an intellectual discipline.'
2 We refer here to the well-known work on paradigmatic shifts by Thomas Kuhn (1970).
3 As a distinct paradigm, we also argue that the new approach is superior, in terms of costs and benefits, to the dominant approach based on telecentres.
4 The problems associated with imported technologies in developing countries were already made apparent by Singer (1970) and Stewart (1977).
5 These approaches are described in Chambers and Ghildyal (1985) and Norman (1978).
6 Thus, if each particular group behaves in this fashion, the larger picture will never emerge.
7 Our task, in other words, is to find that 'big picture' and define it in a meaningful way.
8 Perhaps the clearest example of what local means in this context, is the use of knowledgeable and enthusiastic doctors, lawyers and other skilled professionals on the community radio station in Kothmale, Sri Lanka (described in Chapter 4). Because they function as volunteers, moreover, such persons have a major impact on the outcome of the project.
9 Unfortunately, this is far from being the only area in development where such pronounced barriers in communication occur between these two groups. In fact, I can think of few cases where the opposite situation exists.

## 2 The existing paradigm and its limitations

1 This chapter draws in part on the argument set out in James (2003).
2 The notion of a technological system, in the context of developing countries, is explored in a historical context by James and Khan (1998). They also examine the way in which modern and traditional technological systems coexist in today's technologically dualistic societies in the Third World. For an earlier

discussion, on which James and Khan (1998) base much of their analysis, see Stewart (1977).

3 Singer (1970) also paid attention to the dualism within developing countries that was due to the import of foreign technology exclusively by the modern rather than the traditional sectors of those countries.

4 Internal technological dualism is associated with a polarization of society, in which the distribution of income, wages and infrastructure become ever more pronounced between the sectors. Yet, without technological improvements in the (relatively large) traditional sector, it is difficult to imagine growth occurring in the economy as a whole.

5 This section draws on James (1999).

6 The later chapters, however, give a fuller sense of the degree to which pro-poor innovations in information technology are emerging in and for the rural areas in India. The best known source of such innovations in that country is probably the Indian Institute of Technology in Chennai.

7 A fascinating explanation of this tendency was provided in the mid-1970s by Tendler (1975), based on her own experience of working in aid institutions. Tendler's study remains to this day, one of the most insightful studies ever written from the perspective of an 'insider'.

8 That evidence, however, is sparse and mostly lacking the necessary amount of quantitative data or the required degree of analytical rigour. In fact, as argued in the previous chapter, data collection and analysis is perhaps the single most important priority for further research into the agenda that this book has raised.

9 That new approach, however, turns heavily on the idea of an intermediary, which is not raised as an alternative to imported technology in the early literature. There, the major alternative was thought to rely on building up a country's ability to design and manufacture its own 'appropriate technologies'. In our approach, technology is by no means unimportant, but it fits into a much larger set of alternative ideas and organizational innovations. Indeed, it can reasonably be argued that the 'appropriate technology' view was more successful in terms of the hardware of innovations than in the areas of 'appropriate institutions' and organizational change.

**3 An emerging paradigm**

1 We are here focusing on long-distance forms of communication, but there are also face-to-face forms of intermediation, such as rural Internet kiosks where the distance factor becomes irrelevant. Chapters 7 and 8 deal with two of the best known 'face-to-face' forms of Internet intermediation.

2 This quotation was part of a personal communication to the author on 3 December 2002. See also the collection of papers edited by Girard (2003).

3 In the 1970s part of the case for a basic needs approach rather than an approach based on raising incomes, was that the former could attack the problems of illiteracy, hunger and infant mortality, directly, rather than indirectly as incomes grew. The former, it was argued, was consequently much more efficient.

4 This statement is not entirely true, since there are cases, such as the one in the following chapter, where certain, more technically advanced members of the community do in fact use the computers at the radio station. More

generally, the point is that villagers in rural areas differ in age, education and technological capabilities.

5 Although there are formidable data collection problems at the individual level that would be associated with this type of approach, it is ultimately the only way of getting at the true welfare effects of information derived from the Internet.

6 There is a clear parallel here between the notions of appropriate technology and appropriate products, in that both seek alternatives to what is imported from the developed countries. Most success in these respects has undoubtedly occurred in India, and to a lesser degree in some of the larger Latin American countries.

7 This line of reasoning has been most extensively pursued by Becker (1965).

8 Because of the huge potential that exists for blending the Internet with existing, and relatively widespread traditional technologies such as radios and telephones, it may be that blending is now an even more important concept than it was in the 1980s.

9 The use of volunteers is a good example of this attempt to save resources, as is the sharing of radios.

10 A paper by McConnell (2000) focuses on the role that NGOs can play in this process. He shows that in some such institutions in Uganda, information acquired through either e-mail or the World Wide Web had been forwarded to their respective communities and that the information in question was often of considerable relevance. In the case of the Uganda Rural Development and Training Programme (URDT), for example, the information

> related to a solar energy system, which was proposed for one of its communities in Western Uganda. URDT staff used the web to locate information on the various technological options available to their community members, including system specifications and price. Once this information was presented in non-electronic format to the community members for assessment, a decision was made by the community as to which particular solar energy's company would be involved in further negotiations. The result of this process was that community members were able to select and utilize micro-credit to purchase a total of 130 solar energy systems which were appropriate to their needs and financial capabilities. A similar example occurred in URDT's acquisition of over 60 water harvesting tanks which were purchased by the community members after the technology was refined through Internet-facilitated interactions with Canadian-based technicians.
>
> (McConnell 2000: 5)

## 4 Community radio and the Internet

1 The point being that in a sequential process, failure at any given stage can undo the successful efforts made at prior stages. This sequentiality can be illustrated in a diagram containing forks at each stage of the project.

