

Contributions to Economics

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# Integration and Clustering for Sustainable Economic Growth

 Springer

# **Contributions to Economics**

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Editors

# Integration and Clustering for Sustainable Economic Growth

 Springer

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# Foreword: Role of Integration and Clustering in Providing Sustainable Economic Growth

The idea of economic growth forms the basis of the modern global economy. Eager to achieve this, countries face various socio-ecological problems that are inherent “side effects” of economic development. Thus, the problem of sustainability of such growth is actualized for the purpose of minimizing its negative manifestations and consequences and providing its long-term effects.

In view of the recent financial crisis, the consequences of which have not yet been overcome by most participants in global economic relations, it is necessary to change our approach to economic growth and development, which makes the concept of sustainability even more attractive. However, despite general recognition for the need for sustainable development of economic systems, the secrets of its achievement remain undetermined, and tools and mechanisms remain poorly studied.

In the modern scientific society, there is still little agreement between scholars on the influence of clustering and integration on economic growth and its sustainability. Some experts consider that integration violates the balance in an economy and strengthens its risk component, as it adds new participants into the system of economic relations, opening the system to the influence of novel international factors. The creation of economic clusters in this context is viewed through a prism of monopolization and is seen as a negative phenomenon, violating the action of market mechanisms and the principle of rationality in economy.

Other researchers, however, tend towards a different opinion and consider that integration allows economic agents at the micro-level and economic systems at the macro-level to unite in identifying a joint solution for their common problems, and allow expansion of access to resources and sales markets and joint conduct of scientific research and implementation of innovations into production. Clustering is a supporting mechanism that allows globalizing economic systems to adapt to new economic conditions and to preserve domestic production.

Lack of clear substantiation of the influence of integration and clustering on economic growth is a restraining factor for practical use of these mechanisms in the economic activities of various countries and economic agents. This presents serious

scientific and practical problems, as if integration and clustering play a positive role in the provision of sustainable economic growth, denying their full-scale implementation implies a significant loss of profit.

If the impact of integration and clustering in provision of economic growth is negative, while not scientifically proven and not recognized by the global society, these tools will be used and will damage economic systems. Furthermore, if the influence of integration and clustering on provision of sustainable economic growth depends on circumstances and peculiarities of the economic system, where these circumstances are unknown, these tools are applied “randomly,” which reduces their effectiveness.

This explains the intensity of study of the role of integration and clustering in providing sustainable economic growth. Despite the wide diversity in studies on economic integration, clustering, economic growth, and sustainable development of economic systems, they have a fragmentary character and are devoted to the study of only specific aspects of these issues. This does not allow us to build a comprehensive picture and thereby to determine the role of integration and clustering in providing sustainable economic growth. This book concentrates on filling these gaps and sets the following main tasks:

- To study the cluster initiatives as a factor of competitiveness of modern enterprises;
- To determine the possibilities and perspectives of provision of economic security by means of creation of an innovational network of transnational cluster initiatives;
- To determine the effectiveness of state management and economic growth in the context of global integration and clustering;
- To analyze methodological approaches to measuring the sustainable development of industrial enterprises under the conditions of integration and clustering.

This book presents scientifically substantiated opinions on the role of integration and clustering in the provision of sustainable economic growth, based on results of leading fundamental and applied research. This provides the reader with an overall idea of the problem and the possibilities available to solve it. We therefore offer the latest analytical materials and practical recommendations that allow maximum profit to be gained from the process of clustering and integration for the purpose of providing sustainable economic growth.

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## About the Book

As a result of growing tensions in international socio-economic conditions and worsening of global economic problems, the necessity for provision of sustainable economic growth for modern economic systems is becoming more critical. Sustainable growth is necessary for the well-balanced development of an economy and for overcoming the structural disproportions that hinder achievement of a better level and quality of life.

Existing approaches to provision of sustainable economic growth are ineffective in the current economic situation in the global economy. Thus, market mechanisms of self-regulation of economic systems stimulate an increase in the gap between leading and underdeveloped components of economic systems and growth of their structural imbalance. Ecological and social issues relate to the number of market gaps that hinder sustainable economic growth.

Strengthening the role of the state in the regulation of socio-economic processes leads to a reduction in a general systemic level of economic development. That is, leveling of structural elements of an economic system takes place not by taking socio-economic indicators of the most underdeveloped systems to the leaders, but by slowing down the development of the leading members, which contradicts the general idea of economic growth and development.

Thus, there is a need for new methods and tools to provide sustainable economic growth which will allow eliminating market gaps and preserving a high level of economic effectiveness of economic systems. Many modern scientists think that cluster and integration approaches to providing sustainable economic growth and solving the problem of structural disproportions of economic systems are appropriate.

This book includes submissions from the international scientific and practical conference “Role of Integration and Clustering in Provision of Sustainable Economic Growth” that took place on 17–19 March 2016 in Volgograd, Russia. This conference brought together contributions from leading specialists in the sphere of clustering from around the world with a view to solving topical issues



of stimulation of economic growth and presenting results of recent research in this area.

Some of the contributions included in this book are of a fundamental nature and view the conceptual issues of global integration and clustering. Other studies emphasize development of the methodology of formation and development of economic clusters, and achievement of sustainable economic growth. Others are of a more applied nature and focus on the study of practical aspects and analysis of empirical data in the area of realization of cluster initiatives in the development of economic systems.

Presentations at the conference were grouped into four main categories, which form the basis of the four chapters of this book. The first chapter “Building Cluster Initiatives as a Factor of Competitiveness of Modern Enterprises” is devoted to the development of a theoretical platform for studying various aspects of economic clustering. The exceptional contribution in this chapter is the article by scientists from Orenburg State University, M. Troyanskaya and Y. Tyurina, “Contradiction of Cluster Taxation in Russia: Taxes as Barriers and Stimuli for Clustering.” This article is devoted to the study of the role of taxation in the process of clustering in the economy of modern Russia. In their research, the authors determine the sense and specifics of taxation of clusters in Russia, analyze tax barriers for the development of the process of clustering in the economy of modern Russia, and study the problems and perspectives of tax stimulation by clustering in Russia. The authors conclude that taxes play a contradictory role in the process of clustering of the economy, and are both barriers and stimuli for creation and development of clusters. Based on complex analysis of the macro-economic situation in modern Russia, possible scenarios of clustering of the Russian economy depending on state fiscal policy are presented.

In the second chapter, “Provision of Economic Security by Means of Creation of an Innovational Network of Transnational Cluster Initiatives,” the leading article is the paper by scientists from Volgograd State Technical University, I. Morozova and T. Litvinova, “Transnational Cluster Initiatives in Business as a Top-Priority Direction of Maximization of Economic Growth in Asian Countries.” This article is devoted to determination of perspectives of maximization of economic growth in Asian countries. The working hypothesis of the research consists of the idea that transnational cluster initiatives in entrepreneurship are a top-priority direction of maximization of economic growth in Asian countries. The article looks at the role of transnational cluster initiatives in entrepreneurship in providing economic growth in Asian countries and offers a model of economic growth for Asian countries on the basis of realization of transnational cluster initiatives in entrepreneurship. A key conclusion of the research is proving the hypothesis and substantiating the fact that transnational cluster initiatives in entrepreneurship are a top-priority direction of maximization of economic growth in Asian countries.

In the third chapter, “Effectiveness of State Management and Economic Growth in the Context of Global Integration and Clustering,” the article “Effectiveness of State Territorial Administration in Provision of Sustainable Economic Growth of the Region,” is deserving of close attention.

The basis of the fourth chapter, “Methodological Approaches to Measurement of Sustainable Development of Industrial Enterprises Under the Conditions of Integration and Clustering,” is presented in the article by I. Morozova (Volgograd State Technical University), M. Mysina (Samara State Institute of Culture), and S. Gryaznov (Samara Law Institute of FSIN of the RF): “Educational Clusters as a Factor of Development of an Educational Services Market in Region.” The purpose of this article is the study of educational clusters as a factor of development of an educational services market in the region. The authors determine the sense and specifics of educational clusters, compile economic and mathematical models of development of the educational services market in the region, determine the main factors involved in the development of the market of educational services in the region, specify the role of educational clusters in development of educational services market in the region, and determine perspectives of their development. They with a compilation of their recommendations.

It is worth noting another article by these authors, “Development of the Entrepreneurial Component as a Factor in Increasing the Effectiveness of Cluster Structures Management,” which is devoted to studying the perspectives involved in increasing the effectiveness of management of cluster structures by means of development of an entrepreneurial component.

In their research, the authors determined peculiarities of management of cluster structures, factors involved in the effectiveness of cluster structure management, and methods for increasing effectiveness of cluster structure management by means of development of an entrepreneurial component, and offer recommendations for development of an entrepreneurial component of cluster structure management. The analysis showed that development of an entrepreneurial component positively influences all aspects involved in the effectiveness of cluster structure management. Therefore, the effectiveness of cluster structure management could be increased by means of maximization of the use of the market structure and organization of cluster self-management. This is achieved by means of including an entrepreneurial component in the process of cluster structures management.

Finally, we would like to acknowledge the efforts of the reviewers, participants, and organizers of the conference, through whose efforts we were able to actualize the problem of integration and clustering as the most important component for provision of sustainable economic growth, and compile the results of the latest and most appropriate studies in this area.

We are also grateful to the participants of the program committee of the conference: Doctor of Economics and Professor of the Chair “World Economics” of the University of Messina, Sergi Bruno, and Doctor of Economics and Professor of the Chair “International Economics” of Harvard Business School, Rawi Abdelal.

We also thank the organizers of the conference, the higher educational institutions of Volgograd—Volgograd State Technical University and Volgograd State University, as well as Marka marketing agency and Prostor-Tour tourist agency.

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**Part I**  
**Building Cluster Initiatives as a Factor of**  
**Competitiveness of Modern Enterprises**

# Contradiction of Clusters Taxation in Russia: Taxes as Barriers and Stimuli for Clustering

Maria A. Troyanskaya and Yulia G. Tyurina

**Abstract** The purpose of the article is to study the role of taxation in the process of clustering of modern Russian economy. Methodological basis of the research consists of methods of induction, deduction, synthesis, problem and systemic analysis, modeling, and forecasting. The work also uses the method of scenario analysis for determination of the perspectives of development of the process of clustering in Russia depending on the fiscal policy. During the research, the authors determine sense and specifics of taxation of clusters in Russia, analyze tax barriers of development of the process of clustering of modern Russian economy, and study problems and perspectives of tax stimulation of clustering in Russia. As a result of the research, the authors come to the conclusion that taxes play a contradictory role in the process of clustering of economy of modern Russia, being barriers and stimuli for creation and development of clusters at the same time. Based on complex analysis of situation in modern Russia, possible scenarios are offered for clustering of Russian economy, depending of state fiscal policy.

## 1 Introduction

Under the conditions of economic recession, caused by low rates of economic growth, high inflation rate, and high unemployment rate, conditions for entrepreneurial activities in Russia become less favorable. Despite the low level of foreign competition, due to state protectionist measures and limited presence of foreign rivals in the Russian markets, Russian enterprises make a lot of efforts to preserve their market positions and continue functioning due to unfavorable tendencies of demand, related to significant reduction of purchasing capacity of population.

Loss of national production is intolerable, as it will lead to strong dependence of Russian economy on import and loss of economic independence of the country. However, under the conditions of raw materials dependence of Russia economy, the state possesses strictly limited set of tools for regulation of national economic system. Die to reduction of oil prices, the Russian government has to reduce

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expenses of the state budget and faces a difficult choice: cutting social programs or continuing pressure on business.

It should be noted that both these measures contradict strategic goals of development of Russia and will negatively influence the national economy. On the one hand, realization of social programs is a key function of the state. That's why reduction of expenses for them contradicts the foundations of social state and will lead to reduction of living standards of the population, as well as strengthen social tension in the country.

On the other hand, entrepreneurship is a foundation of market economy; further strengthening of tax burden will lead to development of shadow business and greater reduction of the volume of tax revenues into the state budget. Besides, there would be a wave of bankruptcies of Russian enterprises and further growth of unemployment rate. Therefore, none of the obvious decisions cannot solve the problem of the deficit of the state budget of Russia at present.

In the existing situation, an unexpected solution to the stated problem may be innovational market mechanism—clustering. Successful experience of other countries of the world shows that the process of cluster emergence leads to strengthening of market positions of enterprises and increase of their innovational activity, which allows them to enter new, including global, markets and to maximize total profit of cluster members.

Due to that, clustering should be viewed as a top-priority direction of development of economy of modern Russia, as it can solve the problem of deficit of the state budget under the condition of preservation of Russian entrepreneurship and social programs in previous volume. Despite market character of the process of clustering and the fact that the source of cluster initiatives is private business, the state takes direct part in this process through realization of fiscal policy. That's why actuality of study of the role of taxation in development of the process of clustering of economy of modern Russia grows.

Due to large diversity of tax tools and large number of direct and hidden taxes, taxation may be stimulating and restraining factor of development of entrepreneurship in economy at the same time. Based on this, the article offers a hypothesis that in modern Russia taxation plays a contradictory role in the process of clustering of economy—on the one hand, taxes are barriers for clustering, on the other hand, taxes are stimuli for creation and development of cluster entities. The purpose of the article is to verify this hypothesis and study contradictions of taxation of clusters in Russia.

## 2 Literature Overview

Cluster is an integration union of a range of enterprises from one sphere within horizontal integration (Yang et al. 2015) or from adjoining spheres within vertical integration (Murzabekov et al. 2015). Cluster may often include R&D centers which facilitate maximization of innovational activity of cluster entity (Krenea

et al. 2015). Due to higher total competitiveness and sustainability of enterprises of cluster, it ensures their higher investment attractiveness, which also facilitates creation and implementation of innovations into production (Zakharova et al. 2015).

Modern clusters are represented in most spheres of economy, but the most popular are industrial (Palyvoda 2015). Clustering is used by governments of various countries for preservation and development of domestic production and development of entrepreneurship (Paraušić et al. 2014), stimulation of innovative activity in economy, etc. (Korzhenevskaya 2014). Clustering of economy also stimulates the increase of rates of its economic growth, increasing total efficiency of enterprises in cluster entities (Popkova et al. 2013).

Taxes are one of the most important tools of state regulation of entrepreneurship in particular and economy on the whole, as they allow redistributing public income, stimulating activity in top-priority spheres of economy, and restraining unwanted economic activity (Mollan and Tennent 2015). In Russian experience, taxes have traditionally been a measure of support for domestic production and restraining foreign competition (Cho 2014). The state budget of formed by means of tax revenues, which allows realizing state policy for support for entrepreneurship, etc. (David et al. 2014).

Various tax tools are used within state fiscal policy (Colacchio 2014). Thus, in many countries of the world, including modern Russia, there are tax subsidies for small enterprises, special tax regimes, and differentiated tax rates for various types of enterprises (Dindić 2013). During conducting fiscal policy, the state should strive for provision of social justice (Adebisi and Gbegi 2013). Very often, tax subsidies are a stimulus for increase of corporate social and ecological responsibility (Schreiber 2013).

Depending on the priority of the process of clustering for national or regional economy, it can provide special tax regimes for taxation of cluster entities (Veselovsky et al. 2015). Clustering could be viewed as a tool for struggling with shadow economy (Gafurov et al. 2014), as enterprises of a cluster are a large market player and, thus, attract much more attention from controlling state bodies, which reduces possibilities for shadow business (Barycheva et al. 2014).

One of the most important problems of taxation of cluster entities is the fact that on the one hand, for the purpose of stimulation of cluster initiatives, the state is interested in provision of tax subsidies for cluster (Huskinson and Lawson 2014), but, on the other hand, enterprises in a cluster acquire larger market power and increase their competitiveness—so providing tax subsidies for them could strengthen their positions and hinder development of enterprises which are not part of clusters (Razvadovskaya et al. 2015).

### 3 Materials and Methods of the Research

Methodological basis of the research is comprised of the methods of induction, deduction, synthesis, problem and systemic analysis, modeling, and forecasting. The work also uses the method of scenario analysis for determination of perspectives of development of the process of clustering in Russia, depending on fiscal policy. Informational and analytical basis of the research is comprised of materials of scientific and practical research of modern Russian and foreign authors on the topic of taxation of cluster entities. During conduct of the research, the authors also use materials of the Federal State Statistics Data—in particular, statistical yearbook “Finances of Russia” for 2014, for analysis of tax statistics in Russia.

## 4 Results

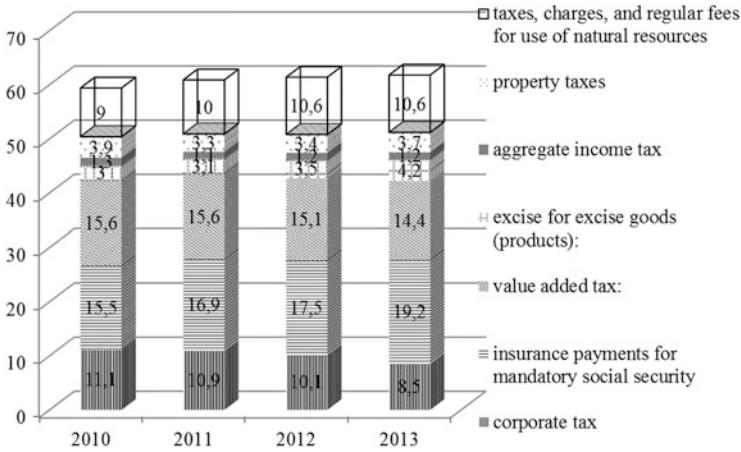
### 4.1 *The Sense and Specifics of Taxation of Clusters in Russia*

At present, clustering is a new phenomenon in Russia—so the state fiscal policy does not have any peculiarities for taxation of clusters. Therefore, enterprises in cluster entities are imposed with the same tax in the same volumes in Russia, as other enterprises that do not belong to clusters. Taxes from entrepreneurial activities are viewed in Russia, like in other countries, as the main source of formation of the state budget. Dynamics of the structure of tax revenues of the consolidated budget of the Russian Federation for 2010–2013 is shown in Fig. 1.

As is seen from Fig. 1, the structure of tax revenues of the state budget of the Russian Federation for 2010 is dominated by VAT (15.6 %, or RUB 2498.6 billion); however, in 2011–2013, the share of insurance fees for social security, which form social tax, grew, constituting 19.2 % (RUB 4694.2 billion) in 2013. Similarly, corporate tax lost its third position—its share constituted 11.1 % (RUB 1774.6 billion) in 2010 and then reduced to 8.5 % (RUB 2071.9 billion) in 2013. It was replaced by taxes for using natural resources, the share of which constituted 10.6 % in 2013 (RUB 5898 billion).

Other taxes—property tax, aggregate income tax, and excise tax—formed 9.1 % of the budget in 2013. According to the 2013 data, tax revenues of the state constituted 65.4 % of the total structure of revenues of the consolidated budget. Tax burden of entrepreneurship in Russia could be conventionally divided into two large categories—social taxes and economic taxes. Social taxes are payments for social needs—primarily, into pension fund and social security fund. They are allocated on the basis of wages fund. Their share in the structure of tax burden reaches 60 %.

Economic taxes are VAT, corporate income tax, land tax, etc. They do not depend on the quantity and volume of wages of enterprises’ employees, but are set depending on its economic activities. Their share constitutes around 40 % in the



**Fig. 1** Dynamics of the structure of tax revenues of the consolidated budget of the Russian Federation in 2010–2013. Source: Finances of Russia (2014)

structure of tax burden of entrepreneurship in Russia. Over the recent years, Russia went up from 124th to 51st position in the international ranking Doing Business. According to “taxation” indicator, Russia occupies 47th position in the world (World bank 2014). This shows a favorable tendency in the sphere of taxation of entrepreneurial activities in modern Russia and allows forming further positive forecasts in this direction.

#### 4.2 Tax Barriers of Development of the Process of Clustering of Economy of Modern Russia

The current Russian tax system is a serious barrier for creation and development of business. This is proved by the growth of share of shadow economy, which, according to the 2015 data, constitutes more than 30 % of Russian GDP. It should be noted that enterprises are more inclined to concealing the quantity of their employees and volume of wages fund than to concealing the profit. Clustering is a direction of legalization of income and refusal from shadow business—so most of Russian enterprises prefer not to join cluster entities due to threat of increase of tax burden as a result of full reflection of economic state in accounting and tax records.

Taking into account that tax system is an obstacle for development of entrepreneurship in modern Russia, it could be concluded that it is also a barrier for development of the process of clustering of Russian economy, as a special type of entrepreneurial activities. Russian tax legislation is so complex that most of medium and especially large enterprises are obliged to maintain tax records separately from accounting records. This is caused by differences in documentation,

which should be provided to tax bodies and owners of enterprises, in terms of documents keeping, their execution, etc.

Maintaining a specialist of a whole department for tax records, in addition to accounting records, places additional expenses on enterprise, related to non-production activities. It is a restraining factor for development of especially large business in Russia. Like in some other countries, the system of taxation of entrepreneurship in Russia is rather complex. That's why, in order to fully correspond to requirements of tax laws and perform tax optimization, Russian enterprises have to seek additional help from external companies and experts, which increases their expenses.

Besides, periodic complication and strengthening of tax laws, together with instability of fiscal policy, complicates organizational aspects of entrepreneurship in Russia. Violation of tax laws leads to enterprises being fined, which increases tax risks and general risk component of entrepreneurial activities in Russia. Thus, unfavorable tax climate is a restraining factor of Russian entrepreneurship—both independent and in cluster entities.

### ***4.3 Problems and Perspectives of Tax Stimulation of Clustering in Russia***

Clustering opens for Russian business the access to more profitable terms of taxation and conduct of entrepreneurial activities. Firstly, under the conditions of market structure of monopolistic competition in most Russian markets, enterprises have to enlarge, in order to increase their market share, market power, and competitiveness. This inevitable leads to increase of their tax base and necessity for transition to standard system of taxation instead of simplified system of taxation, which is accessible only to small enterprises and supposes more profitable tax conditions.

Joining a cluster entity, the enterprise acquires higher competitiveness, and market share of enterprises in the cluster grows, which eliminates the necessity for their enlargement and allows preserving small size. Therefore, while in cluster entities, small enterprises possess advantages of large enterprises, at the same time preserving tax subsidies. This makes clustering of economy the most profitable for small business or medium business, which is interested in reduction of their size for acquiring access to simplified system of taxation with preservation of their advantages.

Secondly, in order to stand market competition, enterprises should constantly create and implement innovations. Conduct of scientific research is costly and supposes increase of enterprises' expenses. Small enterprises, as a rule, do not possess necessary volume of investments for conduct of scientific research and implementation of innovations into their activities, which reduces their



competitiveness. While in a cluster, enterprises can conduct joint scientific R&D and receive access to innovations of other cluster members.

Cluster may also include specialized R&D centers responsible for creation of innovations for cluster members. This allows reducing expenses for scientific research and eliminates the necessity for keeping employees who are involved with scientific research. Therefore, joining a cluster allows reducing the number of employees, wages fund, and the volume of paid social taxes.

Thirdly, due to access to general knowledge, experience, and information of all cluster members, necessity for their independent study of novelties in tax legislature disappears. This eliminates the necessity for using external consultants for explanation of tax legislature, allows reducing expenses for keeping tax records, and creates a possibility for conduct of measures for tax optimization of enterprises. That's why enterprises in a cluster can reduce expenses for keeping tax records, which is a stimulus for joining a cluster entity.

## 5 Discussion

As a result of the research, the offered hypothesis is proved, which confirms contradictory role of taxation in the process of clustering of economy of modern Russia. Taxes are barriers and stimuli for clustering at the same time. Perspectives of development of the process of clustering in Russia are connected to provision of additional tax stimuli for enterprises which a part of the cluster entities. Based on the complex analysis of macro-economic analysis of situation in modern Russia, it is possible to distinguish three possible scenarios of clustering of Russian economy depending on state fiscal policy.

The first scenario is realistic and most probable. Within this scenario, current state fiscal policy is preserved; it does not suppose any additional tax barriers or stimuli for cluster entities. Due to current advantages of taxation in clusters, Russian enterprises join them actively, which stipulates further clustering of Russian economy. As a result of preservation and development of entrepreneurship, revenues of state budget grow, which allows preserving social programs.

The second scenario is optimistic, it is characterized by medium probability. The state introduces a system of additional fiscal measures for tax stimulation of the process of clustering in Russia. This allows accelerating the clustering of Russian economy. Despite the fact that in the short term, due to tax subsidies, the volume of tax revenues into the state budget reduces, in the long term—due to development of entrepreneurship—the volume of these revenues grows significantly, which allows not only preserving, but expanding social programs in Russia.

The third scenario is pessimistic and the least probable. This scenario supposes that the state sets tax subsidies for enterprises which joined cluster entities, which stimulates development of clustering but hinders development of entrepreneurship in Russia, as enterprises outside of clusters suffer losses, which leads to massive

wave of business bankruptcy, reduction of the volume of tax revenues into the state budget, and closure of social programs—both in the short term and the long term.

## 6 Conclusions

Thus, it is possible to conclude that taxes are barriers for clustering in Russia, as joining clusters leads to increase of openness, transparency, and accountability of business and increases its tax expenses due to impossibility for continuation of making shadow business. While in a cluster, tax risks grow for enterprises. At that, current Russian tax system provides stimuli for clustering of economy. It is a possibility for preservation of small business and access to simplified system of taxation, simplification of organizational structure, reduction of the volume of paid social taxes, and simplification of tax accounting.

This constitutes contradiction of taxation of clusters in Russia. That's why during correction and change of the course of state fiscal policy in Russia it is necessary to strive for preservation of this balance of interests of separate enterprises and enterprises belonging to clusters, interests of the state, society, business, domestic business, its foreign rivals, etc. Under the conditions of announced course of Russia for creation of innovations-oriented highly competitive economy, it is possible to expect from the state the tax policy which would be favorable for clustering, or, at least, preservation of current tax situation. This will facilitate further clustering of Russian economy.

This work poses interest for modern science and practice. The performed research makes an important contribution into development of the theory of entrepreneurial activities and concept of clustering of modern economic systems, which causes its high theoretical significance. Practical significance of the performed research is pre-determined by possibility and expedience for use of authors' conclusions during development and conduct of state fiscal policy in Russia and the policy of clustering of Russian economy. In this context, the largest interest is posed by the determined scenarios of clustering of Russian economy depending on the state fiscal policy.

It should be concluded that despite a possibility for distribution of the general conclusion of the research on contradictory role of taxation in the process of clustering of economy on other economic systems, a certain limitation of the results of the performed research is narrowness of its object and orientation at economy of modern Russia. That's why a perspective direction of further research in this sphere is study of influence of taxes on the process of clustering in other countries of the world and development of the methods of tax stimulation of cluster entities without dealing damage to enterprises outside clusters.

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# Using Project-Based Approach in Public-Private Partnership with Participation of Corporate Holding Structures

Yulia Veis

**Abstract** Integration processes in economy lead to changes in the model of interaction between state and private business, especially with participation of corporate holding structures in partnership relations. The article studies peculiarities of the use of project-based approach with participation of corporate holding structures in public-private partnership. The role of state influence on participants of partnership relations is described. The necessity for the formation of unified control center during realization of project activities within public-private partnership is substantiated. The model of division of functional responsibilities during cooperation between this center and the state is formed.

Under the conditions of integration processes of economy, interaction between state and private business becomes more important. As realization of large projects requires attraction of large investment resources, it is expedient—while in crisis—to take this load off the budget, attraction large corporate structures as investors. However, cooperation of corporate holding structures within public-private partnership is impossible without taking into account structural specifics: complex systemic interconnections, heaviness of structure, and synergism, which appear during realization of controlling influence. Effectiveness of activities of corporate holding structures could be increased during the use of project-based approach in public-private partnership.

Project management is the sphere of management which covers the spheres of production activities in which creation of product or service is realized as a unique complex of interconnected targeted events with certain requirements to terms, budget, and characteristics of expected result (Zarenkov 2010). Thus, while defining “projects” in practice of management, the following characteristics are determined: uniqueness, time limitation, and direction at solving a specific task. These characteristics allow using project-based approach in public-private partnership.

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Specifics of project-based approach sets special requirements to organizations-members and management methods, the sense of which consists in concentration of authorities and responsibility for the whole project within the position of “project management” and representatives-members during creation of a project team, which is to a certain extent estranged during performance of the project from activities within regularly working companies.

The following stages could be distinguished in project activities:

- determination of project’s goals;
- establishment of stages of project realization;
- selection of criteria for attraction of participants of public–private cooperation;
- establishment of necessary volumes and sources of funding;
- determination of terms of project realization, compilation of performance plan;
- compilation of cost sheet and budget of project, determination of possible risks to be taken into account in future;
- provision of delegation of functions and authorities;
- performance of control over realization of project.

There are many definitions and treatments of the term “project” (Project Management Institute 2008):

- project is temporary enterprise aimed for creation of unique products, results, and services;
- project is a complex of measures aimed at achievement of aim, within the set time with certain resources;
- according to the English Association of project managers, project is a strictly determined enterprise with clearly set (determined) aims which include (suppose) set requirements in the sphere of time, cost, and quality of received results.

All definitions of “project” have the following peculiarities of project: management object pre-determined by complex tasks and works, as well as orientation of such complex for achievement of the set goals under the condition of limited budget and time, labor, and material resources (Ermolima 2013).

It is possible to say that project is a tool with the help of which any organization or group of companies, any enterprise or person can direct possibilities and resources at achievement of the set goals. This predetermines specifics of application of this approach in public–private partnership.

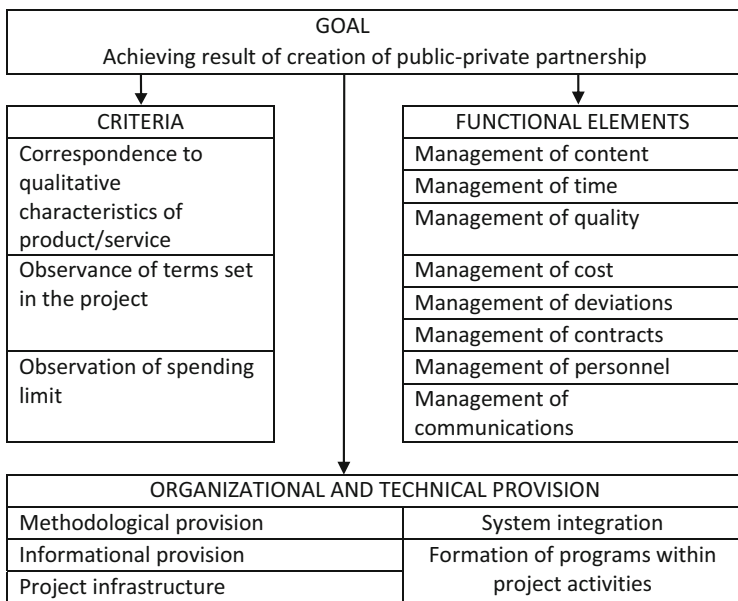
Participation of corporate structures is peculiar for orientation of many managers of corporations at production process. This influences positively the current activities of enterprise, but there could be failures in observation of terms and budgets during realization of projects in partnership. Qualitative changes are needed for solving the problem—orientation at the results, which is provided by establishment of project management.

The main goal of creation of public–private partnership is realization of specific investment project of complex of projects.

Structurally, realization of project activities could be divided into two blocks of works. The first one is project-based: all that relates to project documentation, cost

sheet and contract relations, budget, and pre-production preparation. The second block includes direct work at the object. While companies work for the process, project department exists separately from production. The main goal during realization of public-private partnership is to unite both blocks into one process. Also, this could be done by giving all project coordination and controlling functions to the state. An alternative to this could be formation of a unified control center capable of conducting work for management of project activities. This center can track the whole process and control it, as well as perform coordination interaction between participants of public-private partnership. It is important not to make this control center complicated, so it is necessary to ensure linear cooperation in the structure. Otherwise, this may lead to growth of transaction costs, incoordination within the control center, and reduction of synergetic effect from realization of public-private partnership. Apart from the person responsible for projects, the control center should feature representatives of each enterprise participating in partnership and representatives of public authorities. Thus, a team of specialists that work on the project is created at a linear level. They understand the general strategy and goals of project activities, as well as specifics of activities of separate members. This will stimulate structuring and planning of work, without deviations from main goals of investment project.

Figure 1 shows the model of project-oriented public-private partnership with determination of main criteria, functional elements, and organizational & technical provision.



**Fig. 1** Model of project-oriented public-private partnership

Delegation of functions and responsibilities should be entrusted to the manager of control center.

The following three ways of works grouping and delegation of functional responsibilities are used most often in project activities:

1. functional division, when sales managers unite into one group, constructors—into another group, etc.
2. territorial principle, when work of personnel with various skills is coordinated in one place. Such principle should be used when organizations of the partnership have departments that are geographically remote from the formed control center.
3. on the basis of manufactured product, when various skills and knowledge are united into conventional organizational structures in order to achieve common goal.

An important component is totality of organizational and technical conditions created for successful and effective work of project's personnel work, which is system of management of the project. Large attention should be paid to the processes of project management in the following spheres:

1. content management (object area of the project)—determination of goals, results, and criteria of evaluation of project's successfulness;
2. time management—division of project into separate works; determination of sequence of performance, duration, and plan of works—calendar plan of the project; control over changes in the calendar plan;
3. quality management—determination of quality standards, ways of achievement of the required level of quality, and measures for provision and control of quality;
4. management of cost—determination of type and quantity of resources (personnel, equipment, materials); determination of cost of resources and works; accounting and control for expenditures and revenues, as well as budget changes;
5. management of deviations includes:
  - management of risks (determination of events which may influence projects, finding ways to work with them, planning and control over corresponding events);
  - management of problems (determination of emerging functional issues, their monitoring, analysis, decision making);
  - management of changes (determination of emerging modifications of previously agreed parameters, decision making, monitoring of changes of project);
6. management of contracts—determination of required goods and services, potential sellers and suppliers, maintaining relations;
7. management of personnel—distribution of roles, responsibility, and relations of coordination and subordination of project's personnel, personnel selection, completion and development of project's team;

8. management of communications—determination of subjects and consumers of information within and outside the project, development of communication channels and periodicity of provision of information, management of official sources of information and rumours, internal and external PR project.

Despite significant advantages of the project, it is necessary to take into account its negative influence on realization of goals of public–private partnership. Table 1 shows main advantages and drawbacks of project-based approach.

Taking into account the drawbacks of project-based approach, it is possible to bring their negative influence down to the minimum.

Another complexity during formation of the unified center could be specifics of project activities related to dual subordination of employees-participants of the control center: linear subordination to managers of their corporate structures is preserved, but at the same time they answer to the project manager within activities of public–private partnership. Such division leads to necessity for solving a range of tasks in the sphere of administrative management and personnel management.

Motivation of employees for regular and project activities may have an ambiguous character. Project activities may distract employee from solving regular tasks. The employee has to “keep” several positions. He tries to view the situation wider and see in it the aspects which are not directly related to his functional role (Chechina 2014). However, this leads to conflict of interests—protection of corporate interests to the disadvantage of general interests of partnership. This process should be clearly tracked and stopped by the project manager.

Projects team is formed not only on the basis of professional and personal characteristics of employees. An important principle of selection of members of a project-based group is the factor of complementarity and mutual substitution of specialists during the work process. At present, it is obvious that all other things being equal, most effective are the groups of not similar but different and complementary people. They can cover a wider circle of tasks and work in dynamically changing environment and under the conditions of uncertainty. That is, risks caused by human factor are much lower in them. During organization of project-based

**Table 1** Advantages and drawbacks of project-based approach

Advantages	Drawbacks
High quality of the planned indicators	Quality of information influences significantly the whole project
Clear control of all stages of the project	Changes of external environment may lead to significant deviations from the plan
Reduction of risks of deviation from terms	Required correction in view of external factors and specifics of participants of project activities
Best organization and cooperation during performance of project at the stage of planning	Complex system of participants’ cooperation: organizational and financial & economic
Evaluation of financial and economic risks	Possible conflict of interests during realization of project between participants



groups, it is expedient to found on psychological types—the Keirsey model (2011), and during the work with managerial teams that are constant and formal elements in organization, it is advisable to use role models, e.g., Belbin model (2010), Margerison et al. (1995), and Bazarov (2003).

An important aspect is not only organization of project group but correct selection of methods of management of project during realization of investment activities in public–private partnership.

While selecting one or another method, it is necessary to pay attention to its specifics, peculiarities of its execution, terms, sustainability to risks, etc. At present, there are many factors which should be taken into account while selecting a certain method of project management. If the project manager cannot select correct method of management of his project, he can attract specialists who will help him to manage project activities with greater effectiveness.

In order to receive the largest effect during realization of public–private partnership with corporate holding structures, it is important to combine project-based approach with process approach to management. From the point of view of process approach, management of project activities could be divided into the following processes:

- pre-investment process (includes development of concepts and establishment of the project plan);
- process of planning of investment activities (determination of goals and criteria at which success of project could be achieved; development of plans and schemes);
- process of selection of participants and performers (interaction of holding center and state, distribution of authority, functions, and responsibility)
- process of realization of project (realization and execution of the project plan);
- process of control (control over correctness of realization of the project plan from the state and from the corporate control center);
- process of analysis (analysis of the level of achievement of the goal, emerging risks, irrational decisions);
- process of completion of project (evaluation of the received results from the point of view of effectiveness for participants of investment activities).

In order to perform any part of the project, it is necessary to fulfill basic and integrating functions of management. Basic functions include:

1. Management of object area of the project. This function is performed with the help of determination of goals and consists in planning, development of concepts, accounting and control over execution of the project.
2. Function of quality management. It helps to evaluate the results of work of the project participants, namely, to track the quality of managerial decisions and quality of final product.
3. Time resources management. Terms of realization of the project are set.

4. Cost management. Evaluation of expenses, compilation of cost sheet, determination of source of the project funding, attraction of investments, and control over correct distribution of material resources.

Integrating functions:

1. Management of the project's personnel—HR management, selection of specialists of various spheres.
2. Communications management. Forecasting and control over execution of works.
3. Management of contracts. Work with contractors and control over execution of contacts.
4. Management of risk. Insurance, evaluation of risks, distribution of risks, and elimination of consequences during their appearance.

Based on analysis of main principles of project and process approach during investment activities, it is possible to form single structure of cooperation of participants of public–private partnership and the control center.

The most popular types of organizational structures capable to form effectively within public–private partnership are the following: classical & hierarchical, divisional, and matrix. Project, as a form of unique (irregular) activities, could be a rare precedent with a classical hierarchical model of management or regular case in organization with matrix organizational structure, designed for the purpose of simultaneous execution of multiple projects. In this case, it is necessary to take into account problems of personnel interaction. Working with personnel who are special trained for work with multiple projects is one thing, and working with personnel who are used to function within regular activities is another thing.

However, extreme cases are rare. In the Russian structures of public–private partnership, there are few examples which have consistently implemented matrix method of organization of activities. Certain combination is a more regular case: part of the project of horizontal structure is put onto the existing vertical one.

Any projects work should be evaluated by the result which corresponds to the selected criteria.

Project system of management of investment activities requires new approach to managers of the project: they have to live not in the past or for the day, but think about the future.

Increase of effectiveness of cooperation of state and private business requires formalization of all processes (statutes, technologies, plans) and connections with participation of all interested parties which work in public–private partnership.

The main problems of the project system appear at the level of communications, so there is a need for councils. At least, at the initial stage, managers of projects should gather their team which works for the project, for the purpose of maintaining cooperation, setting the tasks, developing plans, and establishing checkpoints. This will be a workgroup that should include those responsible for a certain volume of work in the project from each participant.

Forms of cooperation between the state and holding within partnership relations are multiple and diverse. These are the main of them (Deryabina 2008):

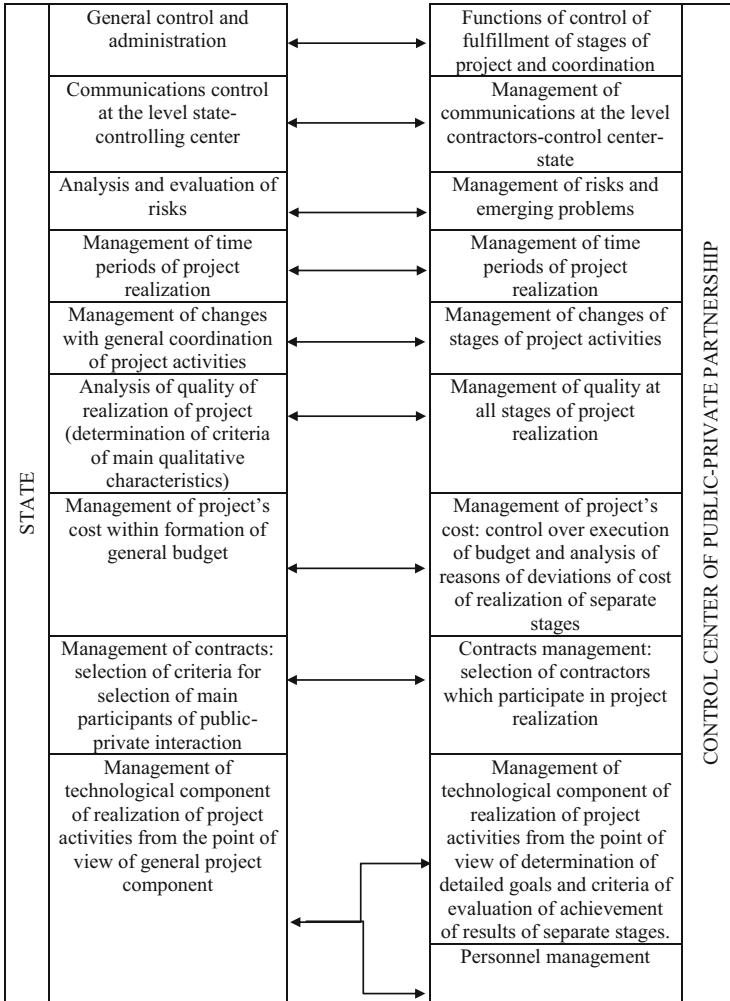
1. Contract for execution of works, provision of public services, and provision of products for government needs.
2. Contracts for technical help.
3. Contracts for management.
4. Rent, lease.
5. Contract on division of products.
6. Attraction of investor on a parity basis.
7. Investment agreement.
8. Joint ventures.
9. Concessions.

The choice of the level of delegation of authorities to control center largely depends on financial participation of the state, social significance of the project, period of realization of the project, and strictness of time plan of its realization (Fig. 2).

From the point of view of process approach, the model of cooperation of the state and unified control center could be represented by the scheme in Fig. 3. Excessively strict controlling influence of the state with corporate holding structures could negatively influence effectiveness of realization of project activities. A soft scheme of influence with active participation of representatives of the state in control center of public–private partnership is an optimal choice.

Level of influence of state on partnership relations during realization of projects in top-priority investment directions	Public-private partnership	The state makes decisions independently and informs partnership relations participants of it
		The state makes a decision and then offers partnership participants to introduce additions or wishes.
		The state informs of a problem, listens to opinions of managers-participants of partnership relations, and then makes a decision independently.
		The state offers an idea and waits for questions and offers. Decision is discussed and made together with a group of managers-participants of partnership.
	↑	
	↓	
	Private-public partnership	The state makes limiting conditions and asks the project participants to make a decision.
		The state offers managers-participants of partnership to make a decision based on preliminary conditions.
	The state outlines the problem and full freedom of actions in decision-making for partnership participants.	

**Fig. 2** Level of state’s influence during realization of partnership relations during realization of projects in top-priority directions of investment activities



**Fig. 3** Model of division of functional authorities during interaction of state and control center within realization of partnership relations

The presented model of interaction of state and control center of public-private partnership allows receiving an optimal results of cooperation within realization of investment projects in view of the level of delegation of power from state, use of process and project-based approach to activities, consideration of structural peculiarities of corporate holding structures of participants, and possibility of cooperation of structural departments of holding within realization of investment projects.

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# Effective HR Management as the Most Important Condition of Successful Business Administration

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**Abstract** The purpose of the article is to determine perspectives of increase of effectiveness of business administration of modern enterprises by means of improvement of the process of HR management. In order to verify the offered hypothesis, the work uses the methods of factor analysis and methods of correlations and regression analysis. With these methods, the authors determine the contribution of HR management into success of business administration. The authors determine the most important indicators of success of business administration, describe the contribution of HR management into achievement of its effectiveness, and offer the authors' recommendations for increase of effectiveness of HR management of the studied enterprise. As a result of the research, it was found that effective HR management is the most important condition for successful business administration. That's why during the process of business administration of modern enterprise, it is necessary to pay special attention to issues related to HR management. Perspectives of increase of effectiveness of business administration of modern enterprises by means of improvement of the process of HR management are connected to growth of the role of personal aspect of human capital.

## 1 Introduction

Under the modern economic conditions, management of entrepreneurial structures is performed within business administration. This supposes a complex and systemic approach to management of enterprise and coordination of actions of all its components within the general market strategy. Due to successful business administration, it is possible to reach sustainability of enterprise to changes of market environment and stability of its development in the long-term.

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Business administration is a complex task, characterized by high level of uncertainty and risk, as well as the necessity for simultaneous control over various factors and management of multiple structural elements of enterprise. Thus, there are errors of business administration of modern enterprises, which leads to loss of common landmarks and application of efforts of various departments in different directions, which leads to absence of the effect of synergy and the rates of development of enterprise and system are slowed down.

Crises at the level of separate enterprises lead to national and global economic recession, the source of overcoming and prevention of which is development of the process of business administration at the micro-level. The recent global financial crisis showed that there are serious problems in the sphere of business administration.

Thus, the actuality of study of the key components and factors of success of business administration grows. This article offers a hypothesis that the most important condition of successful business administration is effective HR management. The article is devoted to verification of this hypothesis and determination of perspectives of increase of effectiveness of business administration of modern enterprises by means of perfection of the process of HR management.

## 2 Literature Review

HR management is the process of development of managerial relations at enterprise for the purpose of increase of labor activities efficiency (Novotný 2016). The sense of HR management is manifested in determination of internal structure of enterprise and functions of its main components (Mizik and Pysarevska 2014). The specifics of HR management is studied in many modern works, among which are the works by (Marchuk 2014; Popkova et al. 2015; Kayl et al. 2013; Kayl et al. 2015b), etc.

The most important condition of effectiveness of HR management is comprehensiveness of the system of management and balanced development of managerial process (Yi and Rong 2015). Constant changes of HR policy may lead to disorientation of enterprise's personnel, reduction of labor efficiency, violation of economic strategy of development of enterprises, etc. (Chadwick et al. 2012). That's why, despite the necessity for periodic correction of market strategy of enterprise depending on changes of external environment, it is necessary to preserve comprehensiveness and general logic of HR management (Ng and Wei 2012).

Business administration is a process of management of enterprise on the whole (Clermont et al. 2015) and its finances, personnel, and production, in particular (Fetke et al. 2015). Business administration is performed at the higher level of management (Export promotion. . . 2014). Theoretical and methodological aspects of business administration of modern enterprises are viewed in the works by (Nadtochey 2012; Kayl and Bakhracheva 2015; Kayl et al. 2015a; Kayl and Epinina 2014), etc.

The analysis of recent studies and publications on the viewed topic showed that its separate aspects related to HR management and business administration are characterized by high level of elaboration. At that, formulations of the problem of

interdependence between business administration and HR management and attempts of solving it cannot be found in materials of scientific works, which predetermines the necessity for further development of this topic.

### 3 Research Methods

For verification of the offered hypothesis, the work uses the method of factor analysis, with the help of which the contribution of HR management into success of business administration is determined, which is effectiveness of management of enterprise. Selection of this method is predetermined by the fact that it allows determining the influence of each particular factor on the studied indicator without the necessity for study of influence of other factors, which would make calculations too complicated.

According to the authors of this research, the model of success of business administration has the following form:

$$S_{BA} = E_{HRM} * E_{MM} * E_{MF} * E_{MT} \quad (1)$$

Where

$S_{BA}$ —success of business administration;  
 $E_{HRM}$ —effectiveness of HR management (labor management);  
 $E_{MM}$ —effectiveness of management of materials (land);  
 $E_{MF}$ —effectiveness of management of finances (capital);  
 $E_{MT}$ —effectiveness of management of production (technology).

As could be seen from the formula (1), successfulness of business administration depends on effectiveness of management of production factors. At that, effectiveness is viewed in classical form and is determined as ratio of result to expenses for its achievement. That is, in order to find a contribution of HR management into successfulness of business administration, it is necessary to determine the following two proportions:

$$E_{BA}(E_{HRM}) = E_{BA0} * (E_{HRM1}/E_{HRM0}) \quad (2)$$

where

$E_{BA}(E_{HRM})$ —influence of HR management on expenses for business administration;  
 $E_{BA0}$ —expenses for business administration for the previous period;  
 $E_{HRM1/0}$ —expenses for HR management for the current/previous period.



$$P(E_{HRM}) = P_0 * (E_{HRM1} / E_{HRM0}) \quad (3)$$

where

$P(E_{HRM})$ —influence of HR management on profit of enterprise, as the most important result of business administration;

$P_0$ —profit of enterprise for the previous period;

$E_{HRM1/0}$ —effectiveness of HR management for the current/previous period.