2 The notion of radio web browsing refers to a programme in which the programmers use the radio as a medium for browsing the Internet live, with the aid of a computer in the studio.

3 I owe this point to Michael David.
4 There is an analogy here with the case for trade between developing countries, which, according to Stewart (1977: 173) rests heavily on appropriate technology and appropriate products. In particular, 'Trade between third world countries would permit the development of appropriate technology on a third world basis.'
5 The Radio Sagarmatha experience is dealt with by Pringle (1999) and Malik (2003). The latter emphasizes the willingness at Sagarmatha to experiment with new ideas that engage the listener and that encourage audience participation.
6 A recent volume edited by Girard (2003) contains detailed information on a variety of community radio stations in different parts of the world.
7 It well bears emphasizing, however, that there is no inevitable, pre-ordained basis for this conclusion. On the contrary, a great deal of effort needs to go into the planning and implementation of successful 'radio browsing' projects. Much of this effort, moreover, is non-routine, involving the finding of imaginative solutions to particular problems.

**5 Basic telephony and the Internet in rural areas**

1 See the home page of this firm at www.prologixsoft.com
2 I am extremely grateful to Vinamra Agarwal of Prologix for providing a clear, non-technical description of the material in this paragraph.
3 The relevant URL for this institution is www.worldtalk.org
4 The Grameen telephone project is in fact a precursor of the rural Internet kiosks that are described in later chapters. For, what these kiosks offer for sale is information available on the Internet as opposed to telephone time in the Grameen case.
5 In developed countries it is by now a commonplace to confront a series of menus and instructions when placing a call to institutions such as large firms, hospitals, airlines and so on.
6 As such, therefore, conveying precisely the idea underlying so-called intermediate technology.
7 Among others, by Bill Gates, who posed the options as being mutually exclusive, when, in fact, they are obviously not.
8 The firm was called Adesemi Communications International, and in spite of its early success, was forced to close down at the end of the 1990s, partly because of deteriorating relationships with the Tanzanian government. As told by one of the most committed members of the American firm, the story is to be found in Maddy (2000).
9 By so doing, one would in effect greatly enhance the value to villagers of the traditional village payphone, which has no mechanism for dealing with incoming calls.

**6 The need for alternatives**

1 Yet another reason is that most consumer expenditure surveys (with the notable exception of those conducted in South Africa) tend to focus on ownership rather than access at the level of the individual household.

2 In particular, what seems to have been of decisive importance was the transition from the apartheid regime and the initiation by the post-apartheid regime, of a new broadcasting policy that would be more consistent with a democratic and open society.
3 The issue of replicability is dealt with from numerous points of view in James (1989), including a wide range of actual case study material.
4 Among such cases, too, there are certain exceptional models, which seem to have made a difference to the lives of many rural inhabitants, through a variety of different mechanisms. Indeed, the Gyandoot project described in Chapter 7 has been referred to as the most widely replicated model in India, (according to a personal communication dated 27 August 2003, from Dr Rajesh Rajora, one of the leading authorities on the project. In that same communication Dr Rajora suggests that Gyandoot has already been replicated in 41 districts in India).

**7 The role of rural Internet kiosks: Gyandoot**

1 Some other examples are covered in responses given by Kenneth Keniston in an article on cheap information kiosks in India (Keniston: 2003).
2 Mardle (2003) makes the interesting point that certain parts of projects such as Gyandoot, work best. In particular, be mentions those parts that permit individuals to gain direct access to information that is very specific and personalized and on the basis of which certain actions can be taken. For instance, knowing my land tenure has implications for various other things such as entitlements to seed subsidies.
3 As evidenced, for example, by the fact that in June 2000, the project received the highly prestigious Stockholm Challenge Award.
4 These are described by Huffman (2002).
5 Recall from the introductory chapter, the importance of having a new paradigm in place before the existing one can be rejected.
6 According to Dr Rajora, who implemented the Gyandoot project during its first few years, the impact it had on rural poverty is questionable. Though, as he also points out, it is intrinsically difficult to reach the poorest rural groups, even with projects that are specifically designed for this purpose.
7 This example well illustrates the need for intermediate products and standards, lying somewhere between those adopted and used in developed countries and no standards at all.

**8 The role of rural Internet kiosks: n-Logue**

1 Very recently 'n-Logue Communications' was selected by the World Summit Award as one of the five best products in the e-inclusion category. The winning products were selected out of 800 nominations by a group of experts drawn from thirty-six countries. The World Summit Award describes itself as 'an official side event' of the Geneva World Summit on the Information Society. For more information consult the Summit's home page at www.europrix.org/wsis-award

2 The export of low-cost technology from one developing country to numerous others, is an important phenomenon given the usual biases that such technology needs to confront. The export of corDECT to the countries mentioned, deserves more attention than it has thus far been given.
3 Such as, for example, constraints on selling practices imposed by the firm on kiosk-owners.
4 More generally, what one would like to know is whether differences in earnings are related to factors that reflect entrepreneurial behaviour, as against variables that are exogenous to the earnings process. As regards the former, Alexander (2002) has written an extremely interesting article about 'a day in the life of a village kiosk operator', showing the diversity of the available services and the role in this of the kiosk operator.
5 In a context that predates the introduction of the Internet in developing countries, Stewart and Ranis (1990: 31) stress the need for institutional changes to promote appropriate technology.

Among the institutions that proved important in the case studies they reviewed were small-farmer associations, co-operatives of coffee producers and producer organizations. In general, 'The development of appropriate organizations – and the reform of inappropriate ones – was thus found to be of wide significance, with relevance to most of the areas affecting technology choice and change.'

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