Effectiveness of HR management of enterprise is determined with the help of the method of expert evaluation within the evaluating system of the enterprise, with the help of certain criteria. In this work, such evaluation is not performed; the results of evaluation of effectiveness of HR management by the enterprise's experts are used.

In addition, in order to provide stronger methodological basis and confidence in results of verification of the hypothesis, the work also uses the method of correlation and regression analysis. Thus method helps to find the level of dependence of expenses for business administration ( $y_1$ ) on expenses for HR management ( $x_1$ ), and dependence of profit of enterprise ( $y_2$ ) on effectiveness of HR management ( $x_2$ ) in dynamics of the period.

## 4 Results

It should be noted that the role of HR management in business administration is largely determined by specifics of business and volume of enterprise. That's why the object of research in this work is medium enterprise **Man LLC** from Volgograd Oblast, Russia, which operates in the sphere of retail trade. Initial data for the calculations is provided in Table 1.

Based on the data of Table 1, the following calculations within the factor analysis are performed.  $E_{BA}(E_{HRM}) = 1187.29 * (554.32 / 458.12) = 1436.63$  million RUB. That is, by means of growth of expenses for HR management, expenses for business administration of enterprise grew by  $1733.45 - 1436.63 = 296.82$  million RUB (or by 54.35 %).  $P(E_{HRM}) = 939.80 * (9.12 / 8.75) = 979.84$  million RUB. So by means of growth of effectiveness of HR management, the enterprise profit grew by  $1024.38 - 979.84 = 44.84$  million RUB, or by 53.02 %. Therefore, the growth of

**Table 1** Initial data for factor, correlation, and regression analysis by the example of Man LLC

Indicators	Values of indicators by years				
	2011	2012	2013	2014 ( $t_0$ )	2015 ( $t_1$ )
$E_{BA}$ , RUB million	549.48	686.85	886.04	1187.29	1733.45
$E_{HRM}$ , RUB million	286.12	329.04	384.97	458.12	554.32
P, RUB million	894.36	903.30	921.37	939.80	1024.38
$E_{HRM}$ , points	8.4	8.41	8.56	8.75	9.12

effectiveness of HR management stimulates increase of successfulness of business administration.

As a result of correlation and regression analysis, it was found that coefficient of correlations of expenses for business administration ( $y_1$ ) from expenses for HR management ( $x_1$ ) constitutes 98 %, and profit of enterprise ( $y_2$ ) from effectiveness of HR management ( $x_2$ ) constitutes more than 99 %. This proves existence of strong interdependence of the studied indicators and support of the offered hypothesis.

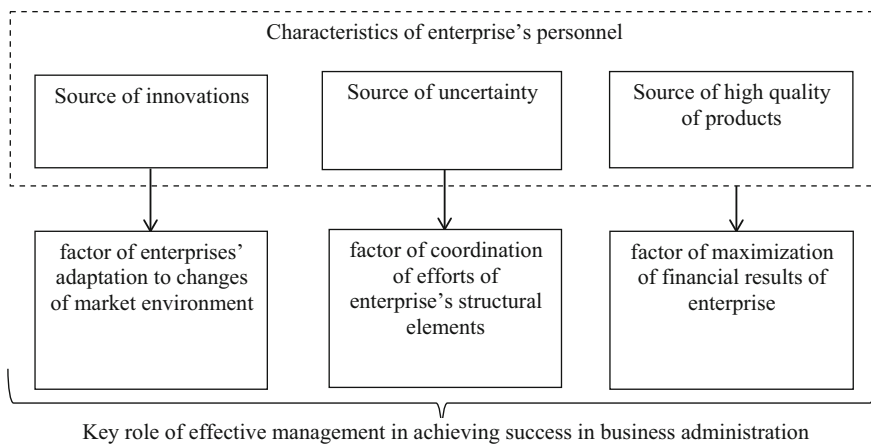
Let us view reasons of the found dependence and analyze the character of influence of effectiveness of HR management on success of business administration of modern enterprise. The most important indicators of success of business administration are the following:

- successful adaptation of enterprise to changes of market environment;
- coordination of efforts of structural elements of enterprise;
- maximization of financial results of activities of enterprise.

While performing deep analysis of causal connections of management of enterprise it is possible to note that high values of these indicators are achieved with the direct participation of its employees and depend on effectiveness of HR management (Fig. 1).

Thus, adaptation to external environment is possible due flexibility and innovativeness of enterprise’s personnel, which determines high significance of HR management. The least predictable production factor and source of actions which contradicts the general strategy of development of enterprise is its personnel. That’s why effectiveness of HR management determines successfulness of coordination of efforts of enterprise’s structural elements.

The reasons for improvement of profit and profitability of enterprise could be various. However, in the long-term, they cannot be achieved under the condition of



**Fig. 1** Effective of HR management as the most important conditions of successful business administration

“economy on product quality” or corporate responsibility, etc. That’s why, in order to achieve long-term financial success, the enterprise requires effective HR management, as a source of high quality of products and innovations.

## 5 Discussion

As a result of the research, the offered hypothesis is proved—effective HR management is the most important condition of successful business administration. Perspectives of increase of effectiveness of business administration of modern enterprises by means of perfection of the process of HR management are connected to the growth of the role of personal component of human capital.

This work offers the following recommendations for increase of effectiveness of HR management of the studied enterprise:

- Active involvement of personnel of enterprises with its problems and attempts of solving them. This is necessary for enterprise’s employees to feel their significance and direct their efforts for achievement of the common business. This could be achieved by delegation of authority, dialog between the management and employees of the enterprise, and establishment of dependence of employees’ wages on general success of enterprise;
- Establishment of close and trust relations between enterprise’s management and employees, demonstration of interest in employees’ problems. This will allow ensuring employees’ loyalty to enterprise and could be achieved by means of consideration of individual peculiarities of enterprise’s employees and not only of their working functions;
- Refusal from economy on expenses for HR management of enterprise. Such expenses could provide short-term profit, but in the long-term they lead to reduction of employees’ loyalty to enterprise and their negative reaction which, in its turn, leads to reduction of its financial results.

Realization of the stated recommendations in activities of modern enterprises will allow using human resources of enterprise and turning them from source of expenses into factor of competitive advantages and success of enterprise.

## 6 Conclusions

Thus, it is possible to conclude that in the process of business administration of modern enterprise it is necessary to pay special attention to issues related to HR management. In order to provide effectiveness of such management, it is necessary to treat enterprise personnel as personalities with their own goals and interests and strive to provide correspondence of their individual goals to collective goals at the level of enterprise on the whole.

Under the conditions of functioning of enterprises at the global markets, ignoring the tendency of the growth of the role of HR management in the process of business administration could very likely lead to enterprise being impossible to stand the global competition. That's why it's necessary to modernize technologies of HR management of modern enterprise.

Theoretical significance of results of the performed research consists in expansion of the concept of HR management and the concept of business administration and in determination of connection between these concepts. Practical significance of the work consists in development of practical recommendations for increase of effectiveness of HR management, which could be used in activities of modern enterprises.

The results of the performed research are limited by its conceptual and fundamental character. Taking into account high dynamics of modern market economy, the perspectives of further research in this sphere are related to development of new and more effective mechanisms and technologies of HR management of enterprise for increase of effectiveness of its business administration.

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# Marketing Strategies of Cluster Development in Retailing Sector

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**Abstract** The purpose of the article is to verify the hypothesis and develop recommendations for selection and performance of marketing strategies of cluster development in retailing sector. As a method of verification of the offered hypothesis, this work uses the method of comparative analysis, with the help of which the authors compare activities of a particular enterprise and cluster in retailing sector and substantiate the necessity for the cluster using its own approach to selection of marketing strategy. The authors substantiate the necessity for use of various marketing strategies of development of separate enterprise and cluster entity in retailing sector, study specifics of marketing activities of cluster in retailing sector, compile recommendations for selection and performance of marketing strategies of cluster development in retailing sector, and develop the matrix of marketing strategies of cluster development in retailing sector.

## 1 Introduction

Modern global economy is developing according to the post-industrial type. That's why most countries of the world strive to maximization of the share of service sphere in the structure of GDP. Together with striving for increase of rates of economic growth, this supposes not the reduction of volumes of industrial and agricultural production but growth of volume of provision of services.

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Under these conditions, retail business is one of the high-priority spheres of development of economy. Most of able-bodied citizens are employed in this sphere. The sphere of retail business is peculiar for the process of active clustering. Creation of clusters in the sphere of retail business allows increasing its investment attractiveness and stimulates the growth of rates of development of this sphere.

Most of subjects of the market in the sphere of retail business are small and medium enterprises. It is easier for enterprises of retail business to organize supplies and sales of the products if they are in a cluster. Also, clusters have additional advantages related to development of brand and receipt of state support.

The sphere of retail business is peculiar for high level of competition; keeping and improving the market positions of clusters—same as for usual enterprises—requires conduct of effective marketing activities. This is explained by actuality of study of marketing aspects of development of cluster in the sphere of retail business.

A starting point of this research is hypothesis that due to clusters' specifics, it is necessary to use the approach to selection and conduct of marketing strategy that is different from the approach that is used by certain enterprises. The purpose of the article consists in verification of this statement and development of recommendations for selection and conduct of marketing strategies of development of cluster in the sphere of retail business.

## 2 Literature Overview

Marketing activities play a very important role in activities of modern enterprises which act in the markets with developed competitive environment (Popkova et al. 2014). Marketing strategies suppose various approaches to behavior of the company in the market (Volosatova et al. 2014) and use of various means of competitive struggle (Popkova et al. 2013).

Correctness of selection and success of conduct of marketing strategy determine effectiveness of activities of an economic subject and its capability to survive market competition (Pappas 2016). That's why marketing occupies an important place in the system of management of modern enterprise (Ryding et al. 2016).

Cluster is an association of enterprises on the basis of a common feature, for joined economic activities (Amdam and Bjarnar 2015). This could be geographical proximity, sectorial belonging, etc. (Pogodina et al. 2015). Development of cluster supposes successful coordination of efforts of its members (Gibson 2015), efficient exchange of accumulated knowledge and experience (Troshin and Fedorova 2015), and receipt of maximum profit from the cooperation (Anokhina et al. 2015).

Retail business is the sphere of economy in which products are sold to final consumers (Schroeder et al. 2016). Issues of development of the sphere of retail business are viewed in detail in the works by such authors as (Nguimkeu 2016), (Babin et al. 2016), (Singleton et al. 2016), (Nilsson and Smirnov 2016), etc.

As a result of literature overview on the topic of the research, it is possible to conclude that the sense of marketing activities, role of clusters in development of

economy, and specifics of the sphere of retail business are viewed separately in the works of modern scientists. At that, the problem of marketing activities of clusters in the sphere of retail business remains out of sight of most contemporary researchers, which leaves vast field for further research in this sphere.

### 3 Research Methods

As a method of verification of the offered hypothesis, the work uses the method of comparative analysis, with the help of which the authors compare activities of particular enterprise and cluster in the sphere of retail business and substantiate necessity for cluster using its own approach to selection of a marketing strategy. The following qualitative indicators are used as comparison criteria:

- position in the market—the larger the share of market of the business structure, the more marketing tools are available for it;
- level of homogeneity—the more complex the economic structure, the more flexible managerial approaches are necessary for managing it;
- complexity of coordination of actions—the more complex the coordination of actions of structural components of economic subject, the more control is necessary during performance of marketing strategy;
- access to resources—the more accessible the financial, human, material, and technological resources, the simpler it is to perform marketing strategy;
- possibilities of innovational development—the more possibilities the business structure has for implementation of innovations into its activities, the more changes for success in the market it has.
- possibility to influence market prices—this possibility determined access for economic subject to tool of pricing competition and conduct of programs of loyalty for attraction and keeping clients.

Besides, the work uses the method of systemic and problem analysis, synthesis, induction, deduction, and graphic presentation of information.

## 4 Results

### ***4.1 Substantiation of Necessity for Using Various Marketing Strategies of Development of Particular Enterprise and Cluster Entity in the Sphere of Retail Business***

Results of comparison of activities of particular enterprise and cluster in the sphere of retail business are shown in Table 1.



**Table 1** Comparative analysis of activities of particular enterprise and cluster in the sphere of retail business

Criteria of comparison	Particular enterprise	Cluster
Position in the market (market share)	Less that 1 %	5–10 %
Level of homogeneity	High	Low
Complexity of coordination of actions	Low	High
Accessibility of resources	Low	High
Possibilities for innovational development	Insignificant	Significant
Possibility to influence market prices	Almost none	Possibility exists

As is seen from Table 1, cluster in the sphere of retail business is peculiar for larger share of market (5–10 % on average) than for separate enterprise (1 % on average). More sustainable position in the market gives the cluster a possibility to influence the prices and perform full-scale loyalty programs.

While small enterprise in the sphere of retail business can go to another market in case of unsuccessful selection and conduct of marketing strategy, a cluster, which is a unity of enterprises that operate in this sphere, cannot change its specialization.

Cluster is characterized by low level of homogeneity and high level of coordination of actions, which determines importance of flexible managerial approach. High accessibility of resources and wide possibilities for innovational development provide a cluster with wider diversity of marketing strategies than is for separate enterprise.

#### ***4.2 Specifics of Marketing Activities of Cluster in the Sphere of Retail Business***

The sphere of retail business is characterized by developed competitive environment. This pre-determines an important role of marketing activities in development of business structures in this sphere and its certain specifics. Firstly, in the sphere of retail business, i.e., in B2C market, a cluster ends the chain of added value and interacts directly with final consumers.

That's why it has an opportunity to study their needs and habits, and analyze preferences and individual peculiarities of consumers. Unlike particular enterprises, cluster can build marketing communications with a large number of consumers and cover a large share of market, this determining tendencies and regularities in development of consumer preferences.

Secondly, in the sphere of retail business, assortment of products is rather wide, so issue of its formation should be paid large attention. Consumers are used to purchase products in certain stores, so it is especially important to provide availability of the products and its correspondence to consumers' requirements.

Unlike manufacturers in B2B market, a cluster in the sphere of retail business cannot concentrate efforts on development of one product, which always supposes certain diversification of its activities. Performance of assortment policy under the conditions of cluster is connected to a range of difficulties related to necessity for coordination of products' assortment.

Thirdly, due to large diversity of the offered products in the sphere of retail business, it is expedient to develop the brand of a cluster on the whole, not the brand of each separate product. It is possible also to sell products under own trademark—in order to increase consumers' loyalty.

### ***4.3 Recommendations for Selection and Conduct of Marketing Strategies of Development of Cluster in the Sphere of Retail Business***

According to the principle of the famous Ansoff matrix, which reflects the logic of selection of strategy of development of particular enterprise on the basis of comparison of product and market, this work offers a proprietary matrix of development of cluster in the sphere of retail business on the basis of comparing the position of cluster in the market and the level of homogeneity of cluster members (Table 2).

As is seen from Table 2, depending on the position of the cluster in the market and the level of heterogeneity of cluster members in the sphere of retail business, it is expedient to implement one of the four marketing strategies. When the market share of cluster is large and its structure is heterogeneous, the cluster takes a leading position in the market of retail business and is interested in preservation of leadership and driving the rivals from the market.

**Table 2** Matrix of marketing strategies of cluster development in the sphere of retail business

		Position of the cluster in the market	
		Large share of the market	Small share of the market
Diversity of cluster members	Heterogeneous cluster	Cluster-leader Strategy of diversification and pricing competition Goal: driving the rivals from the market	Cluster-follower Strategy of diversification and non-pricing competition Goal: preservation of the market share, strengthening of the positions
	Homogeneous cluster	Cluster-contender for leadership Strategy of specialization and pricing competition Goal: conquering the leadership positions in the market	Niche cluster Strategy of specialization and non-pricing competition Goal: leadership in own segment of the market

For that, the cluster should conduct the strategy of diversification of its activities and pricing competition. Diversification could be performed in the form of expansion of the network of retail stores of enterprises of the cluster, expansion of assortment of products offered, etc. It is aimed at maximum coverage of the market.

Large-scale loyalty program with provision of large discounts for regular customers for products of cluster enterprises will increase their loyalty and put rivals into a tight position—loss of clients or refusal from the part of profit due to reduction of prices.

When the market share of cluster is large and its structure is homogeneous, the cluster remains a contender for leadership, but it cannot cover the whole market. It is interested in conquering leadership positions in the market. For that, it has to use the strategy of specialization and pricing competition.

The specialization supposes that while retail stores of cluster enterprises are concentrated in certain geographical location, it is necessary to open new stores in the same location—in order to ensure its maximum coverage and only then strive for coverage of neighboring locations.

If a cluster enterprise offers a certain range of products for its clients, it should not be expanded. It is necessary to gain advantage in the current assortment by means of high quality or low prices. Due to significant market share, cluster may influence the price. That's why pricing program of loyalty with provision of a system of discounts for regular clients might strengthen and improve positions of such cluster.

When the market share of cluster is small and its structure is heterogeneous, cluster is a follower and strives for preservation of its market share and strengthening of positions in it. As a rule, it does not have enough possibilities for driving the rivals out from the market and it cannot influence the price. That's why in this case it is advisable to use the strategy of diversification and non-pricing competition.

Diversification supposes entering new markets (of neighboring countries) and expansion of assortment of supposed products. Cluster should concentrate efforts on increase of service quality. Having no possibility for provision of significant discounts for customers, cluster can provide benevolence and politeness of its employees and additional non-pricing conveniences for customers (children's room, ATMs, etc.).

When market share of cluster is small and its structure is homogeneous, cluster is a niche one and is interested in achievement of leadership in its segment of the market. For that, it has to use the strategy of specialization and non-pricing competition. Specialization supposes bringing business into maximal correspondence to the smallest requirements of targeted clients.

Non-pricing competition supposes conduct of various marketing actions (for example, with prizes), involvement of consumers into various events, and their involvement with cluster's activities for the purpose of conquering their trust and loyalty.

It should be noted that despite the given ranking of the roles of clusters in market (leader, follower, etc.), they do not determine their market success. With the

increase of the number of enterprises in cluster and their size, its market share grows as well. At that, relations between cluster members and the process of managing them become complicated. With complication and enlargement of cluster, the level of risk grows.

On the contrary, with small number of cluster members and their small or medium size, cluster does not possess a significant share of the market, but provide them larger market power than with independent economic activities. Such clusters are easier to manage and it is easier to develop required relations between its members. The level of activities of such clusters is not high. So when forming a cluster, it is necessary to evaluate not only the acquired advantages but possible drawbacks of its further marketing activities.

## 5 Conclusions

As a result of the research, it is possible to conclude that peculiarities of a cluster pre-determine the necessity for using the approach to selection and conduct of marketing strategy that is different from the approach successfully used by separate enterprises. This work offers the matrix of development of cluster in the sphere of retail business on the basis of comparing the state of cluster in the market and the level of heterogeneity of its members.

Despite division of risk between its members, cluster in the sphere of retail business has larger risk component than a separate enterprise. Cluster is peculiar for strict specialization and availability of significant assets, which determines its low flexibility and attachment to a certain sphere of economy.

Unlike separate enterprise, cluster in the sphere of retail business cannot switch into another sphere or change the assortment of the offered products. However, cluster has a larger range of marketing tools related to brand management, development of marketing communications, conduct of loyalty programs, and driving the rivals out of the market.

Scientific and practical value of the results of the performed research consists in development and unification of the concept of marketing and concept of cluster development of economy. A certain limitation of the results of the performed research is absence of approbation of the offered recommendations for selection and conduct of marketing strategies of cluster development in the sphere of retail business. While conducting further research in this sphere, it is necessary to pay attention to the issues related to practical realization of the matrix of marketing strategies of cluster development in the sphere of retail business.

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# Place and Role of Budgeting in the System of Methods of Managerial Accounting of Cluster Contractual Relationship

Gulfira M. Duysenbieva, Nizami A. Yusufov, Rasim A. Radzhabov,  
and Kamil A. Umalatov

**Abstract** The purpose of the article is to determine the place and role of budgeting in the system of methods of managerial accounting of contractual relationship of cluster. The research was conducted within the concept of institutional economy, concept of enterprise management, concept of financial management, and concept of clustering of economy. This determined the choice and use of the methodology of the research, based on the method of institutional, financial, problem, systemic, and structural & functional analysis, synthesis, induction, deduction, formalization, and modeling of economic systems. The authors determined the specifics of management of contractual relationship of cluster, analyzed the system of methods of managerial accounting of contractual relationship of cluster, and determined problems and perspectives and developed recommendations for development of budgeting as a key method of managerial accounting of contractual relationship of cluster. As a result, the authors came to the conclusion that budgeting occupies the central place and performs the key role in the system of methods of managerial accounting of contractual relationship of cluster.

## 1 Introduction

At present, under the influence of the processes of globalization of the world economy, transnationalism of entrepreneurial activities, and post-industrialization of socio-economic systems, the number and frequency of economic operations grow quickly. The strategy of achievement of the “scale effect” and maximization of sales volumes becomes more popular in the global markets. All of this leads to formation of transaction economy.

Transaction economy is an economic system in which economic deal or transaction occupies a central place in the system of economic relations. Under these

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conditions, importance and actuality of minimization of transaction costs and management of transaction or contractual relationship of entrepreneurial structures grow.

In addition to that, many modern socio-economic systems develop by the cluster type. This supposes formation of sectorial economic clusters in various spheres of national economy. Cluster features more complex transaction relationships than between separate enterprises as the structure of cluster is complex and many-sided.

Taking into account that the main idea of creation of economic cluster consists in maximization of effectiveness of economic activities of its members, development of methodology for optimization of its contractual relationship is a perspective direction for scientific research.

This work offers a hypothesis that budgeting occupies a central place and plays a key role in the system of methods of managerial accounting of contractual relationship of cluster. The purpose of the article is determination of the place and role of budgeting in the system of methods of managerial accounting of contractual relationship of cluster.

## 2 Literature Overview

Managerial accounting is the process of collection and analysis of information and making managerial decisions regarding various aspects of activities of enterprises (Jacková 2016). Managerial accounting is the basis of modern business (Otley 2016), as it provides planned and systemic nature of its development (Libby et al. 2015) and is a guarantee of effective management (Chenhall and Moers 2015).

Contractual relationship of enterprises appear as a result of conclusion of business deals (Johnson and Sohi 2016). They are registered officially and are performed on the basis of contract and current legislation (Subramanian et al. 2016). Contractual relationships are necessary for stable functioning of enterprises in market (Vasconcelos 2014), as they provide predictability of its relations with business partners (Ding et al. 2013).

Budgeting is the process of collection and processing of information for compilation of budget and management of enterprises' finances (Schlegel et al. 2016). Foundations of budgeting, as a method of managerial accounting, are set in works of such modern authors as Popesko and Šocová (2015), Ji and Lejeune (2015), Dudin et al. (2015), etc.

Economic cluster is an economic system consisting of many enterprises united on the basis of a certain attribute (Popkova et al. 2013a). The sense and specifics of functioning and development of cluster are viewed in the works by Popkova et al. (2013b, 2015a, b), etc.

Literature review on the topic of the research showed that despite the high level of elaboration of its particular aspects, the problem of determination of the place and role of budgeting in the system of methods of managerial accounting of contractual relationship of cluster remains unsolved in contemporary science, which causes necessity for conduct of further research.

### 3 Research Methods

The research is performed within the concept of institutional economics, concept of management of enterprise, concept of financial management, and concept of clustering of economy. This pre-determined choice and use of the methodology of the research, which is based on the method of institutional, financial, problem, systemic, and structural & functional analysis, synthesis, induction, deduction, formalization, and modeling of economic systems.

In order to substantiate the necessity for managerial accounting of contractual relationship of cluster, the authors of this work use the concept of transaction economy, within which they determine the role of contract as a reflection of transaction in modern economic system and analyze the process of formalization and institutionalization of contractual relationship of cluster.

Due to conduct of institutional analysis, this work analyzes the sense of cluster as an economic institute and determines foundations of its contractual relationship. Based on the concept of management of enterprise, the work studies the methods of managerial accounting which accessible for cluster. With the help of conceptual provisions of financial management, the articles views budgeting as a financial tool in the system of methods of managerial accounting of cluster contractual relationship.

Within the concept of clustering of economy, the authors of this paper finds the sense of cluster as an economic category, determine specifics of its contractual relationship as a unique structural phenomenon, and view the system of internal relations in enterprises within cluster and the system of interrelations between cluster and environment. Also, the authors use the foundations of synergetic approach during study of cluster and methods of managerial accounting of its contractual relationship as an economic system.

## 4 Results

### 4.1 *Specifics of Management of Cluster Contractual Relationship*

Peculiarities of the structure of cluster, as a socio-economic system, determine specifics of its contractual relationships which are formed within two levels: internal and external. Internal level includes conclusion of contracts and transactions between cluster members.

A typical example of such contractual relationship is transactions between R&D institutes and industrial enterprise regarding buy and sell of new technologies. As a rule, it is relationship contracts which are built on the basis of not only formal mechanisms but on the basis of the system of informal relations and insider's information of cluster members; they may even have an implicit form.



The external level includes contractual relationship between cluster and its contractors. For example, it could be relationship between industrial enterprises of cluster and their suppliers. Such contracts are usually neo-classical, they are more formalized, and are concluded in explicit form.

A common feature of intra-cluster and contractual relationship in the internal level and cluster relationship in the external cluster is the fact that they are built on the basis of the principle of economic effectiveness. According to this principle, the contract parties conclude it for the purpose of receipt of own profit and maximization of advantages from cooperation. This principle is also coordinated with the market's mechanism which works inside the cluster and outside it.

#### ***4.2 The System of Methods of Managerial Accounting of Cluster Contractual Relationship***

This work distinguished the following components in the system of methods of managerial accounting of cluster contractual relationship:

- planning and selection—the process of setting the tasks of initiating contractual relationship, consideration of possible variants of contracts conclusion and potential business partners of cluster, and determination of criteria of their comparison and selection of the most optimal ones;
- grouping and systematization—the process of structuring of potential business partners of cluster, determination of their common and different attributes, and formation of comprehensive idea on the situation in the market, where the contract is to be concluded;
- cost estimation and calculation—the process of analysis of transaction costs related to conclusion of the planned contract with different potential business partners;
- analysis and evaluation—the process of determination of potential profits from conclusion of various contracts with various potential business partners;
- rating and establishing limits—the process of determination of maximum allowable level of transaction costs for cluster and minimum profit necessary for acknowledging the contract to be expedient;
- budgeting—the process of determination of expediency of conclusion of the contract with this business partner through comparison of costs and profits and development of control variables for further evaluation of its effectiveness;
- control and audit—the process of monitoring of results of conclusion of contract, the process of its performance, and evaluation of its effectiveness with the system of previously developed criteria (Fig. 1).

As is seen from Fig. 1, the process of managerial accounting of contractual relationship of cluster goes through four main stages. The first stage includes collection and analysis of information on the planned contract. Most of methods

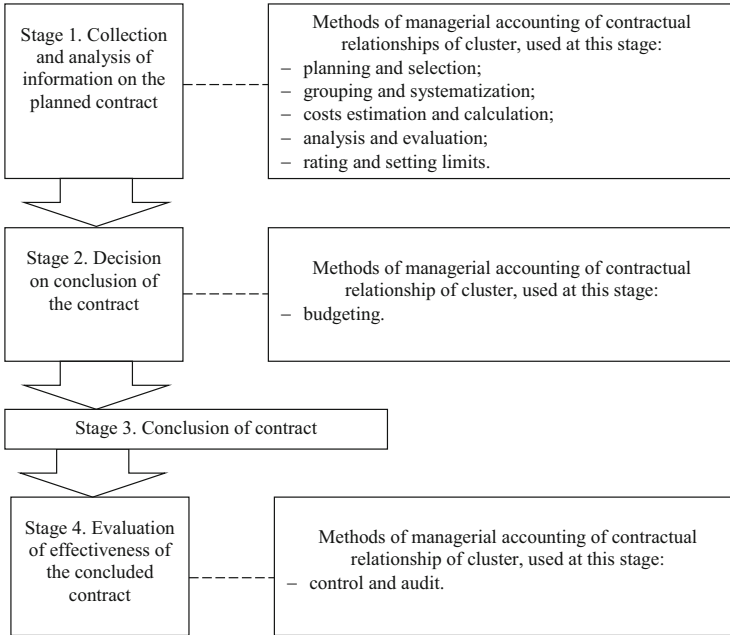


Fig. 1 Process and system of methods of managerial accounting of cluster contractual relationship

of managerial accounting of contractual relationship of cluster are used here: planning and selection, grouping and systematization, cost estimates and calculation, analysis and evaluation, and rating and setting limits.

The second stage includes making decision on conclusion of a contract with the help of the budgeting method. The third stage includes conclusion of a contract between cluster and its business partner. The fourth stage includes evaluation of effectiveness of the concluded contract with the help of methods of managerial accounting of contractual relationship of cluster as control and audit.

According to the authors of this article, the most important, complex, and responsible stage is making a decision on conclusion of contract. As this stage supposes the use of only the budgeting method, it occupies the central position and plays a key role in the system of methods of managerial accounting of contractual relationship of cluster.

### ***4.3 Perspectives and Recommendations for Development of Budgeting as a Key Method of Managerial Accounting of Contractual Relationship of Cluster***

The most popular problems of the use of the method of budgeting in the process of managerial accounting in contractual relationship of cluster are the following. Firstly, large complexity of budgeting. The process of budgeting supposes processing of large volume of information, which requires a lot of time and efforts, as a slightest mistake can distort the final result.

Secondly, lack of data for compilation of precise calculations and forecasts. It is very difficult to study the full situation in the market and develop a comprehensive idea of all possible variants of cluster contractual relationship cluster. Incompleteness or distortion of initial information leads to strengthening of approach and reduction of probability of the compiled forecasts, which may be a reason for making wrong managerial decisions.

Thirdly, a large number of cluster members, the interests of which should be taken into account and regulated. Most of interested parties seek various goals and interests, which significantly complicates the process of management of cluster contractual relationship, as compared to particular enterprise. Consideration of interest of some members of cluster and ignoring the others may lead to its destruction.

Perspectives of solving these issues are related to perfection of the process of budgeting and the use of systemic approach to conduct of managerial accounting of cluster contractual relationship. For development of budgeting, as a key method of managerial accounting of cluster contractual relationship, this work offers the following recommendations:

- automatization of the process of budgeting—using the newest software will allow simplifying and accelerating the process of budgeting and reducing the role of subjective components in the process of performance of calculations and decision making;
- creation and development of informational system for budgeting—availability of renewed data base on possible variants of development of cluster contractual relationship will allow simplifying the process of decision making;
- optimization of cluster contractual relationship—for regulation of interests of various members of cluster, it is necessary to find their balance. If it's impossible to conclude a contract that fully corresponds to interests of all members of the cluster and that satisfies only some of them, it is expedient to conclude the next contract that corresponds to the interests of other members, in order to preserve the cluster.

## 5 Conclusions

Thus, as a result of the research, the offered hypothesis was proved and it was confirmed that budgeting occupies a central place and plays a key role in the system of methods of managerial accounting of cluster contractual relationship, as it is used within the most responsible stage of this process and cannot be substituted.

It should be concluded that peculiarities of functioning of economic cluster cause conclusion of contractual relationship at the internal level. For that, it is expedient to unite into a cluster horizontally and vertically integrated enterprises.

Contractual relationship at the internal level are characterized by lower level of uncertainty and risk. Transaction costs for their conclusion are lower than at external level, due to absence of necessity for their full formalization and detalization and the possibility for performance of these relationships based on mutual trust.

Reduction to the minimum of the share of contractual relationship at the external level of cluster will allow increasing effectiveness of budgeting and managerial accounting on the whole. It is also expedient to use the developed recommendations for development of budgeting as a key method of managerial accounting of contractual relationship of cluster.

Generalized character of the model of contractual relationship of cluster and their managerial accounting, as well as developed recommendations causes certain limitation of results of the performed research. That's why empirical analysis of the system and methodology of managerial accounting of cluster contractual relationship and of effectiveness of the offered recommendations constitutes the basis for further research in this sphere.

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# Role of Clusters in Promotion of Region's Economic Competitiveness

Irina V. Cheremushkina, Olga V. Oseneva, and Olga N. Ozherelyeva

**Abstract** The article shows the background of the implementation of cluster policy, the problem of creating cluster structures, and their role in improving the competitiveness and efficiency of the regional economy. The basic characteristics in a meaningful definition of a cluster are determined. The mechanisms of forming industrial clusters in the Voronezh region are discussed. The analysis of the main results of implementation of cluster policy in the region demonstrates the competitiveness of the regional economy and its innovative orientation.

Modern economic literature provides various definitions of a cluster. Researchers of the French classical theory considered clusters on the basis of the concept of “filierre”, the purpose of their formation is the creation of technological linkages between industries and different sectors of economy in order to realize the main advantages.

In our opinion, the most appropriate and effective theory of cluster approach is the method of M. Porter. He suggested a theory of national, state, and local competitiveness in the global economy. “Clusters are geographically concentrated groups of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated organizations (e.g., universities, standards agencies, trade associations) in particular fields that compete but lead collaboration”. Clusters cause a new view on the economy and its development, new roles of business, government and institutions, and new ways of structuring the relationship of the type “business—government or business—institutions” (Porter 2005).

The processes of globalization, global financial crisis, increased competition, the use of IT, modern knowledge, processes, and products (services) led to the emergence of clusters as an institutional framework of innovative development of regions and a country as a whole. As a consequence, the theory of clustering can be considered as a new approach to assessing conditions for the development of the regional economy, representing the system as a single interrelated complex that provides the possibility of making management decisions.

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In the promotion of innovation development, a cluster becomes the most acceptable form of activity in the form of a network of independent production companies, including suppliers, creators of technologies (educational and research institutions), market institutions (consultants) and consumers interacting with each other within a network.

D. Lyakhovsky (2016) gives the following definition: “A cluster is a network of independent manufacturers or service firms, including their suppliers, creators of the technology and know-how (universities, research institutes, engineering companies, etc.), market institutions (brokers, consultants), and consumers interacting with each other within the same network and having geographical proximity”. This definition gives a broad idea of possible members of a cluster, their role, and functions, reflecting a modern point of view. The main role in the definition is given to consumers. We see a contemporary viewpoint on the role of a final buyer in the mechanism of transformation of resources and obtaining results of practical activity, i.e., all members of the cluster form a sort of network through interaction and relationships inside a cluster. The interaction based on geographical proximity determines the effectiveness of the cluster itself.

One may state that the most successful clusters will be formed if there are innovations in engineering and production technology, followed by entry into new market niche, as one of the features of a cluster is its innovative orientation.

To date, the cluster is considered as a network of geographically interrelated and complementary enterprises, including specialized suppliers, producers and buyers, which are in a close relationship with research and educational centers, local institutions, and authorities with the aim of improving the competitiveness of enterprises, regions and national economies. Regional cluster is a set of business entities located on the same property and forming the basis of the local environment through the production of the final product, based on the use of knowledge and technology. Such clusters usually unite not only large enterprises but also small and medium ones. Clusters are a driving force for improving competitiveness at all levels of the economic system, the engines of economic growth and social progress. At the core of the cluster, as a rule, there is a large enterprise which interacts with other organizations involved in the cluster, based on vertical links (chains of purchases and sales) and horizontal ones (more services, use of modern technology). There are auxiliary organizations that provide necessary technology, information, capital (financial resources), and infrastructure—they are typically created around large groups and become their suppliers. Large companies encourage them to the production of intermediate products and related services, which exerts a powerful influence on the development of small and medium businesses. Therefore, the competitiveness of the whole cluster depends on interactions within the clusters, the ability of their participants to use effectively internal resources and to mobilize external ones.

Thus, it should be noted that while forming a cluster, one must combine the resources of all kinds, such as: technology, capital, knowledge, services, human resources, etc., so that they could give unconditional and exceptionally high emergent effect. It is necessary to find the type of association, communication and interaction, which will give a constant generation of innovative ideas and relatively continuous process of turning them into goods (services).

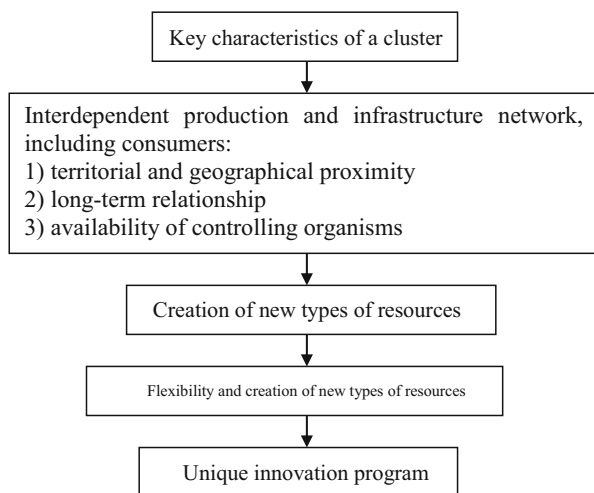
Any pooling of resources will be accompanied by the formation of a single information space, and within this space the identification, accumulation, exchange, and development of knowledge will take place. The creation of such evolutionary space will require completion of certain principles:

- unconditional relationship: centralized management bodies, enterprises, and mechanism of coordination and collaboration;
- long-term relationships and the need for coordination of development of strategies of regional cluster participants with priorities of state and regional policies;
- a geographical unity;
- establishing institutional and functional infrastructure for the implementation of the clustering process;
- the system of interaction in the technological chains;
- the primary role of consumers in the cluster;
- the ability to create new types of resources;
- the availability of innovative programs;
- flexibility and openness of a cluster as a system.

G. P. Khasaev and Y.V. Mikheev (2005) give the following definition: “A cluster is a sustainable territorial and sectoral partnership, united by an innovation program of introduction of advanced manufacturing, engineering, and management technologies with the aim of improving the competitiveness of cluster participants”. From our point of view, this definition states the nature of the problem, i.e., the cluster is clearly characterized as a partnership executing an innovative program, having an ultimate goal: improving the competitiveness of cluster members. Consequently, an innovation is an absolutely necessary characteristic of a cluster—and with a program, a partnership becomes a cluster.

Summarizing, we should consider the approach of D.V. Proskura et al. (2008) and emphasize the main features of a cluster (Fig. 1):

**Fig. 1** Key characteristics of a cluster





- production and technological linkages of the companies forming a cluster;
- territorial and production community of relationships;
- developed infrastructure with the transfer of knowledge and technology;
- flexibility of a cluster—namely, the possibility of its expansion and contraction;
- openness of a cluster as a system.

As noted above, a cluster is a union of different types of resources, including capital, knowledge, technology, human resources, financial resources, etc. Acknowledging the openness of the system, the authors initially state that a cluster has a direct and immediate exchange with the environment in each of these resource elements, and, first of all, in terms of information exchange.

The level of management of industrial complexes of regions determines the level of the whole economic and social state of regions. It is necessary to say that they strengthened their economic independence under the conditions of functioning of market relations. The experience of management under the conditions of market economy shows that the state industrial policy should be implemented not only through the legislative and legal regulation of macroeconomic processes, but it should also provide investment support for industrial enterprises, implement investment plans and programs, and create favorable conditions for the development of certain economic segments that determine its mechanisms.

Today one of the strategic goals of the region is the creation and development of forms of associations like research and production clusters. According to the Decree of the RF Government dated April 23, 2010, No. 282, a research and production cluster is characterized as “a contractual form of cooperation of organizations providing support and carrying out purposeful activity on development, production and promotion of nano-industry production to domestic and foreign markets of high-tech products”.

The main feature of these associations is a system of interaction between industries and organizations, which will have a positive impact on improving production efficiency, promoting competition, minimizing risks, developing links with foreign companies, training of specialists and improving their qualifications, developing and promoting modern scientific achievements, reducing transaction costs.

Competitive advantages of clustered structures are achieved mainly through interaction of different sectors, creation of business connections, collaborative technologies, obtaining new information, development of marketing, strategic decision-making, and coordination. Due to the proposed system of interaction between enterprises, a cluster has more efficient access to resources inside it. Due to the participation of enterprises of various industries in the cluster, there is a possibility of obtaining progressive methods of work, technologies, and new marketing channels. Enterprises in a cluster gain an easy access to new equipment, services, and other components. Participation in a cluster does not involve competition between enterprises, but rather focuses on a specific segment of the market. Combining the efforts of businesses in order to maximize profits is the main point that determines the benefit and the essence of being a member of a cluster.

Coordinated development and investment allows anyone to win, because the links in a cluster are interdependent, the income of one of the links is distributed among others in the optimum ratio, so the entire cluster benefits.

The creation of industrial clusters of the Voronezh region is one of high-priority directions of development of the region. Accordingly, it was decided to create the Center of cluster development in the form of the state budget institutions. The purpose of cluster development is the creation of conditions for effective interaction of enterprises—participants of territorial clusters, educational and scientific institutions, non-profit and public organizations, state authorities and local governments, investors (investing in the development of territorial—industrial clusters), ensuring the implementation of joint (cluster) projects. The tasks to be solve by the Center are the following:

- promoting the creation of new enterprises (production sharing formula);
- expanding the practice of joint participation (consortium) of organizations-cluster participants in the implementation of major orders (public procurement, transnational corporations);
- elaborating and solving the issues related to the implementation of joint projects in the field of cost reduction, competitiveness, logistics, information and communication technologies, etc;
- organizing the development of common standards for products, suppliers, etc.;
- expanding marketing activities of organizations participating in the clusters in order to gain access to new markets, including international ones;
- development of unified requirements to suppliers and the evaluation of suppliers within a cluster;
- organizing benchmarking and ensuring the conformity of products of enterprises;
- participants of clusters to the requirements of consumers in order to access new markets etc.

The Center of cluster development of the Voronezh region was established in September 2011 by the initiative of the regional government. Its main task is creating conditions for effective interaction of enterprises-participants of clusters, educational and research institutions, non-profit and public organizations, authorities, and investors. The necessity of adopting “The Concept of cluster policy of the Voronezh region in the industrial sector of the economy” was determined by the need to harmonize regional policies and activities of the Federal authorities, in particular, the “Concepts of the long-term socially-economic development of the Russian Federation until 2020” sets a goal of “creating a network of territorial-production clusters, realizing the competitive potential of the territories”.

It is possible to distinguish three main reasons why the states stimulate the development of clusters:

clusters increase productivity and efficiency of production, because firms get an easier access to suppliers, skilled labor, information, services, and educational centers;

clusters stimulate innovations, as firms have access to the latest information on improving the production process; and educational and research centers generate new knowledge and have the opportunity to experimentally confirm or refute the validity of new theories;

clusters facilitate commercialization of knowledge and production. Favorable conditions (labor availability, support institutions, and vendors) are provided in order to create new firms and to develop new kinds of goods.

The development and approval of the concept is a natural stage in building the strategic management system of the region. The implementation of cluster policy by the Government of the Voronezh region will expand the access of entities-cluster participants to investment, innovation, specialized services, and personnel and will concentrate production and labor forces in the most competitive areas of the regional economy.

As for the application of the cluster approach in the Voronezh region, it is necessary to say that cluster mechanisms allow revealing the main competitive advantages of the region, which, in turn, provide sufficient conditions for the formation of clusters, first of all, due to the high research and personnel potential, as well as the availability of competitive technology, innovation, and research infrastructure.

The purpose-oriented program “Formation and development of clusters for 2013–2018” is being implemented in the Voronezh region, and its volume of financing constitutes RUR 120 million. The experts highlighted the agro-industrial (processing) sector, construction, manufacture of equipment for oil and gas and nuclear industries, furniture manufacturing, and electronics as the most perspective directions of development of clusters.

Nine clusters have been created in the Voronezh region so far: a cluster of manufacturers of equipment for the oil and gas industry was one of the first ones; the IT cluster; the cluster of construction materials & technologies, furniture, and electronics; transport and logistics cluster; “Voronezh electro-mechanics” cluster; the cluster of aviation; the cluster “Beef cattle”. The meat cluster was started in 2010. Its membership today consists of all the beef producers in the region—from small farms to such giants Zarechnoye LLC, which possesses the feedlots designed for the simultaneous breeding of 24 thousand animals and a meat processing plant capable to produce 40 thousand tons of meat per year. The aim of the cluster (which costs RUB 560 million) is to build a value chain: from production, genetic breeding, and development of commercial herds to processing and marketing of meat. The basic idea of creating a meat cluster is the unification of all production levels: genetic companies, feed facilities, meat processing plants and the level of implementation. The meat processing plant in Ramonsky district was launched this spring and the creation of the cluster was completed. Zarechnoye LLC has developed its own brand “Prime beef”, the production of which will be realized throughout Central Russia. It became the first meat cluster in Russia. Benefits for participants are provided in the manner prescribed by regional legislation in the sphere of investment policy. The head of the regional Department of agrarian policy

Anatoly Spivakov previously explained that a cluster allows producers to “keep all steps of added value in the region, and also it helps manufacturers to manage the difficulties more confidently”. By the end of 2015, the region covered its own needs in milk (120–130 %) and needs in beef (300 %).

The main results of implementing the cluster policy in the Voronezh region are the increase of the economic competitiveness of the region through growth in production volumes, the increase of the share of innovative products and productivity of cluster members, the increase of volumes of direct investments in the region's economy, and increase of number of competitive enterprises in the region.

The main aim of cluster policy is to ensure high rates of economic growth and diversification of the economy by increasing the competitiveness of enterprises, suppliers of equipment, components, specialized production and services, research, and educational institutions and making up territorial-production clusters. The clusters, being cross-sectoral formations, increase the interconnection and complementarity of businesses through faster implementation of specific technologies, information and marketing skills. An important feature of a cluster is its innovative orientation—the rapid development of new types of equipment and production technology, followed by the entry into new markets.

The main expected results of the development of cluster policy in the Voronezh region are total amount of additional tax revenues of the consolidated budget of the region by 2019—RUR 450.8; the total number of small and medium-sized businesses participants of the clusters—98 companies; the total number of jobs in small and medium-sized enterprises—cluster participants—over 10,000 people.

According to A. Brodetsky (2013), an important feature of cluster is its innovative orientation, manifested in the rapid development of new types of equipment and production technology, followed by the entry into new markets. We should identify a number of factors stimulating the innovation activity of companies:

- interaction of educational institutions and industrial enterprises, ensuring the development of scientific research and innovative activity in the region;
- participation in a cluster facilitates access to new technologies used by enterprises due to the cost reduction for implementation of research and development activities as a result of cooperation, easier and cheaper access to specialized inputs (components, equipment, personnel, and services) in comparison with other options of integration (vertical formation of alliances);
- the enterprises participating in a cluster have additional competitive advantages due to the possibility to carry out an internal specialization and standardization, to minimize the cost of innovation, and also due to a flexible business structure of small businesses competing in the process of production of creative ideas, enabling the identification of innovative points of growth of the economy of the region.

Analyzing the above, the cluster approach should be considered as a new management technology that allows increasing the competitiveness of both individual enterprises and an industry brunch or a whole region.

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# Clustering as a Growth Point of Modern Russian Business

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**Abstract** The article is devoted to the role of clustering in the development of modern Russian business. The authors analyze the dynamics of main parameters of development of small and medium business in modern Russia and reveal the problems and perspectives of development of business. The authors offer and prove the hypothesis that clustering is a growth point of modern Russian business.

## 1 Introduction

The main task of modern Russian lies in the macroeconomic plane and consists in mobilization of economic potential of the country and its orientation of the increase of attraction of Russian territories as regions of conduct of business. This requires the implementation of structural changes in Russian economy, which is hindered by existing barriers of a certain kind.

Firstly, according to the data of the Global competitiveness report, Russian has low indices as to such parameters as liberalizing of trade and non-tariff barriers, and the competitiveness in the country is influenced by corruption and administrative

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inefficiency. Secondly, the business leaders, who start a new project in Russia, report the substantial restraining factors at its beginning, such as instability of socio-economic situation, complexity of long-term planning and forecasting, high investment risks, difficulty in attracting financial resources, related to high interest rates in credits and low investment attractiveness of Russian economy, insufficiently developed infrastructure, etc. Thirdly, Russian financial markets have low indices in the sphere of complex services and companies' financing.

These barriers determine the unfavorable conditions for conduct of business in modern Russia, which causes the problem of creating the conditions for development of business in all regions of Russia. One of the possible ways of dealing with the existing problems may be the creation of new economic model, based on the clustering of regions of Russia. Based on this, the research offers the hypothesis that clustering is a point of growth of modern Russian business. The aim of this research is to check this hypothesis and determine the role of clustering in the development of modern Russian business.

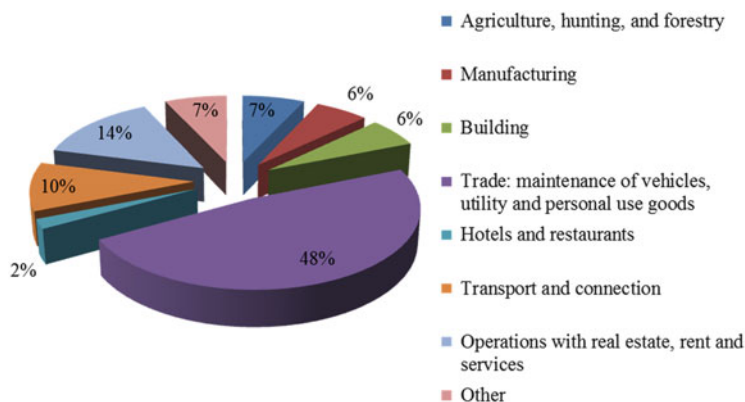
## 2 Materials and Methods

At the present time, there is a polarization of structure of business in Russia. The sphere of extraction of commercial minerals is characterized by oligopolistic sectorial structure which includes mostly large enterprises. These enterprises export their products, have high level of competitiveness in the global markets and to a lesser extent require a state support, than enterprises in other spheres of economy, in which the main part is constituted by small and medium enterprises, acting under conditions of fierce competition and orienting at the domestic market.

Let us view the dynamics of main parameters of development of small and medium business in modern Russia. In 2013, there were 3.5 million small and medium enterprises from the total of 4.7 million enterprises in Russia. In 2013, the number of private entrepreneurs reduced by 3 %. The main reason was the increase of insurance payments to the Pension fund of Russia. In 2014, there was stabilization and small positive dynamics of the quantity of private entrepreneurs.

At the present time, most of the subjects of small and medium business (medium, small enterprises, micro-enterprises, and private entrepreneurs) of Russia are engaged in wholesale and retail, as well as in maintenance of motor transport vehicles, utility and personal use products (48 %), real estate operations, rent, and services (14 %), and transport and connection (10 %) Fig. 1.

It is important to note high level of labor efficiency and mobility of subjects of small and medium business in the spheres of wholesale and retail, as well as in the spheres of maintenance of motor transport vehicles, utility and personal use products. Subjects of small and medium business which are engaged in the sphere of operations with real estate, rent, and service, on the contrary, show low labor efficiency. Also, low labor efficiency is observed in the subjects of small and medium business which are involved in the sphere of manufacturing activity, agriculture, hunting, and forestry.



**Fig. 1** Structure of small and medium business in Russia in 2013. Source: Russia in numbers: Russian statistical yearbook: Rosstat 2014

**Table 1** Dynamics of share of sales turnover of small and medium business subjects in top-priority spheres in relation to all subjects of small and medium business

Top-priority spheres	2011(%)	2012(%)	2013(%)	Change of share(%)
Agriculture	9.72	8.11	5.77	-3.95
Mineral extraction	1.03	0.75	0.66	-0.37
Textile and garment manufactures	0.02	0.02	0.10	0.08
Chemical industry	0.49	0.39	0.46	-0.03
Metallurgical production	0.01	0.02	0.06	0.05
Manufacture of machines and equipment	0.25	0.36	0.55	0.30
Building	15.99	14.58	13.55	-2.44

Source: Evaluation of National Institute for Systemic Studies of Entrepreneurial Studies based on the SPARK database (selection—11,592 subjects of small and medium business)

The sales turnover of small and medium business in Russia in 2013 constituted RUR 4,451 billion, having increased by 5.5%. Its increase is due to the growth of labor efficiency, as an average list quantity of workers at small and medium enterprises reduced by 5% in 2013.

An important aspect is high level of innovational activity of subjects of small business: according to 2013 data, the share of innovational production of small enterprises constituted 4.2% and the expenses of enterprises for technological innovations—RUR 254 million for 1000 small enterprises.

Level of opportuneness of business sphere in Russia, according to the results of analysis of main parameters of development of small and medium business subjects, may be determined as low; however, there is a substantial potential for development of small and medium business in the top-priority spheres.

Considering the sectorial structure of activity of small and medium business subjects in top-priority sectors, it is possible to observe a tendency for reducing the share of their sales turnover in these very spheres (Table 1).



As we see, the share of sales turnover of small and medium business in such spheres as textile and garment manufacture, metallurgical production, and manufacture of machines and equipment increases from 2011, which shows the substantial potential of development of small and medium business in all the spheres.

Moreover, taking into account the support measures, which are already being realized and planned, it is possible to forecast the further improvement of entrepreneurial sphere, which will positively influence the development of small and medium business if there is no quick and significant aggravation of macroeconomic situation in the country.

In mid-term, the large potential for active attraction of investments is observed in the subjects of small and medium business of such spheres as:

- manufacture of clothes, fur dressing and dying;
- manufacture of electrical machines and equipment;
- recycling of secondary raw materials.

In the whole Russia, the negative influence on the state of small and medium business is performed by the following internal and external factors:

- increase of rent and land tax, due to the growth of cadastral value of land;
- growth of energy prices and, as consequence, rise of prices for goods and services.

Also, the obstacles, which limit the development of subjects of small and medium business, include:

- insufficient level of development of small and medium business in industry and agriculture, which limits the quantity of innovational projects that have commercial perspectives for such enterprises;
- absence of true operative economical and statistical information on the state of small and medium business in municipal establishments;
- low level of equipment, its age and lack of buildings which are in possession of small and medium business.

The perspectives of small and medium business depend directly on the solution of the abovementioned problems, so one of the main factors of development of small business is many-sided system of measures of government support at all levels of economy. The financial crisis influenced negatively the subjects of small and medium business, which led to substantial decrease of all main parameters of their activity. After reduction of crisis phenomena, beginning from 2011, the financial and property position of subjects of small and medium business began to improve.

### **3 Results**

Based on the analysis of key indicators of activity of small and medium business subjects (income, profit, capital and reserves, permanent assets, current assets), the spheres, in which small and medium business develops in the most active way, are the following:

- 1) manufacture of clothes, fur dressing and dying;
- 2) manufacture of electrical machines and equipment;
- 3) recycling of secondary raw materials.

In these spheres there is a possibility of growth of subjects of small and medium business in mid-term, which stimulates the increase of investments in these sectors as of now, due to their better payback, in comparison with investments in small and medium business of other spheres.

The measures of government support for small and medium business are characterized by average level of efficiency. The complex of support measures is formed according to the key issues of small and medium business; however, the best practices of support for subjects of small and medium business are just beginning to be implemented. According to the Subprogram “Development and support for small and medium business” for 2012–2016 and the Strategy of development of small and medium business until 2020, in order to provide the stable development of small and medium business subjects, a program and complex approach to support for small and medium business is used (subsidies of 8 types; small loans and guarantees; property support and other services from the objects of infrastructure of support for development of small and medium business), the key aim of which is the solution of the key problems of small and medium business (Popkova and Tinyakova 2013a):

- lack of personnel of required qualification and highly skilled personnel (also, competencies of business management);
- low availability of financial resources;
- low availability of structures;
- low availability of production equipment, mostly high-tech;
- issues of administrative climate and corruption;
- increase of energy tariffs;
- low availability of new energy capacities.

It should be noted that nowadays there is a change in principles, on which the approach to small and medium business support is based: the principles of small and medium business support are implemented which are used both in the developed countries and in the leading regions of Russia. Thus, the support measures become more targeted; e.g., the target group for subsidies for emergent entrepreneurs is not all spheres of small and medium business, but innovational enterprises (Popkova and Tinyakova 2013b).

Also, there are procedures of a unified window for citizens’ queries as to the issue of small and medium business support and as to submission of documents for subsidies. According to the trend of realization of the best Russian and global practices of small and medium business support, the engineering centers were created in Russia in 2009 which provide the subjects of small and medium business services that may be compared to the best global practices for stimulation of implementation of new technologies at the enterprises, namely (Popkova et al. 2013):

- providing consulting and expert support for subjects of small and medium business in the sphere of technological and project engineering;

- conduct of analytical research in the sphere of determining the needs and potential possibilities of small and medium business subjects with account of diversifying of production, use of leading technologies, increase of energy efficiency, and use of alternative sources of energy;
- cooperation in training, retraining, and advanced training for subjects of small and medium business in the projects of modernization and creation of new manufactures;
- preparation for small and medium business subjects of unified standards and methodological solutions for use of technologies of management of projects in various spheres of activity.

Among the best practices of leading regions of Russia as to the level of development of small and medium business it is important to note the subsidies for small and medium business subjects that are aimed at the acquisition of international certificates, which facilitates the increase of competitiveness of production and allows the small and medium business subjects to emerge in the sales market. Moreover, there is a Russian program of realization of measures for stimulation of development of private industrial parks until 2020, which will primarily stimulate the development of small and medium business in technological spheres through expansion of cooperation of small and medium business with large business and creation of the center for social innovations.

Over recent years, the practice of forming the regional sectorial clusters has been popular. Unlike the planned economy, inherited by Russia, where the economic policy is guided from the center and the ties buyer/supplier are seen from the point of view of national perspective. The economic policy, which is based on a cluster, supposes sufficient autonomy at the regional and local levels. Moreover, there should be specialization of regions in the spheres where they are competitive, and the geographical choice is based on the economic attractiveness of the region and location of enterprises as to other enterprises, in order to receive the maximum profit from a cluster.

A variety of functions which are performed by clusters in economic development of any country or region show the necessity for their creation and development (Cao et al. 2015; Yang et al. 2015):

- Clusters are “growth points” in economic structure of national and regional economy. The prosperity of region depends on the significant positions in a certain number of competitive clusters.
- Clusters may determine the fundamental tasks in national or regional conditions of business activity: to a greater extent, clusters are associated with the nature of competition and microeconomic factors which influence the competitive advantages.
- Clusters provide a new way of thinking in the sphere of economy and efforts for development of its organization. Thus, a cluster is a reason to reconsider the roles of a private sector, government, trade associations, and educational and research establishments in economic development, and determine the total possibilities and not only common problems of firms and companies of all forms of property.

Productivity and prosperity of the region depend not on which sectors the firms compete, but on how they do it. The firms may have high level of productivity in any sector of industry—shoemaking, agriculture, or manufacture of semiconductors—if they use the modern progressive technologies and provide goods and services of high quality. At that, just the presence of high tech in the sphere does not guarantee the prosperity of the companies which are not productive.

Thus, the welfare of the region depends on the productivity in the sphere, in which the local companies conduct their business. This leads to the establishing the salary level, which can be sustained, and level of income that could be reached. The contribution to the region's welfare is made by national and foreign companies, depending on their productivity in this region. The presence of foreign companies which conduct complicated business often leads to the increase of efficiency of national companies and vice versa (Cooke 2012).

Movement towards the developed economy requires strong local competition. The competition should go on the way of shift of accent from low salary to low gross expenses, which requires the perfection of production and service efficiency. Ultimately, the competition should also evolve beyond the limits of expenses, primarily by differentiation (Cortright 2013). The competition should shift from imitation to innovations, from low investments to high investments not only in view of material assets, but also as to the qualification of employees and the technologies used. Clusters have an integrating role in these transitions (Molina and Garrigós 2011).

Clusters are one of the bounds of a rhomb of competitiveness of enterprises (related and supporting spheres), but it is better to view them as a manifestation of cooperation of four bounds. Clusters influence the competitive struggle in two ways: firstly, by increasing the productivity of enterprises and spheres that constitute them; secondly, by increasing the capability for innovations and, thus, for rise of productivity; thirdly, by stimulating new business entities which support innovations and expand the cluster limits. Many advantages of a cluster are based on external economy or on transition of advantages through various companies and sectors (Desrochers 2014). Thus, a cluster may be determined as a system of interconnected companies and organizations, the values of which, as a single whole, exceeds the simple sum of the constituents.

The competitive advantages of clusters are not equally important in all spheres, despite the fact that clusters widely cover the economy. Usually, the stronger the advantages of the clusters and more popular their goods and services are, the fewer the number of “viable” places for cluster location is. The importance of clusters rises with the increase of complexity of competition, supposing the tendency for increase of number of clusters with the development of economy.

Each of the three clusters' influences in the competition depends in a certain way on the interpersonal relations, personal contacts, and cooperation of networks of private entrepreneurs with government organizations. In spite of the fact that cluster facilitates the development of this cooperation and increases its efficiency, this process is not automatic. Formal and informal organizational mechanisms and

norms of culture often possess large significance for development and functioning of clusters.

## 4 Conclusions

Thus, in the result of research, the offered hypothesis was proved—clustering is indeed a growth point for modern Russian business. Facilitating the development of competition, clustering leads to increase of innovational activity of enterprises and improving the stability against foreign production; clustering is an effective alternative of protectionism. Consequently, the growth of modern Russian entrepreneurship may be ensured by the regional sectorial clustering.

It should be noted that Russia's experience might be useful for other countries which are interested in the development of business. The advantages of clustering for business do not depend on national peculiarities and are universal for all countries. However, the mechanisms of clustering and level of government participation in regulation of clustering process depend on the level of competition and type of economic system, so the development of these mechanisms is a perspective direction of further research.

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# Perspectives of Use of Competence-Based Approach to Management in Educational Services Market

Irina V. Reikhanova

**Abstract** The purpose of the article is the study of perspectives of use of competence-based approach to management in the market of educational services. In order to evaluate advantages and drawbacks of existing approaches to management, the method of comparative analysis is used. In order to determine peculiarities and problems of management in the market of educational services, the method of problem analysis is used. In order to describe and determine internal logics of the process of management in the market of educational services and determine perspectives of its development as a result of using the competence-based approach, the method of logical modeling is used. Also, the work uses general methods of scientific research: induction, deduction, synthesis, formalization, etc. As a result of the research, the author develops the model of the process of management of human resources in the market of educational services and determines logical succession of the process of management in the market of educational services as a result of use of competence-based approach. As a result, the author concludes that competence-based approach is a perspective approach to management in the market of educational services, as it allows overcoming the drawbacks of existing approaches to management and possesses significant advantages. By the example of modern Russia, the author proves that this approach can be applied to HR management and management of the quality of educational services, which makes it universal and highly effective approach to management in the market of educational services.

## 1 Introduction

Educational services differ from other types of services due to their high social focus. Firstly, high-quality provision of educational services is a national priority. Thus, in case of low-quality provision of other types of services, the one who suffers is the consumer, while in case of low-quality provision of educational services, the whole society suffers.

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Secondly, provision of educational services is a basis of formation of production factor—human capital. The education level determines the quality of human capital and its contribution into development of not only specific enterprise, but economy on the whole. That's why the market of educational services is a basis for formation of infrastructure of entrepreneurship and is a factor of economic growth.

Due to the above peculiarities, in many countries, including Russia, provision of educational services was a prerogative of the state for a long time. Transition to market path of development predetermined formation of the market of educational services and emergence of full-scale market relations in the sphere of education. This requires the use of new approaches to management in this sphere, while under the conditions of competition the quality of management determines the success of functioning of educational establishment in the market of educational services, which determines the topicality of this research.

This article is devoted to the search for perspective approaches to management in the market of educational services. Logics and structure of the article suppose conduct of comparative analysis of existing approaches to management with determination of their advantages and drawbacks, determination of their applicability to management in the market of educational services, and substantiation of expedience of using new approaches to management in this market, with competence-based approach being one of them.

## 2 Materials and Method

The study of the problems of perfection of functioning of the market of educational services, including the problem of increasing the effectiveness of management in this market, is viewed in a lot of works of modern scientists, among which are (Gorlov et al. 2015; Nazarova et al. 2014; Snitko et al. 2015; Tripathi and Ranjan 2013), etc.

Also, there are a lot of studies of various authors, devoted to the research of content and peculiarities, advantages and perspectives of the use of competence-based approach to management in view of accumulated experience of practical use of this approach at enterprises of various spheres of economy: (Boccanfuso et al. 2015; Desjardins 2015; Kisida and Wolf 2015; Kovaleva et al. 2015), etc.

Despite the high level of exploration of issues of development of educational services market and increase of the management quality in this market, as well as the use of competence-based approach to management alone, the articles devoted to their complex study are few, which determines certain fragmentarity of existing works in this spheres and necessity for additional studies for determination of possibilities for solving both described problems through their combination and systemic study.

The purpose of the article is to determine perspectives of use of competence-based approach to management in the market of educational services. This purpose is achieved with the help of general methods of scientific research: induction,



deduction, synthesis, formalization, etc., as well as special methods of economic analysis: comparative analysis, problem analysis, and method of logical modeling.

### 3 Results

At present, a wide range of approaches to management is used (Table 1).

As is seen from Table 1, existing approaches to management suppose prevailing of certain landmarks, which breaks the general harmony of the system of management of enterprise. This, approaches are too oriented at correspondence to requirements of external environment, regulation of internal processes of enterprise, or accounting of psychological peculiarities of enterprise, or performance of the announced functions, etc. (Reikhanova 2010).

**Table 1** Comparative analysis of existing approaches to management

Approach to management	Sense of approach	Advantages of approach	Disadvantages of approach
Marketing	Orientation of managing sub-system at consumer during solving any issues	Improvement of adaptation to changes of external environment	Distraction from internal issues of management
Functional	The need is views as totality of functions which should be performed in order to satisfy it	Clear limitation of authorities at enterprise	Depersonalization of employees, abstracting from psychology
Administrative and normative	Setting norms of management for all sub-systems of management	Increase of transparency and simplification of the process of management and control	Inability for development of universal norms, depersonalization of employees
Quantitative	Transition from qualitative to quantitative evaluations	Possibility for use of mathematical instrumentarium and automatization of the management process	Abstracting from high-quality indicators and characteristics of controlled system
Behavioral	Importance of the role of human resources, use of psychology in management	High social responsibility of enterprise	Distraction from functional aspects of controlled system
Situational	Use of various methods of management depending on situation	Flexibility and adaptability of management	Fragmentarity of management and lack of consistency
Program-targeted approach	Clear determination of goals of enterprise and development of programs for optimal achievement of these goals	Transparency and consistency of management of enterprise	Distraction from management objects—employees—and from the role of human factor

Specifics and strategic value of the market of educational services require harmonic combination of all landmarks of activities of educational establishments and their successful interaction in the system of management. It should be noted that the table views only the main seven approaches from the variety of existing approaches, but results of the conducted analysis could be applied also to other approaches.

As the results of the analysis show, peculiarities of the market of educational services determine inefficiency of these approaches and necessity for development of a new approach. This research offers to use competence-based approach to management in the market of educational services. This approach supposes clear regulation of requirements to employees of enterprise in view of their functional roles in the enterprise's activities (competences) and orientation at market's requirements to the enterprise.

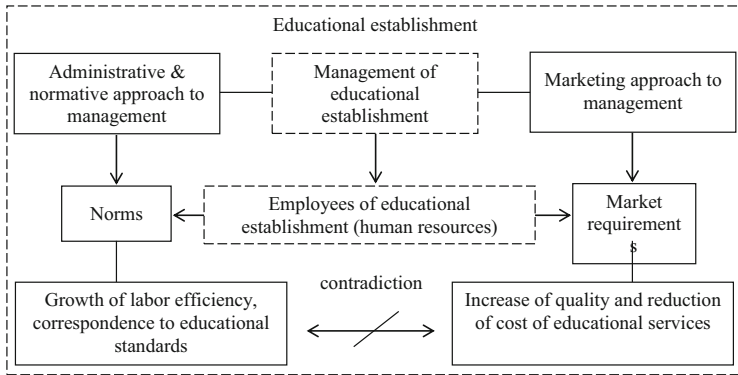
Therefore, competence-based approach combines elements of administrative & normative, behavioral, and marketing approaches to management and possesses its own unique peculiarities. Thus, unlike administrative & normative approach, competence-based approach supposes evaluation of enterprise's staff not as to the level of performance of norms and labor efficiency, but as to personal qualities and possession of certain competences.

Unlike behavioral approach, competence-based approach allows managing psychological and functional characteristics of enterprise's staff. Unlike marketing approach, competence-based approach concentrates on management of human resources and not at adaptation of enterprise to external environment. Advantages of the use of competence-based approach to management are the following (Reikhanova 2011):

- unification of functional and personal parameters of management objects— enterprise's employees;
- provision of transparency of requirements to enterprise's employees and simplification of the process of its HR management;
- achievement of high social responsibility of enterprise by means of HR development;
- successful adaptation of enterprise to changes external environment and support for competitiveness.

In order to determine perspectives of the use of competence-based approach to management, let us build the model of existing process of human resources management in the Russian market of educational services (Fig. 1). Using the Russian experience and conduct of analysis on the basis of modern Russia allows avoiding excessive theory of the model, which increases its practical significance.

As is seen from Fig. 1, Russian educational establishments use at the same time administrative & normative approach, as heritage of administrative & command economic system, and marketing approach which formed after transition to market economic system. According to thus, employees of educational establishment must observe the norms and conform to requirements of the market, with these requirements contradicting each other (Popkova et al. 2015b).



**Fig. 1** Model of the process of management of human resources in the market of educational services

Norms suppose orientation at growth of labor efficiency and correspondence to educational standards, and the market requirements are aimed at increase of quality and reduction of cost of educational services. These aims cannot be achieved simultaneously, which leads to confusion, which finally leads to violation of functioning of the system of management of human resources in the market of educational services and reduction of its effectiveness.

Use of competence-based approach to management in the market of educational services opens new perspectives of development of this market, as it eliminates contradictions of requirements to employees of educational establishments, unifies these requirements, and provides the activities of employees of educational establishments. Logical succession of perfection of the process of management in the market of educational services as a result of the use of competence-based approach is shown in Fig. 2.

As is seen from Fig. 2, internal logics of development of the process of management in the market of educational services as a result of the use of competence-based approach is based on establishment of the harmony of requirements, imposed on employees of educational establishments. As requirements become very clear and executable as a result of elimination of their contradiction, the level of performance of these requirements increases and the process of management is simplified.

Taking into account that the most important criterion of the quality of educational services is satisfaction of clients, it is advisable to use competence-based approach in the market of educational services not only to management of human resources of educational establishments but to management of quality of the provided services. In other words, quality of provision of educational services should be evaluated through the prism of competences.

This supposes that educational programs should be developed in view of competences, necessary for future specialists for successful employment. During the graduation of students from educational establishments, one must evaluate not their knowledge in particular disciplines but acquired competences, and in order to



**Fig. 2** Logical succession of perfection of the process of management in the market of educational services as a result of use of competence-based approach

receive diploma, a graduate should possess a range of competences within his specialty (Reykhanova 2015).

At present, under the conditions of period of Russian economy's transition from administrative & command to market economic system, there is a growing need for presence of marketing competences with representatives of almost all specialties, but educational programs suppose students' receiving only special knowledge within their specialties. This significantly complicates the further employment of graduates of Russian universities and hinders economic growth (Popkova et al. 2015a).

Use of competence-based approach in managing the quality of educational services allows establishing strong connections between labor market and market of educational services, which will increase the general effectiveness of national economic system. That's why the use of competence-based approach to management of the quality of educational services is a perspective direction of development of Russian economy.

## 4 Conclusion

Thus, it is possible to conclude that competence-based approach is a perspective approach to management in the market of educational services, as it allows overcoming drawbacks of existing approaches to management: distraction from internal issues of management, depersonalization of employees, abstracting from psychology, distraction of functional aspects of controlled system, inconsistency and fragmentarity of management, etc.

Competence-based approach also possesses such advantages as combination of functional and personal parameters of management objects, provision of transparency of requirements to employees and simplification of the process of HR management, achievement of high social responsibility of enterprise, successful adaptation of enterprise to changes of market environment, and support for competitiveness.

By the example of modern Russia, it is shown that use of competence-based approach for management of human resources of educational establishments allows increasing the effectiveness of management, as it eliminates contradiction of requirements and makes them clear and executable, which allows the effectiveness of management.

Use of competence-based approach to management of quality of educational services allows building connection between labor market and market of educational services and increasing the quality of educational services, thus improving infrastructure of business and providing economic growth.

Despite universality of theoretical substantiation of perspectives and advantages of the use of competence-based approach to management in market of educational services, study of experience of modern Russia for providing practical examples of demonstration of these advantages limits the results of the conducted research to some extent.

That's why generalization of accumulated experience of the use of competence-based approach to management in the market of educational services of various countries and systematization of universal advantages of this approach, which do not depend on the type of economic system and its national peculiarities, is a perspective direction for further research.

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# Marketing Aspects of Cluster Management in Retailing Sector

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**Abstract** The article is devoted to study of marketing aspects of cluster management in retailing sector. The study was performed within the concept of marketing, concept enterprise management, concept of entrepreneurial activities, and concept of clustering of economy and contributes into their development. The author studied statistics and determined the role of clusters in retail business in development of economy of modern Russia, substantiated the importance of marketing component in provision of successful cluster management in retail business, and developed the “marketing mix” model for management of clusters in retail business. As a result of the research, it is possible to conclude that marketing aspects play a very important role in provision of competitiveness of cluster in retail business under the conditions of globalization and integration; the author offers recommendations for maximization of effectiveness of use of marketing instrumentarium of cluster management in retail business.

## 1 Introduction

Under the conditions of market economy, successfulness of adapting to quickly changing conditions of external environment predetermines the capability of entrepreneurial structures for survival and development. With involvement of international members into the process of competition for local consumers, the importance of marketing activities grows in various countries of the world, as it allows

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analyzing situation in the market, forecasting possible directions of its change, and preparing for them.

In the sphere of retail business, specifics of B2C market predetermines proximity of business to final consumer and necessity for maximal correspondence to its dynamic needs. High saturation of market and complex structure of demand complicate its segmentation and leads to high competition, due to which entrepreneurial structures cannot influence the prices of their products.

For the purpose of expansion of their competitiveness, enterprises in the sphere of retail business are interested in unification into sectorial clusters. This allows them to optimize chains of supplies, develop sales of their products more successfully, increase influence on market processes, etc. Due to the growth of popularity of clustering in the sphere of retail business, the actuality of study of perspectives of perfection of the process of management of clusters in this sphere of economy grows.

The main problem consists in the fact that without effective management, the receipt of profit from clustering is under threat. Based on the above, this work offers a hypothesis that marketing component has a decisive meaning for successful management of clusters in the sphere of retail business. The purpose of the article is to verify this hypothesis, through study of marketing aspects of management of clusters in the sphere of retail business.

## 2 Literature Overview

Marketing activities of cluster are the process of its members' studying the market situation (Sansom and Jaroenwanit 2016) and providing maximal correspondence to market challenges and needs of clients (Popkova et al. 2014a, b) for provision of effective economic activities under the conditions of competition (Felzensztein et al. 2014a, b). Marketing aspects include development and realization of market strategy of cluster (Felzensztein et al. 2014a, b) and detailed elaboration of all aspects of its positioning in the market (Liu and Rao 2011).

Cluster management supposes development and realization of the common mission and strategy of behavior in the market (Sozinova et al. 2016) and individual online management by all cluster members (Barbara et al. 2016). This supposes higher complexity of management, as compared to individual enterprise (Veselovsky et al. 2015) and larger profits related to unification of efforts and resources (Knop 2015) and emergence of synergy effect in the cluster (Popkova et al. 2015).

Cluster in the sphere of retail business is a union of retail trade enterprises for the purpose of joint economic activities, with preservation of their full independence (Rusk et al. 2016). Such clusters are a rare phenomenon in contemporary global economy (Rizvi and Sachdeva 2009). They are peculiar for the most developed countries with post-industrial economy (Globerman and Storer 2015); (Nadtochey 2010); (De Oliveira and De Oliveira Cerqueira Fortes 2014); (Li 2014).

As a result of the study of materials of the research for the selected topic, the authors came to the conclusion that the works of modern scientists study separate tasks, and there is no theoretical and methodological basis for complex solution of

the set problem. That’s why systematization of the accumulated knowledge and achievement of new knowledge is necessary for solving the purpose of this work.

### 3 Research Methods

The research was performed within the concept of marketing, concept of enterprise management, concept of entrepreneurial activities, and concept of clustering of economy, and contributes into their development. The methodology of this work is based on the “marketing mix” method. It allows conducting complex study of the market, determining enterprise’s position in it, and determining perspective strategy and tactics of its behavior.

This method was first offered by N. Borden in 1950; it gained large popularity and then was developed by many scientists in the sphere of marketing.

The advantage of this method is its practical orientation and simplicity in use. The “marketing mix” method is re-developed and improved by the authors of this article, for the purpose of achievement of the goal of the research; it is also transformed into a model. In a general form, the proprietary vision of this method and the received model could be presented in the following way (Fig. 1).

As is seen from Fig. 1, based on the market situation, which is characterized by such indicators as environment (volume of the market, level and character of competition, specifics and tendencies of change of demand, level of development of technologies, etc.), peculiarities, position, and capabilities of enterprise in the market, and partners (peculiarities of added value chain), marketing foundations are developed for successful business, including determination of product, its prices, and preferences for its promotion and sales.

### 4 Results

#### 4.1 Role of Clusters in the Sphere of Retail Business in Development of Economy of Modern Russia

Modern Russia is peculiar for vertical integration of enterprises in cluster, i.e., creation of cluster by sectorial specifics for unification of representatives of various sections of added value chain into single integrated association. Regional sectorial

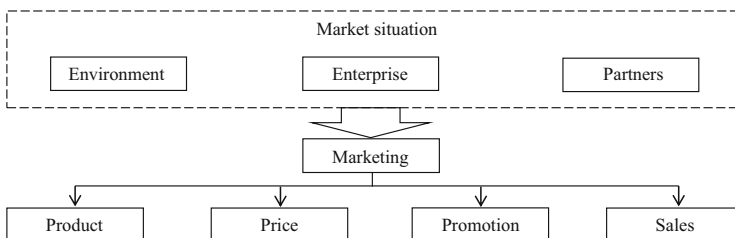


Fig. 1 Generalized adapted model of “marketing mix”



clusters are the most popular in Russia—in them, enterprises are united not only by the criterion of belonging to a certain sphere but by geographical location.

Initially, the initiator of clustering of the Russian economy was the state. After announcing the course for modernization and development of industry, active creation of clusters in various spheres of industry began. These clusters perform manufacture, development, and implementation of innovations, as well as promotion and sales of products in their sphere, and are a reason for monopolization of the real sector of economy (Map of clusters of Russia 2016).

According to the authors of this article, horizontally integrated clusters are a perspective direction of development of the process of clustering in Russia, as they allow providing the same profits with smaller effect of monopolization. Creation of clusters in the sphere of retail business certainly poses interest for the Russian economy, taking into account the growing role of the service sphere in the process of post-industrialization of the economic system.

#### ***4.2 Role of Marketing Component in Provision of Successful Management of Clusters in the Sphere of Retail Business***

As a rule, barriers for entering the markets in the sphere of retail business are minimal. This determines abundance of sources of offer and high level of competition. Specifics of retail business suppose resale of products, i.e., purchase of final products from manufacturers (suppliers) within B2B deals and their sale with retail margin to consumers within B2C deals.

At that, entrepreneurial structures in the sphere of retail business are intermediaries between manufacturers of products and final consumers. As production activities are not planned within business in the sphere of retail business, its main components are management and marketing.

While studying enterprises in the sphere of retail business, it is possible to notice that they belong to small business, so management at their level is rather simple. Even after unification into a cluster, management becomes not very complicated. That's why in provision of successful management of clusters in the sphere of retail business, the leading role belongs to marketing components of business.

Marketing constitutes the foundation of business in the sphere of retail business, as within it the targeted segment/segments of the market are determined, the most perspective assortment of products is selected, prices is set, relations with partners are kept, and sales of products are performed.

For the purpose of provision of unity of cluster, it is necessary to develop and observe general principles of marketing by all its members. This will allow attracting and keeping consumers, as well as driving rivals out from the market and developing competitiveness. That's why activation of the process of clustering in the sphere of retail business in Russia requires development of corresponding marketing provision.

### 4.3 “Marketing Mix” Model for Management of Clusters in the Sphere of Retail Business

This work offers the following “marketing mix” model for management of cluster in the sphere of retail business (Fig. 1).

As is seen from Fig. 2, cluster in the sphere of retail business should offer the consumers a wide assortment of products. This will allow covering large segment of the market, maximizing advantages from horizontal integration within clustering, and increasing market power of cluster members.

Taking into account small share of the market, it’s better to set low prices for products of cluster members and orient at maximization of sales volumes. This will allow receiving profit from the “scale effect”. During the promotion, it is necessary to pay special attention to development and conduct of the common program of cluster loyalty. This will allow forming and developing cluster brand, attracting new clients, and keeping existing clients for a long period of time.

The loyalty program offers special events, provision of loyalty cards with discounts for regular customers, etc. It is also necessary to develop and follow common standards of sales and service within the cluster. Due to this, customers will be more loyal to its members, as the guarantee of purchase of usual products with convenient and familiar service is an important competitive advantage.

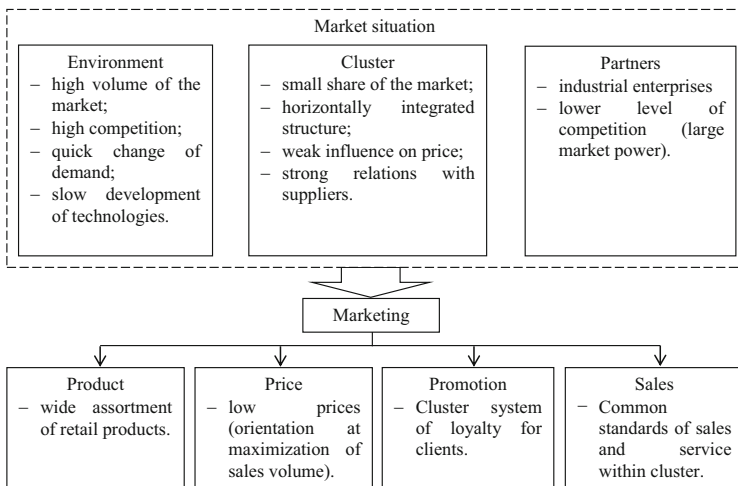


Fig. 2 “Marketing mix” model for cluster management in the sphere of retail business

## 5 Discussion

As a result of the research, the offered hypothesis was proved and it was confirmed that marketing components plays a decisive role in successful management of clusters in the sphere of retail business. The purpose of the article is to verify this through study of marketing aspects of cluster management in the sphere of retail business.

Thus, it is possible to conclude that marketing aspects play a very important role in provision of competitiveness of cluster in the sphere of retail business under the conditions of globalization and integration. For the purpose of maximization of effectiveness of the use of marketing instrumentarium of cluster management in the sphere of retail business, this work offers the following recommendations:

- joint conduct of marketing research for analysis of market by cluster members. This allows receiving full and precise information and rationalizing the process of marketing through division of labor and saving the resources;
- provision of uniqueness of assortment and service in cluster, as compared to other market members, under the condition of observation of unity of standards by all cluster members. This will ensure consumers' loyalty;
- orientation at long-term profits, with possible damage to short-term advantages. Cluster has more resources and possibilities for realization of long-term market strategy. That's why it is expedient to use the principle of monopolization for price dumping for the purpose of driving the rivals out from the market and receiving profits from larger market share and possibility for setting higher prices. At that, it is necessary to observe anti-monopoly laws.

## 6 Conclusions

Increase of global competitiveness of modern Russia requires shifting accents in the sphere of clustering from the state to private initiative, from the sphere of industry to service sphere, and from vertical to horizontal integration. The developed "marketing mix" model and the offered recommendations have to provide foundation for activation of cluster processes in the sphere of retail business and provision of effectiveness of management of such clusters.

Taking into account the lack of real practical examples of Russian clusters in the sphere of retail business, the proprietary conclusions and recommendations have a generalized character. On the one hand, universality is their advantage, but, on the other hand, it limits the possibility of their implementation in real practice of clusters in the sphere of retail business and necessity for detalization, depending on peculiarities of business and market.

That's why further development of marketing aspects of cluster management in the sphere of retail business supposes study of empirical data and practical peculiarities of marketing activities of clusters in the sphere of retail business, as well as development and application of applied marketing models by the example of particular cluster structures.

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# History of Views on Audit of Commercial Structures Management Quality

M.A. Volkova, E.D. Solomatina, N.V. Shabutskaya, T.V. Sabetova,  
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**Abstract** The article studies the views on the problem of audit, economic control, and revision. Comparative characteristics are performed. Audit is viewed from the point of view of criteria as an independent competent study of an economic subject. Information base is studied from the point of view of organizational & legal, tax, financial & analytical, and reserve regulation according to the set criteria and standards.

During the research, the authors used the international standards of audit of the ISO series, defining audit as a documented process of obtaining the proofs of audit and their objective evaluation for the purpose of establishment of the level of execution of coordinated criteria of audit.

It is established that audit is an independent verification of authenticity of financial accounting and economic subject accounting, performed by external auditor and internal competent employee on the basis of observation of existing provisions and standards.

Besides, a reason for negative phenomena in organizations is inadequate system of management, which characterizes instability and uncertainty of managerial decisions. Thus, quality of development and organization of management process determines the work of the organization on the whole and its structural departments in particular. Based on this, the authors set limits and peculiarities of management quality.

One of the forms of management control is internal audit. The sense of audit of organization's management control is defined as a process of study and evaluation of authenticity of data of financial accounting and other financial information that characterizes financial and economic activities of organization. It is emphasized that goals of revision, internal and external general audit, internal and external audit of management quality are determined by organization's management. However, during conduct of external general audit, the tasks are determined not only by organization's management but by the law as well (in case of mandatory audit). Besides, during revision, performed by revision commissions formed by the above

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organization, the goals are determined not by the management of inspected organization but by the above organization.

## 1 Introduction

Economic reforms in Russia changed the structure and system of organization's activities control. This led to appearance of new notions and phenomena in economy: audit, risks, management quality, etc.

The process of management in organization is impossible without control of its financial and economic activities.

Control is a system of observation and inspection of structural departments of organization. Economic control could be presented in the form of revision or audit.

Revision is a system of control actions performed by a revising group or inspector over activities of subordinate enterprises at which legality, authenticity, and economic expediency of performed economic operations is determined, as well as correctness of actions of the officials who took part in them (Podolskiy 2000).

The next form of economic control is audit. In order to understand economic content of audit and its sense, goals, and tasks, it is necessary to view it as the most important attribute of modern economic relations and tool of management and production control. Studying theoretical views on the issues of the sense of audit, it is necessary to analyze various variants of treatment of this notion.

Federal Law "On audit activities" provides a general definition of audit. Here audit is defines as "entrepreneurial activities for independent inspection of business accounting and financial (business) accounting of organizations and individual entrepreneurs" (FZ 2001). This characterizes audit as entrepreneurial activities and independent inspection.

Audit, as entrepreneurial activities, was defined by a group of authors—V.P. Suyts, A.N. Akhmetbekova, T.V. Dubrovina—"Audit is licensed entrepreneurial activities of certified independent legal bodies (audit companies and particular auditors)—legal participants of economic activities, aimed at confirmation of authenticity of financial, business, and tax accounting. . .". This definition narrows down the notion of audit, characterizing it as licensed entrepreneurial activities. At that, the remark pointing at independence of auditors seems to be rather fair.

Independence of audit was emphasized by V.I. Podolskiy, A.A. Savin, and L.V. Sotnikova in its definition, "audit is independent expertise of the state of business accounting, financial reports, and balance sheets" (Podolskiy 2004). The same opinion is supported by I.N. Belyi, stating that audit is "independent expertise of financial reports and balance sheets. Its aim is to verify authenticity of balances and financial accounting of enterprise (firm) and determine correctness of doing business accounting" (Belyi 1994).

International standard "ISO 19011:2008. Guides for auditing management systems" defines audit not only as "systematic, independent. . ." but as ". . .documented process of obtaining the proofs of audit and their objective evaluation for the

purpose of determination of execution of coordinated criteria of audit” and provides explanations of such notions as proofs of audit (records, provision of facts, or other information related to criteria of audit to be inspected) and criteria of audit (totality of policies, procedures, and requirements) (Det Norske Veritas 2004).

In our opinion, this definition explains the sense of the whole audit process fully, pointing at coordination of audit proofs to its criteria. However, in our opinion, audit cannot be defined only as documented process.

Correspondence to criteria is pointed out by Z.A. Kevorkova, “...audit is independent competent study of economic subject and its information basis from the point of view of organizational & legal, tax, financial & analytical, and reserve regulation according to the set criteria and standards”. In our opinion, this definition characterizes audit as a competent study very fairly.

In its turn, L.T. Gilyarovskaya and V.A. Sytnikova pay attention that “audit is a competent study...” The definition includes an important remark pointing at the aim of audit “on the basis of observations of existing standards and provisions for the selected directions for the purpose of development by external and internal users of the substantiated managerial decisions” (Gilyarovskaya and Sytnikova 2000).

A. Arens and J. Lobbek believe that “audit is the process by which a competent independent employee accumulates and evaluates proofs of information subject to quantitative assessment and belonging to specific economic system...” In this definition, the authors emphasize on the fact that audit is performed by an independent person, not specifying whether he is attracted from employees of inspected organization or from a third party, “in order to determined and express the level of correspondence of this information to the set criteria” (Arens and Lobbek 1995).

## 2 Methodology

Deep analysis of historical views on the problem of audit was performed within the research. The results of the research for substantiation of the sense of audit allowed formulated its definition. We think that *audit is independent inspection of authenticity of business accounting, accounting of economic subject, performed by external auditor or internal competent worker on the basis of observation of existing provisions and standards.*

Audit is divided into external and internal. External audit is independent verification of *authenticity of business accounting and accounting, performed by audit organizations or individual auditors.*

External audit could be mandatory, initiative, or by special audit tasks. Based on the studied literature of various authors on this issue, it is possible to state that definition of the sense of external audit and its classification does not have vivid contradictions, which is not true for the sense of internal audit.

Internal audit is viewed by many authors as a part of the system of internal control. Thus, for example, V.P. Suyts, A.N. Akhmetbekova, and T.A. Dubrovina view internal audit as “... one of the means of control over effectiveness of

activities of links of economic subject structure” and then it is viewed as “inseparable part of managerial control over enterprise” (Suyts and Sheremet 2002).

P.I. Kamyshev views audit as a part of internal economic control; he defines internal audit as “. . . inseparable and important element of control in the process of direct management”. Then he views internal audit as “. . . current control over conduct of economic policy and quality of organization management” (Kamyshev 1996).

It is necessary to note the opinions of the authors who stick to the idea that audit is a separate independent activity in organization and a system of internal control. Thus, for example, the authors V.I. Podolskiy, A.A. Savin, and L.V. Sotnikova characterize internal audit as an “. . . independent activities in organization for inspection and evaluation of its work in the managers’ interests” (Podolskiy 2004). This definition points at independence of internal audit and characterizes it as a system of internal control.

V.A. Vetrov and V.I. Skripkin view internal audit as a system of internal control. Besides, they state that internal audit could be viewed as a “system of security measures. . .” (Vetrov and Skripkin 2001). These views of V.A. Vetrov and V.I. Skripkin are very contradictory. Based on the results of internal audit, managerial decisions are made and security measures are developed. That’s why internal audit cannot be viewed as a final system of security measures.

V.V. Burtsev says that “one of the forms of internal control of organization is internal audit. . .” (Burtsev 2003). In his other work, V.V. Burtsev views internal audit as activities, regulated by internal documents of organization, on control of links of management and various aspects of functioning of organization (Burtsev 2004). This definition contains a fair remark regarding control of management links.

The narrowest definition is given by A.A. Terekhov. Viewing internal audit as a part of the internal control system, A.A. Terekhov says that the purpose of internal audit consists in “satisfaction of administration’s needs within this economic system” (Terekhov and Terekhov 1998). However, this definition is not full.

Based on the viewed and generalized opinions of the authors and on the main remarks regarding definition of internal audit, we characterize *internal audit* as a *part of the system of internal control, aimed at conduct of inspections of the data of business accounting and accounting organization*.

It should be noted that the cause of negative phenomena in organization is inadequate system of management, peculiar for instability and uncertainty of managerial decisions. Thus, quality of development and organization of the process of management determines the work of organization on the whole and its structural departments.

Based on this definition of quality (“totality of significant attributes, features, and peculiarities which distinguish the item of phenomenon from others and giving it certainty” (Ozhegov 1999)) in the Ozhegov’s dictionary, we have set the limits and peculiarities of management quality.

Management quality consists in:



- 1) building the system of management;
- 2) setting the goals of organization;
- 3) creation of internal audit service as an element of the system of management on the basis of existing system of internal control;
- 4) determination of goals and tasks before management;
- 5) organization of work according to the laws and normative documents of organization.

### 3 Results

Viewing the above, it is necessary to analyze economic sense of audit of management quality. It is necessary to state that the notion “audit of management quality” is not studied in economic literature.

Defining the sense of *audit of organization's management quality*, it is possible to view it as a *process of study and evaluation of authenticity of data of business accounting, accounting, and other financial information that characterizes financial and economic activities of organization*.

*External audit of management quality of organization is independent inspection of authenticity of business accounting, accounting, and other financial information that characterizes financial activities of organization, conducted by audit organizations or individual auditors.*

*Internal audit of management quality is a part of the system of internal control, aimed at conduct of inspections of the data of business accounting, accounting, and other financial information that characterizes financial activities of organization, aimed for making right managerial decisions by the management.*

Revision and internal audit are executive activities, and external audit is entrepreneurial activities. It should be noted that characteristics of internal and external general audit, internal and external audit of management quality by the types of activities is the same. Thus, regardless of the fact whether it is general audit or audit of management quality, the type of activities of internal and external audit remains the same. Here it should be noted that external audit of management quality is conducted as of the accounting date. Internal audit of management quality supposes not only evaluation and analysis as of the accounting date but forecast for the future.

The same tendency is observed with analysis of belonging of internal and external audit to the types of control. Viewing external audit, internal audit, and revision as main forms of control, it should be noted that internal audit is the only one that provides effective cooperation of preliminary, current, and following control. The only common feature of revision, internal and external general audit, and internal and external audit of management quality is their characteristics as the following control.

Revision and external audit have periodic character, and internal audit has current character—at that, internal audit of management quality differs from internal general audit by seasonal character.

An interesting fact is that during revision, internal and external audit of management quality, the persons who conduct inspections study not only the data of business accounting and accounting but also other financial information. In its turn, general audit is aimed at inspection of the data of business accounting and accounting.

Comparative characteristics of inspection subjects shows that revision differs from other forms of control by the fact that it is conducted by revision commissions, whole audit is conducted by independent experts. Here it should be noted that the subject of external audit is auditors who do not depend on the inspected organization and have a license for this type of entrepreneurship. Subject of internal audit could be not only independent auditors but also competent employees of organization. This is a peculiar feature of internal audit, differentiating it from other forms of control.

Analyzing interrelations, it is necessary to distinguish the main peculiarity of quality of external audit—*independence*. Bodies of external audit do not depend on the audited organization. Regarding independence of internal audit, it is possible only if inspection is conducted by independent auditors, invited from outside.

Deeper understanding of economic content and sense of audit of management quality requires consideration of goals and tasks of control, revision, internal and external general audit, internal and external audit of management quality, and perform their comparative characteristics.

According to A.L. Bavdey, I.N. Belyi, and N.P. Drobyshevskiy, the main goal of control consists in objective study of factual state of business in various spheres of activities of enterprise and determination of the factors that negatively influence execution of the made decisions (Belyi 1994).

We consider that this statement fully reflects the goal of control.

The goals of revision are: determination of drawbacks, their evaluation, and evaluation and punishment of the responsible.

The Federal Law “On audit activities” provides general definition of the goal of audit, “*The goal of audit is expression of opinion regarding authenticity of financial (business) accounting of audited persons and correspondence of the order of business accounting to the laws of the Russian Federation*” (FZ 2001).

Goals of external audit are viewed by the authors V.I. Podolskiy, A.A. Savin, and L.V. Sotnikova, pointing out that external audit is conducted “for the purpose of objective evaluation of authenticity of business accounting and financial accounting of an economic subject” (Belyi 1994). These authors state that the main *goal of external audit* is to “provide objective, real, and precise information on the audited object” (Belyi 1994). *This definition of the goal of audit reflects the goal of external general audit.*

However, the authors moved further, defining the goal of initiative audit: “determining drawbacks in conduct of business accounting, preparation of accounting and taxation, conducting analysis of financial state of economic object, and helping it with organization of accounting” (Podolskiy 2004).

Speaking of internal audit, A.L. Bavdey, I.N. Belyi, and N.P. Drobyshevskiy distinguish the main goal of intra-economic audit: “increase of effectiveness of

enterprise's work on the basis of mobilization of internal reserves of enterprise and increase of product quality, reduction of its cost, and improvement of managerial activities" (Belyi 1994). In our opinion, this definition has deep sense, on the one hand, but it is rather blurred, on the other hand.

In his turn, A.M. Bogomolov, while characterizing internal audit as the service organized at economic subject in the interests of its owners and regulated by internal documents, states the goal of internal audit, "control over observation of the set order of business accounting and reliability of functioning of the system of internal control" (Bogomolov 2000). It is impossible to disagree with this definition.

## 4 Discussion

The goals of general audit and goals of audit of management quality are viewed separately in economic literature.

*The goals of external audit of management quality* are the following: stating opinion on the authenticity of business accounting and other financial information that characterizes activities of organization; determination of possible ways of improvement of organization's activities and expression of opinion regarding reliability of functioning and adequacy of the system of organization's management on the whole and of its separate departments.

While determining the goals of audit of management quality, it should be noted that the purpose of *internal audit of management quality, together with the above goals of audit of management quality*, is control over observation of the set provisions and procedures.

It should be noted that goals of revision, goals of internal and external general audit, and goals of internal and external audit of management quality are determined by organization's management. However, during conduct of external general audit, the tasks are determined not only by organization's management but by the laws as well (in case of mandatory audit). Besides, during conduct of revision by revision commissions formed by the above organization, the goals are determined not by the management of the inspected organization but by the above organization.

Apart from the goals, it is necessary to view tasks of control, revision, internal and external general audit, and internal and external audit of management quality.

*The task of control* consists in evaluation of financial activities and evaluation of economic substantiation, financial efficiency, and legality of the made managerial decisions and results of their execution.

*Practical tasks for all forms of control* are the following:

- determining and evaluating drawbacks;
- determining violations.

A peculiar task of *revision* is punishing the responsible.

The tasks of *internal and external general audit* and *internal and external audit of management quality* are the following:

- expression of opinions on authenticity of the data of business accounting and accounting and correspondence of the order of doing business accounting to the laws of the Russian Federation;
- confirmation of rightness of the data of business accounting and accounting;
- improvement of financial state of the client by determination of drawbacks;
- determination of possible ways of improvement of organization's activities.

It should be noted that the tasks of *internal and external audit of management quality*, apart from the above, are the following:

- expression of opinion regarding reliability of functioning and adequacy of the system of management of organization on the whole and its separate departments;
- expression of opinion regarding authenticity of not only the data of business accounting and accounting but of other financial information;
- confirmation of rightness of the data of business accounting and accounting and of other financial information;
- conduct of analysis and evaluation of adequacy of the system of management of organization on the whole and its structural departments.

At the same time, external and internal audit of management quality and internal general audit perform the task of control over observation of the set provisions and procedures. This task is not set before external general audit.

Such task as “provision of consultation services for various departments of audited party” is set before internal general audit and internal audit of management quality. At that, it should be noted that internal audit solves tasks at the level of specific departments of organization. I.A. Belobzhetskiy distinguishes the following task of internal audit, “. . . provision of consultation services for other departments for the purpose of increase of effectiveness of their work” (Belobzhetskiy 1994).

## 5 Conclusions

Analyzing practical tasks of various forms of control, we came to the conclusion that their common task is study of various financial data. According of the received data, revision determines drawbacks in organization that led to distortion of the data of business accounting and accounting, and external audit, apart from that, forms advice for their elimination. Internal audit also conducts current control of elimination of these drawbacks, thus determining reserves for improvement of financial and economic activities of organization.

Based on the above, let us note that the most effective form of control is internal audit of management quality. It reacts to negative changes in economic activities organization.

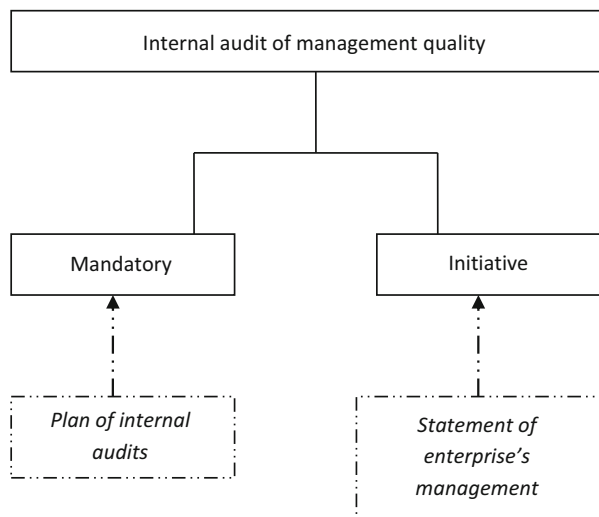
It is necessary to note such issue as task setting. Tasks for revision are set by the management. But while revision is conducted by the commission from the above organization, task setting is determined by the above organization. During conduct of internal and external general audit, internal and external audit of management quality, the tasks are determined by management of the audited organization. The common fact for internal general audit and internal audit of management quality is that task setting could be determined by yearly plan of internal audits. External general audit and external audit of management quality have a common feature of a possibility of task setting by the contract. Task setting for external general audit is peculiar for the fact that tasks could be determined by the law.

Viewing internal audit of management quality as an inseparable part of the system of management at the level of specific organization, generally accepted classification of audit (mandatory, initiative) could be applied to internal audit of management quality. Mandatory internal audit of management quality is set in the yearly plan of internal audit, and initiative audit could be conducted by the decision of organization’s management at any moment due to emergence of production necessity, which is shown in Fig. 1.

Results of internal audits could be used by external auditors during the inspection.

For that, management of the audited organization should guarantee to external auditors that results of the work of internal auditors are adequate, and external auditors can found on these results.

**Fig. 1** Classification of internal audit of management quality



Therefore, it is necessary to ensure mutually profitable cooperation of external and internal auditors of organization, which should be built on mutual understanding and proper experience of audit inspections.

Generalizing the above, it should be noted that the notion “audit of management quality” is wider than the notion “audit”. Audit of management quality is conducted on the basis of general audit, i.e., the data of general audit is used in the process of audit of management quality.

Good organization of internal audit of management quality reduces the volume and content of external audit, as the results of internal audit are an information base for external auditors. Thus, internal and external audits of management quality supplement each other.

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# Approaches to Organization of Project Management in Russia

Innara Lyapina, Olesya Stroeve, Maria Vlasova, Oksana Konobeeva,  
and Elena Konobeeva

**Abstract** Dynamic transformation of external environment and necessity for adequate correction of approaches to management led to necessity for implementation of project management at micro-, meso-, and macro-levels. The article views reasons leading to usage of this technology and sense and mechanism of project management, in view of the Russian realia. The given mechanism of project mechanism includes the subject and object of management, as well as mandatory components for its effective realization (normative and legal base, laws and principles, goals and tasks, functions, processes, methodology, structure, and forms).

## 1 Introduction

A man deals with project activities from the moment of birth. However, project management began to be viewed as innovational technologies of management only recently. Over this period, the tasks of project management were adapted to the current processes of market system subjects, organizational structures, and strategies of their development. Project management is implemented into activities of organizations of micro-, meso-, and macro-levels.

Over the recent years, project management began to be actively used in the Russian practice at regional and state levels. The reasons that made the Government

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of the Russian Federation look for new technologies of management are the following:

- high level of bureaucratization of activities of state establishments,
- striving for coloring/hiding the real state of the management processes from managers,
- lack of mechanisms of early diagnostics of problems in management,
- insufficient level of employees' knowledge of modern technologies of management,
- dominating orientation at the process (which hinders orientation of results of management),
- unequal distribution of personal responsibility for the received results,
- weak motivation of management for effective execution of management processes, etc.

Eventually, project management should stimulate increase of effectiveness of management of national and regional economies by means of:

- formation of direct dependence of material and moral stimulation of employees on efficiency of their activities,
- transparency of the management process,
- optimization of budget expenditures,
- rationalization of distribution of all resources (material, human, time),
- formation of mutually profitable inter-departmental relations within a project,
- attraction of additional investments,
- reduction of terms of achievement of the set goals, etc.

## 2 Materials and Methods

Foreign and Russian scientists started talking about topicality of application of project management some time ago. Chronologically, the most significant stages of development of methodology of project management have the following form:

- 1825—fundamental research in the sphere of project management (M.M. Speranskiy);
- 1900s—development and application of practical methods of management (P.A. Stolypin);
- 1937—development of matrix organization methodology, oriented at management (American scientist L. Gulik);
- 1956—development of methods and means of project management (Du Pont de Nemours Co);



- 1957—development of the program method of critical path (Remington Rand group);
- 1959—systemic approach by project management to stages of life cycle (Anderson committee (NASA)).

In 1960s, project management was oriented at application of network planning methods.

A significant stage of development of project management is creation of the Soviet Association of Project Management in 1990s, which is still active.

Implementation of technologies of project management is conducted progressively. The first results of its implementation into practice of state and regional management are reflected in Table 1 (Protocol of the meeting of the Council for implementation of project management 2014; Filimoshkin 2013).

While noting positive changes in the process of state and regional management in Russia, it is necessary to pay attention to difficulties and problems that accompany these changes.

State and regional management has contradictions between new and traditional mechanisms of management. The thing is that, on the one hand, a transition to project management is declared, and multiple projects are formed and established. On the other hand, they are realized through usual tools and approaches, which hinders realization of the potential of project management and reduces probability of successful realization of the project. This fact is confirmed by results of monitoring of experience of project management in bodies of executive power and companies with state participation (Zolochevskaya and Krivosheeva 2014), presented in Table 2.

The reason of this lies in blurred idea of methodological foundations of realization of project management. Thus, it is expedient to view the sense of technologies of project management and mechanism of its realization.

Within the study of problematics of project management, the work used heuristic methods, namely, the method of decomposition. This method is a basis for systemic approach which allows dividing a complex program into a range of simple ones, presenting them in the form of hierarchical structure or life cycle. The method of successive approaches is also applicable within project management, which allows introducing corrections at all stages of project's life cycle (initiation, planning, realization, and termination of project).

Formalized methods are also present within study of the stated subject of the research—they include methods of optimal design. These methods allow selecting the best and the most competitive solution, which, in its turn, allows proving the effectiveness of the received results by application of criteria (for example, “price-quality”, “economy-effectiveness”, etc.).

**Table 1** First results of implementation of project management in Russia

Result	Characteristics of the result
The key ministries and departments are determined which coordinate implementation of technologies of project management	<p>1. Ministry of Trade and Economic Development of Russia:</p> <ul style="list-style-type: none"> <li>– creation of council for implementation of project management in bodies of executive power</li> <li>– development of methodological recommendations for implementation of project management</li> </ul> <p>2. Ministry of Industry and Trade of Russia:</p> <ul style="list-style-type: none"> <li>– creation of the department of project activities management</li> </ul> <p>3. Ministry of Communications of Russia:</p> <ul style="list-style-type: none"> <li>– development of methodological recommendations for organization of the system of project management of measures for informatization</li> </ul> <p>4. Ministry of Labor of Russia:</p> <ul style="list-style-type: none"> <li>– continuation of work on development of the professional standard for the specialty “Manager of program, project, or project portfolio”</li> </ul> <p>5. Analytical center with the Government of the Russian Federation:</p> <ul style="list-style-type: none"> <li>– Russian competition “Project Olympus”</li> <li>– work on formation of database of the best practices for project management</li> </ul>
Development of state standards and programs for evaluation for project management	<p>Standards:</p> <ul style="list-style-type: none"> <li>– GOST R 54869-2011 “Project management. Requirements to project management”</li> <li>– GOST R 54870-2011 “Project management. Requirements to management of project portfolio”</li> <li>– GOST R 54871-2011 “Project management. Requirements to program management”</li> <li>– GOST R ISO 21500-2014 “Guide on project management”</li> </ul> <p>Programs:</p> <ul style="list-style-type: none"> <li>– Association of project management “COBHET” (<a href="http://www.sovnet.tu">www.sovnet.tu</a>) conducts certification for the model IPMA Delta<sup>®</sup> (confirmation of competence of organization in management of projects at international level)</li> <li>– Autonomous non-profit organization “Center of evaluation and development of project management” (<a href="http://www.isopm.ru">www.isopm.ru</a>) organizes procedures for assessment, developed on the basis of Russian and international standards in the sphere of project management</li> </ul>
Approbation of technologies is conducted on test platforms	<p>Test platforms of the “first level”</p> <ul style="list-style-type: none"> <li>– Belgorod Oblast (from 2010)</li> </ul>

(continued)

**Table 1** (continued)

Result	Characteristics of the result
	<ul style="list-style-type: none"> <li>– Yaroslavl Oblast (from 2009)</li> <li>– Perm Krai (from 2007)</li> </ul> Test platforms of the “second level” <ul style="list-style-type: none"> <li>– Tomsk Oblast</li> <li>– Penza Oblast</li> <li>– Ulyanovsk Oblast</li> <li>– Vologda Oblast</li> </ul>

**Table 2** Results of monitoring of experience of project management in bodies of executive power and companies with state participation

Indicator	Federal bodies of executive power	Bodies of executive power of the subjects of the RF	Companies with state participation
% of usage of terminology of project management	69.2	70	100
% of the use of methodological instrumentarium of project management	13.4	12.5	81.5
% of lack of collegial body for coordination of project management on bodies of executive power or its analog	76.9	81.3	27.3
% of lack of “project office” or its analog	61.5	68.8	0

### 3 Received Results

#### 3.1 *Role of Project Management in the System of Program-Oriented Management of Russian Economy*

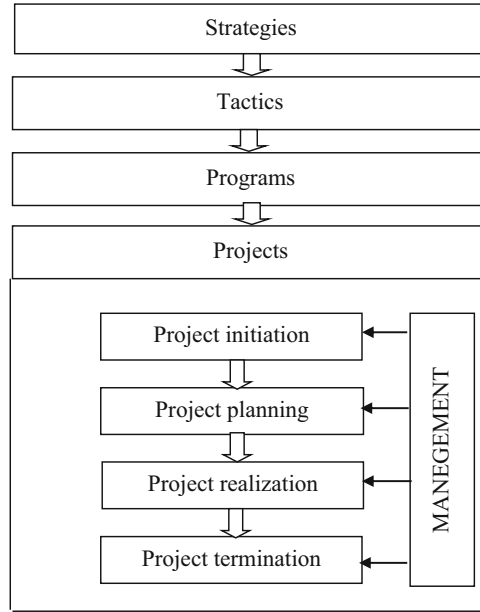
Any project begins with the programs of social and economic development and is aimed at achievement of priorities of strategic development of national and regional economies. Its role in the general system of management of Russian economy is reflected in Fig. 1.

The project’s life cycle consists of four stages: initiation, planning, realization, and termination of the project. Each stage is specific and its results are subject to influence of a large number of factors. Thus, wise management of the project is a guarantee of positive realization.

The process of project management should be oriented not at the realized project but at the environment in which is it implemented into reality (Stroeva et al. 2015).

The technology of project management supposes organization of management of a range of processes presented in Fig. 2.

All processes are cyclic and are conducted simultaneously.



**Fig. 1** Role of project management in the system of program-oriented management of Russian economy

Project's life cycle	Initiation	Planning	Realization	Termination
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Processes of project management	Main	Gathering information	Processing information	Storing information	Controlling information	Decision making	Organization of execution of decisions	Control over results
	Supplementary	Management of motivation of project's participants		Management of competences of participants of project activities	Organizational support for project activities		Technological support for project activities	

**Fig. 2** Processes of project management

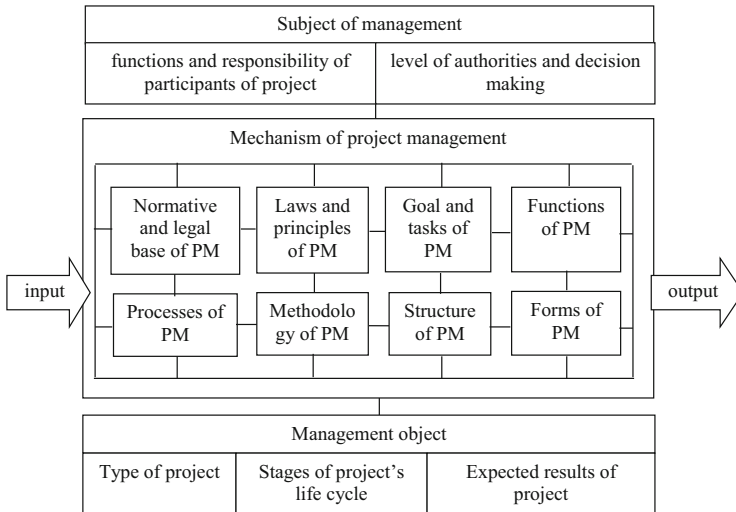


Fig. 3 Mechanism of project management

### 3.2 Mechanism of Project Management

While viewing the technology of project management, special attention should be paid to the mechanism of realization. As such mechanism, project management allows:

- generalizing all rules and procedures of management of realization of project in time,
- coordinating activities of all organizational units/links which realize totality of functions for project management,
- ensuring achievement of control indicators for the project.

In our opinion, the mechanism of project management has the following form (Fig. 3)

## 4 Discussion

The presented mechanism of project management allows balancing interest of all participants of the project (customers, consumers, investors, suppliers, management team, and work participants) and distributing responsibility and rights between them.

Due to the mechanism of project management, it is possible to form non-standard organizational structures and system of communications.

In the process of management, the characterized mechanism allows (Processes of project management 2016; Foundations of project management 2016; Filimoshkin 2013):

1. At the stage of initiation of the project:
  - conducting analysis of problems of economic development and of targeted landmarks,
  - formulating needs for the project, its goals and tasks,
  - determining and comparing alternative variants of the project,
  - forming the project group and determining general circle of its members' responsibilities.
2. At the stage of planning:
  - building a plan of realization of the project in view of set resource limitations,
  - determining and forecasting dynamics of risk component of the project,
  - introducing timely correction into the plan, according to changes of external environment,
  - specifying the process of project realization.
3. At the stage of project realization:
  - distributing functional responsibilities and responsibility for each stage of project realization,
  - forming adequate accounting system for stages of project realization,
  - conducting control over realization of the planned measures and achievement of targeted indicators for stages of project realization;
  - taking timely measures for reduction and prevention of risks that hinder achievement of the project goal,
  - determining factors and reasons of difference between planned and received results,
  - organizing high-quality information accompaniment of the project,
  - managing changes in the project.
4. At the stage of project termination:
  - forming account on the level of project realization and received results,
  - acquainting the customer with final results,
  - generalizing experience of realization of the project for the purpose of perfection of the process of realization of future projects.

Each stage of a life-cycle, after the end of another stage, is subject to evaluation of intermediary/final results and possible correction of further actions. These measures will allow achieving the set goals of project management with the best possible result.

It is necessary to pay attention to the necessity for establishment of the unified terminological list in the sphere of project management, which will allow reducing the terms of confirmation of documents for the projects. It is also necessary to teach employees the project management, which will allow using new effective tools in project and current activities.

## 5 Conclusion

The offered mechanism of project management should not and does not cancel old approaches to planning and conduct of activities at micro-, meso-, and macro-levels. It is built into the existing system of program-oriented management and strengthens it.

When implementing the technology of project management, it is necessary to stick to a range of principles:

- the process of management should be performed from the simple to the complex;
- effectiveness of project management grows under the conditions of active use of information tools (E-documentation, E-government, etc.),
- all intermediary and final results of realization of the projects should be registered for the purpose of control over the received results and generalization of experience.

The technology of project management allows participating—under the competitive conditions—in realization of the project for any citizen and/or organization (allows transferring realization of project tasks for outsource).

The offered mechanism of project management allows solving the issues emerging during realization of the project and achieving the set goals and planned targets.

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# Corporate Culture of Commercial Organization as an Effective Management Tool

Marianna Santalova, Dmitry Zemlyakov, Elvira Lesnikova,  
and Irina Fatyanova

**Abstract** Corporate culture of organization is an effective management tool and its evaluation allows determining advantages and disadvantages of relations in the workplace, responding to a problem situation, and developing recommendations on its further development and improvement.

## 1 Introduction

Corporate culture is the soil in which both victory and defeat of organization grow. The task of a leader is similar to the daily labor of the diligent farmer: shaping corporate culture requires regular attention, watering, fertilizers, and personal involvement. Just consciously creating and continuously maintaining a corporate culture can be a powerful tool for achieving the goals of the organization and motivation for its members.

Corporate culture determines the attitude to work from the staff and their activities in the organization (Deal and Kennedy 1982). If corporate culture is allowed to evolve spontaneously, i.e. decelerating, it can reduce motivation, impair the effectiveness of communication within the organization, and thus affect the overall effectiveness of the organization. It is therefore very important to guide the development of corporate culture of the organization in the right direction.

In the 1970', D. Hunter first described the basic techniques of staff motivation through corporate culture. A systematic study of corporate culture in management theory began in 1982 in the USA, when researchers T. Deal and A. Kennedy, identifying the factors influencing the effectiveness of international corporations, have brought the concept of corporate culture as an important factor influencing organizational behavior and corporate development.

Most foreign and domestic researchers (M. Armstrong, S. V. Shekshnia, E. A. Smirnov, et al.), who studied this phenomenon, refer to corporate culture human values that contribute to behavioral patterns of employees (Armstrong 1998).

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S. P. Robbins considers corporate culture based on the characteristics to be the most valued in the organization: personal initiative; willingness to take risks; clear objectives; coherence; managerial support; balanced control; employee loyalty (Shekshnya 1998; Shein 1985).

A. F. Harris and R. Morgan suggest the other ten characteristics: awareness of themselves and their place in the organization, communication system and language of communication (using oral, written, non-verbal communication, slang, gestures, etc.), appearance, clothing and representation at work (uniforms, business style, makeup, hairstyle, etc.), what and how people eat, habits and traditions in this area, relationships between people (by age and sex, by status, experience, and knowledge, religion and nationality, etc.), awareness of time, attitude to it and its use values and norms, belief and attitude or the location of something (faith in the leadership, their strength, mutual support, ethical behavior, fairness), the process of employee development and training, work ethic and motivation, etc. (Maister 1997).

## 2 Materials and Methods

The study analyzing the corporate culture of the organization was conducted according to the criteria of its formation, and included value-emotional, cognitive, activity, personal-effective, subjective criteria and their corresponding indicators.

To better define the relationship of the employees to the corporate culture, the questionnaire survey of employees was conducted ([http://www.chelt.ru/2009/12-09/eng\\_12-09.html](http://www.chelt.ru/2009/12-09/eng_12-09.html); [http://www.chelt.ru/2009/12-09/eng\\_12-09.html](http://www.chelt.ru/2009/12-09/eng_12-09.html)). The survey was conducted using a specially designed questionnaire. The purpose of the study was to determine the level of development of corporate culture of the studied organizations according to developed criteria.

The survey was performed among 27 people—employees of the organization. The data about the participants of the survey is presented in Figs. 1, 2, 3, 4, 5.

As you can see, most of the people are aged 31–40.

Most of the employees of the studied organization are women.

70 % of employees in the organization have higher education.

Cohesive team organization operates 2–3 years or 3–5 years. Work experience of 75 % of employees is more than 2 years.

The main factors that urge the employees to come to work in the organization are high wages (25 %) and stability and confidence in the future (40 %). These factors determine the work of the staff at present (Fig. 5): high salary (40 %) and stability and confidence in the future (30 %), as well as the desire to realize their potential (15 %).

According to the employees, the factors that negatively affect the labor conditions in their group are material and technical equipment (15 %) and organization of work (5 %). However, the majority of staff (75 %) believes that the organization of

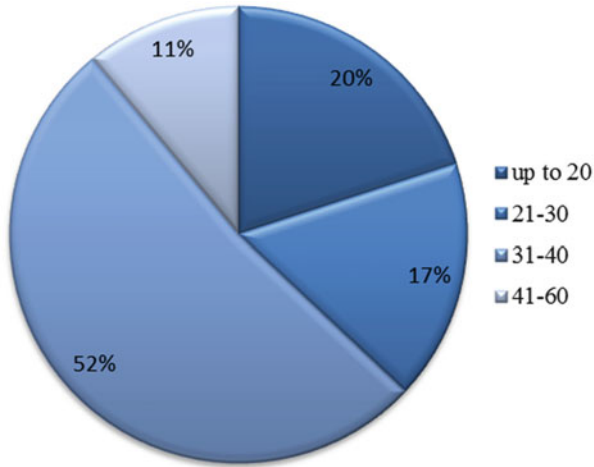


Fig. 1 Age of the employees of the studied organization

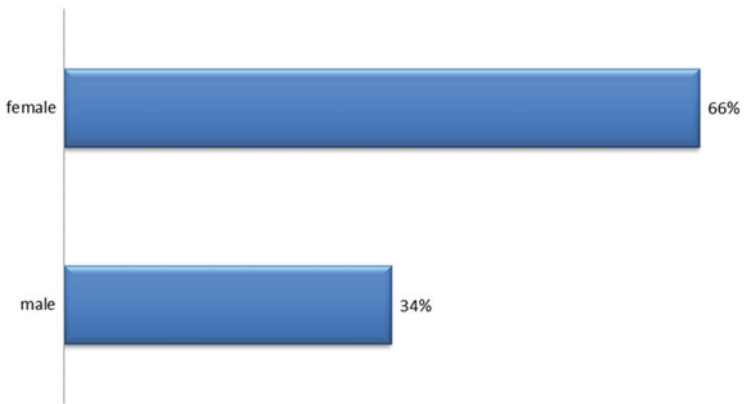


Fig. 2 Distribution of the organization's staff by gender

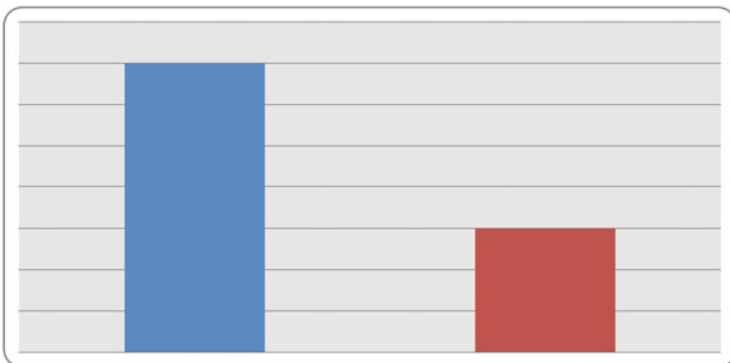


Fig. 3 Education of the interviewed employees of the studied organization

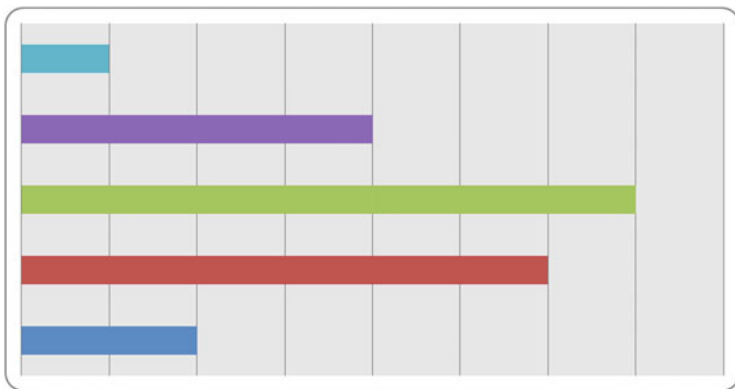


Fig. 4 Seniority of employees of the studied organization

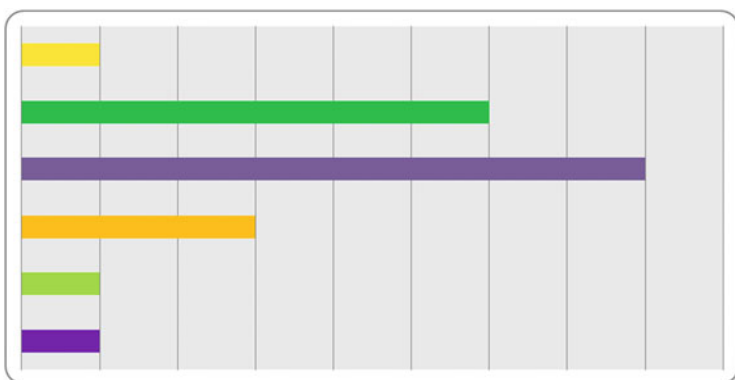


Fig. 5 Priorities that determine the stability of the employees of the studied organization

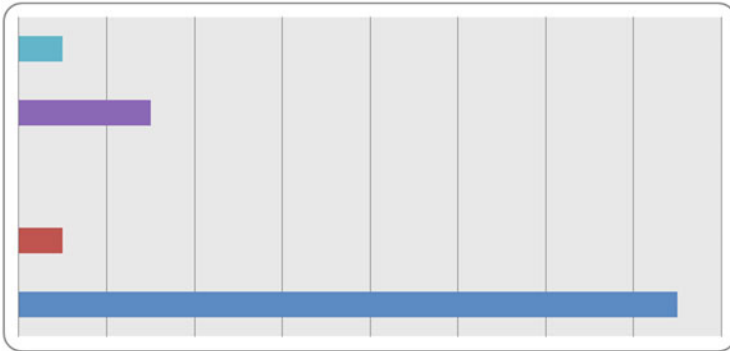
work, material and technical equipment and moral & psychological climate in the team have a positive impact on labor conditions (Fig. 6).

The majority of respondents believe that the main factor of advancement is the skill level and volume of work performed (50 %).

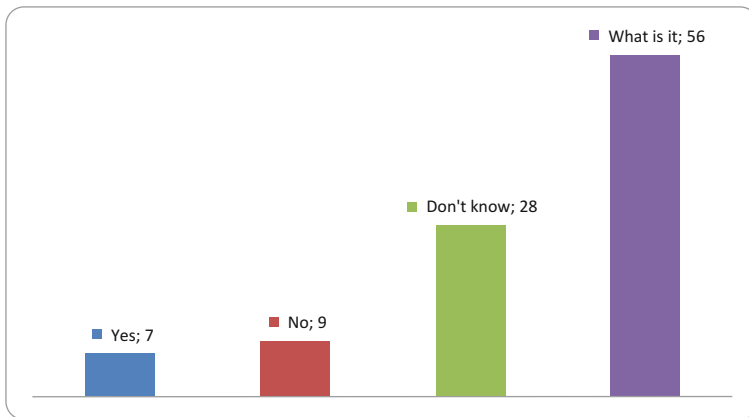
The answers to the question “Does the organization have a corporate code?” are distributed in the following way. (Fig. 7).

The majority of respondents heard nothing about the corporate code; only 7 % answered positively.

The majority of respondents believe that the manager does not seek advice from his subordinates during decision-making, does not discuss the issue collectively (30 %), or include the opinion of a narrow circle of employees (30 %). The majority also confirmed that the organization’s CEO determines subordinates’ methods and means of implementation (55 %); in the exercise of control over the work he tries to develop mutual control in the team (60 %); assignment of tasks and motivation of subordinates. Leaders prefer tools such as advice, proposal, or request (80 %);



**Fig. 6** Factors affecting labor conditions in the team



**Fig. 7** Presence of a corporate organization code

while stimulating subordinates equally, and encouragement, and criticism (50 %); in relationships with subordinates tries to maintain good personal relationships (45 %).

The answers to the question, “What existing elements of corporate style do you now?” were the following: logo, logotype, corporate colors, and anthem. (Fig. 8).

As you can see, the majority of respondents are familiar with the corporate style of the organization.

Then, peculiarities of corporate culture of the company are studied. The efficiency of corporate culture is a very important factor affecting the success of the organization. In this connection, it was revealed how employees evaluate the effectiveness of the corporate culture of the organization.

As a result, it is concluded that 70 % of surveyed employees were satisfied with their jobs, 5 %—not satisfied, 15 %—very unsatisfied, and 10 %—undecided.

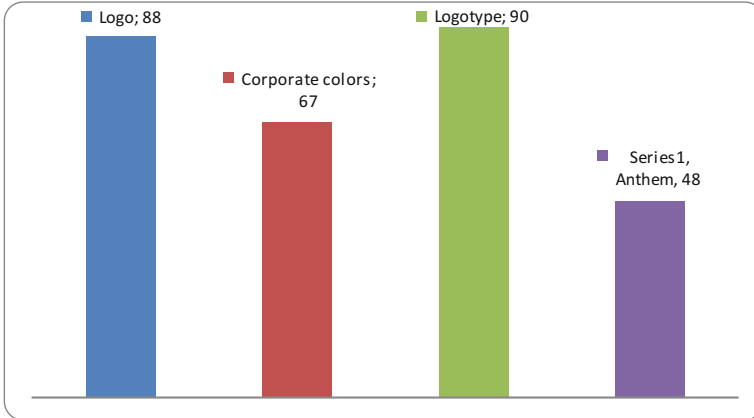


Fig. 8 Branding of organization

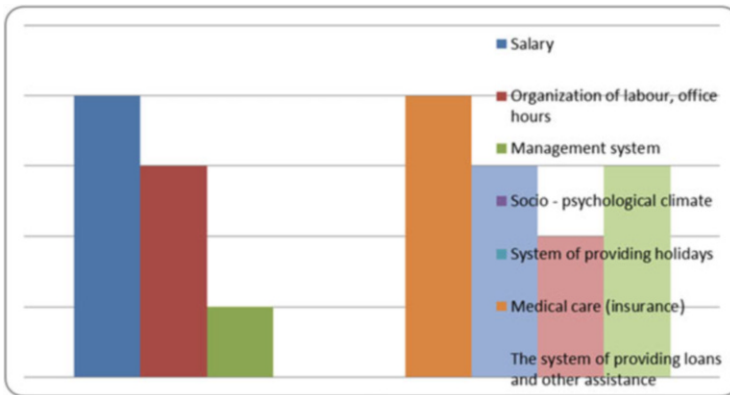


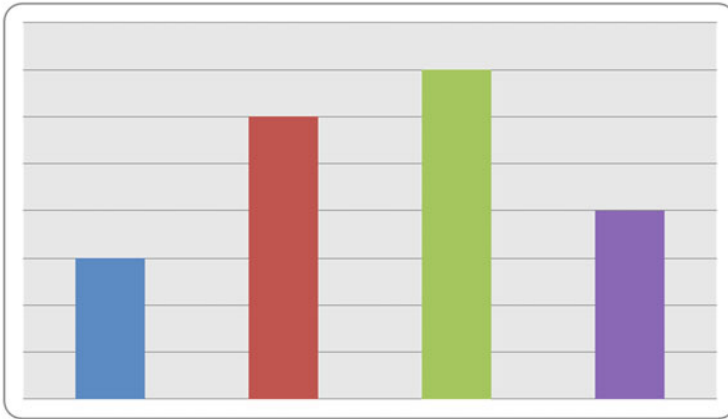
Fig. 9 Reasons for dissatisfaction of employees to solve social problems in the organization

The question “Are you satisfied with the solution of social problems in your team?” received the following answers: 45 % of respondents are fully satisfied, 45 % are partially satisfied with the same, and 10 % couldn’t decide.

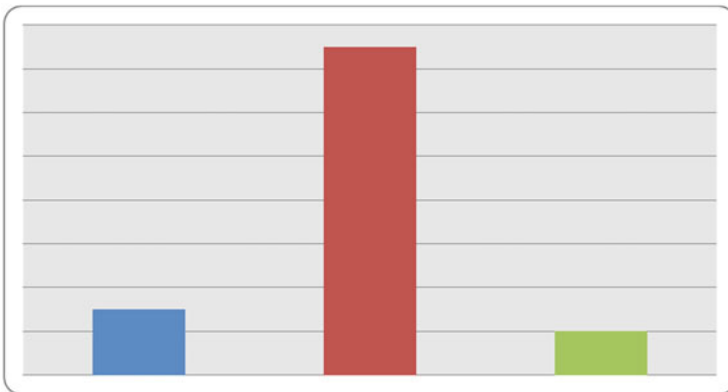
The question “What is your frustration in solving social problems?” received the following replies: 20 %—wages, 20 %—medical care, 15 %—organization of labor, 15 %—service provision system, and 5 %—management system in the organization (Fig. 9).

80 % of the respondents are satisfied with interpersonal relationships in the team, 5 % are not satisfied, and 15 % were undecided. 70 % of respondents are satisfied with the relationships between leader and subordinates, 5 % are not satisfied, and 15 % cannot make a decision.

In assessing the overall atmosphere in the team, 35 % found it friendly, 30 %—loyal friendly, 15 %—pure business, and 20 % couldn’t make a decision (Fig. 10).



**Fig. 10** Assessment of the atmosphere in the team

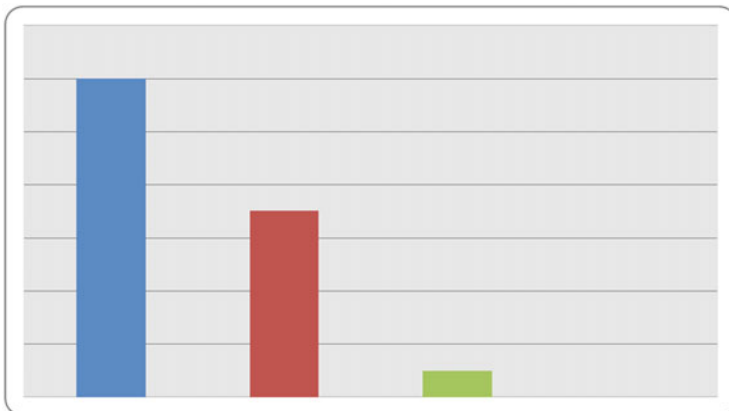


**Fig. 11** Evaluation of employees' corporate events

Regarding the issue of corporate activities 75 % of respondents answered that they are quite satisfied with corporate events in the organization; 15 % do not have enough activities, and 10 % believe that there is too much of them (Fig. 11).

The question “Does your team have united “corporate spirit”, common goals, norms of behavior, and shared values?”, 60 % answered “Yes, completely”, 35 %— “partially”, and 5 % could not make a decision. Not a single staff member felt the team was not cohesive (Fig. 12).

Analysis of formation of corporate culture of the company was conducted through a study of the public field (media, blogosphere), during which they identified key substantive and evaluative characteristics of the company and the opinions of the journalistic community. In this analysis, a survey was conducted among the correspondents of local editions. The questions included the following, “How often do you write?”, “Where do I get material for my articles?”, and “How often do you



**Fig. 12** Assessment of the degree of team cohesion

buy articles about the company?” The following results were obtained: the studied organization is known in the city. The journalist of “Moscow News” writes articles about the company once a month. The company’s management orders information article during professional holidays and public holidays. The articles are usually placed on the front page of the newspaper. The articles are published both on the organization as a whole and on particular events.

Regarding the analysis of public space (media coverage and the blogosphere), here, as a rule, two main tasks are solved: analysis of corporate culture and analysis of communication tools (Meister 2005; <http://www.careerdoctor.org/career-doctor-blog/2009/01/reading-corporate-culture-duri.html>; <http://corpculture.ru/content/tipologiyakorporativnykh-kultur-g-khofstede>). Analysis of open sources of information is the most common method for analyzing communications.

The first group of works is responsible for daily control (<http://www.tdan.com/view-articles/5248>; Santalova and Petrov 2014). Firstly, it is necessary to obtain information about what is happening in the macro-environment and industry developments and, secondly, to timely respond to external challenges. Among the tools that solve these problems are products of the monitoring: monitoring of the media and the blogosphere, digest, press review, news online. A key feature of this work is completeness and timeliness of information received.

### 3 Results

This study showed that the organization has quite promising future directions. Evaluation of the conducted research enables to conclude that the effectiveness of the management of corporate culture in companies is at a high level. However, there are reasons why the employees of the organization have misunderstandings and

conflicts with supervisors; many employees are not satisfied with the solution of social problems.

However to calculate the efficiency of corporate culture in commercial organization, which maintained a high level of labor discipline (FTD), we have used the following formula:

$$FTD = (Es - CHN) / Es * (FPL - TPV) / FPL$$

where

Es is the average number of employees,

CHN—number of employees who have committed violations of employment laws;

FPL—planned Fund of working time, man-hours;

TPV is the amount of breaks in between shifts and full day of lost work time due to violations of labor discipline.

## 4 Discussion

It is obvious that efficiency of corporate culture has an impact on business results (<http://vestnikmanagement.pu.ru/archive/pdf/271.pdf>; Santalova and Petrov 2014). Some scientists believe that it can be changed in accordance with the development strategy of the business, others have proposed to use expert evaluation, surveys, evaluation of external sources of information in order to identify the characteristics of corporate culture.

The article presents some elements of corporate culture estimation of a commercial organization, which allows making a concluding regarding its formation and determining the path of development.

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**Part II**  
**Provision of Economic Security by Means**  
**of Creation of Innovational Network of**  
**Transnational Cluster Initiatives**

# Transnational Cluster Initiatives in Business as a Top-Priority Direction of Maximization of Economic Growth in Asian Countries

Irina A. Morozova, Tatiana N. Litvinova, and Alexandra V. Sycheva

**Abstract** *Research Objectives:* The purpose of the article is to determine perspectives of maximization of economic growth in Asian countries. The hypothesis of the research consists in supposition that transnational cluster initiatives are a top-priority direction of maximization of economic growth in Asian countries.

*Methodologies:* Methodology of the research includes the method of problem and systemic analysis and the method of economic modeling and forecasting.

*Preliminary Findings:* The key conclusion of the research is substantiation of the offered hypothesis and of the fact that transnational cluster initiatives in business are a top-priority direction of maximization of economic growth in Asian countries.

*Potential Contributions to the Literature:* The value of the performed research for science and practice consists in a possibility for using the authors' recommendations for realization and development of transnational cluster initiatives in business of Asian countries for maximization of their economic growth.

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## 1 Introduction

Maximization of rates of economic growth is the most important goal of modern economic systems. Against the background of the global economic recession, Asian countries have been demonstrating the decline of economic development. This has been caused by violation of economic ties under the conditions of the global economic crisis, reduction of effective demand due to reduction of total global income of population, and general geopolitical tension in the world.

Over the recent decade, leading countries of Asia, such as China and Japan, have been demonstrating high rates of economic growth, being locomotives of the global economic development. It should be noted that Asian countries are countries of deployment of many transnational corporations which compete with the most successful European and American companies. An example of this is success of Samsung which has won market positions from Apple, etc.

Based on that, it is possible to expect in the mid-term the continuation of division of the global markets which are characterized by traditional domination of European and American companies, to the favor of Asian companies. This may lead not only to change of growth vectors of the global economy but to change of balance of forces and change of polarity, as well as to formation of multipolar economic system, characterized by higher economic effectiveness than current unipolar system.

That's why restoration of previous rates of their economic growth is the goal of not only these countries but of the whole global economic system, as they determine the rate of its economic growth and stimulate healthy competition in the global markets. Industrial orientation of economies of Asian countries—under the condition of their turning into global economic leaders—may lead to increase of sustainability and stability of development of the global economy, thus solving the problems related to domination of post-industrial economies.

One of peculiarities of economic systems in Asian countries is their orientation at individual development and lack of inclination to integration at corporate, national, and regional levels. Thus, Asian countries' entering new markets is complicated, and their economic position is aggravated—as compared to companies from the most economically developed countries. It's highly probable that change of landmarks for business and priorities of macro-economic policy in favor of stimulation of integration processes within economic system will lead to creation of more favorable conditions for maximization of rates of economic growth in Asian countries.

Based on this, the working hypothesis of the research consists in supposition that transnational cluster initiatives of business are a top-priority direction of maximization of economic growth in Asian countries. The purpose of the article is verification of this hypothesis and determination of perspectives of maximization of economic growth in Asian countries, related to realization of transnational cluster initiatives in business.

## 2 Literature Overview

Economic growth is a very important indicator of dynamics of development of economic systems (Bhanumurthy and Singh 2013). The rate of economic growth reflects production activity of national enterprises (Škare and Sinković 2013) and demand for their products in internal and foreign markets (Bozkurt et al. 2015). Due to peculiarities of development of market economy (Teekasap 2014), rates of economic growth of economic systems are accelerated or slowed down (Caporale and Spagnolo 2012), forming economic cycles (Gehring 2014).

Within the theory of cycles, it is possible to distinguish the following stages of economic cycle: growth (economic growth), decline (recession), and stagnation (Jahfer and Inoue 2014). Rates of economic growth could be low (growth of GDP less than 1 % per year), moderate (growth of GDP from 1 to 5 % per year), high (growth of GDP from 5 to 10 % per year) and very high (growth of GDP by more than 10 % per year) (Md Al and Sohag 2015).

During analysis of economic systems, it is necessary to pay attention—apart from the rate—to the quality of economic growth, determined by sources of such growth and structure of GDP (Popkova et al. 2013b). With low quality and under the conditions of resource economy, the rate of economic growth is a secondary indicator which does not allow fully reflecting the state and perspectives of development of economic system (Popkova et al. 2013a), as it is largely predetermined by external factors (Popkova and Tinyakova 2013a).

The most important condition of high quality of economic growth is innovational activity of national enterprises (Popkova and Tinyakova 2013b), as it ensures their long-term competitiveness, sustainability of economic development, and stability of rates of economic growth (Popkova and Tinyakova 2013c). That's why, for the purpose of maximization of rates of economic growth, modern leading countries focus at building innovations-oriented economic systems (Popkova et al. 2015).

Conceptual foundations of the concept of clustering of economy are set in works by such authors as (Gallié et al. 2013); (Mantaeva and Kurkedinova 2012); (Mihajlović 2014); (Nica 2010); (Reveiu and Dârdală 2015); (Vanka et al. 2012); (Xavier Molina-Morales et al. 2015), etc. Economic clusters are vertical and/or horizontal associations of a range of enterprises (Aragón et al. 2014). Very often, cluster entities include R&D centers, due to which successful translation of knowledge into economy and high innovational activity of enterprises within a cluster are achieved (Emmoth et al. 2015).

Literature review on the topic of the research showed that the concept of economic growth and concept of clustering of economic systems are studied in many works by modern scientists. However, most researchers analyze these phenomena separately, which leads to fragmentarity of study of the role of clusters in provision of economic growth and constitutes a field for complex research of these phenomena—to which this article is devoted. Methodology of this research includes the method of problem and systemic analysis, as well as method of economic modeling and forecasting.

### 3 Role of Transnational Cluster Initiatives in Business in Provision of Economic Growth of Asian Countries

In order to determine the role of transnational cluster initiatives in business, let us analyze statistics and build a model of economic growth of Asian countries. This work offers to use the following economic and mathematical model of GDP of Asian countries:

$$\text{GDP}_{\text{Asia}} = 0.45\% \text{IN} (0.80\% \text{NC} + 0.20\% \text{CL}) + 0.45\% \text{SR} + 10\% \text{AG} \quad (1)$$

where  $\text{GDP}_{\text{Asia}}$ —GDP of Asian countries;

IN—industry;

NC—industrial enterprises which do not belong to clusters;

CL—industrial clusters;

SR—service sphere;

AG—agriculture.

As is seen from formula (1), industry forms 45 % of GDP of Asian countries, service sphere—45 %, and agriculture—10 %. Clustering is peculiar for industry of Asian countries. Clusters account for 20 % of the industry of Asian countries. The model of economic growth can be presented in the following way:

$$\text{EG}_{\text{Asia}} = 0.68\% \text{IN} (0.90\% \text{NC} + 0.10\% \text{CL}) + 0.30\% \text{SR} + 0.02\% \text{AG} \quad (2)$$

where  $\text{EG}_{\text{Asia}}$ —economic growth ( $\Delta\text{GDP}$ ) of Asian countries;

As is seen from formula (2), economic growth of Asian countries is by 68 % ensured by increase of the volume of industrial production, 10 % of which is provided within cluster entities. 30 % of economic growth in Asian countries is provided by means of service sphere and 2 %—by means of agriculture. It should be noted that these models are compiled on the basis of average data which can somehow differ in various countries of Asia depending on their national peculiarities, but they provide a general picture of Asian countries on the whole.

At present, there are around 15,000 clusters in Asian countries. Total volume of investments into realization of cluster initiatives in Asian countries constitutes more than \$11 billion. However, according to the 2014 data, their contribution into formation of GDP of Asian countries constitutes around 3–5 %. It's worth noting that the tendency for clustering of Asian economy continues. Annual growth of the number of clusters and the volume of their production constitutes 10 % on the average (Sören 2015).

This proves that clustering is a popular and widespread phenomenon in Asian countries. At the same time, Asian countries are not interested in cross-country cooperation and realization of transnational cluster initiatives which supposes inclusion of enterprises from various countries into cluster entities.

Thus, it is possible to conclude that realization of cluster initiatives in business plays insignificant role in provision of economic growth of Asian countries. At the

same time, conditions for their realization are favorable on the whole, which is caused by general tendency of clustering of economy of Asian countries in recent years.

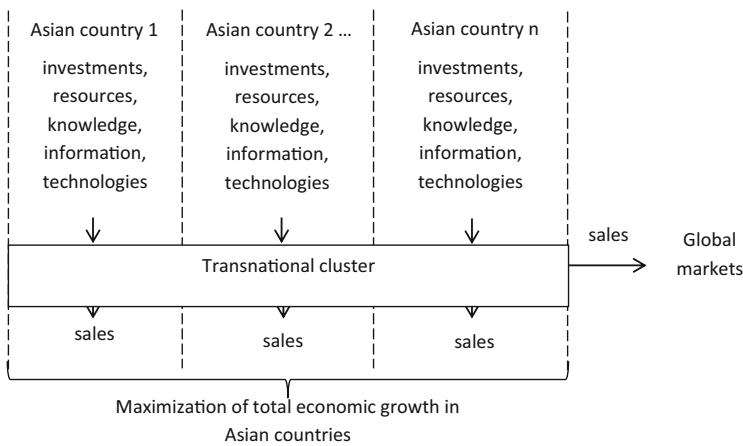
#### 4 Model of Economic Growth of Asian Countries on the Basis of Realization of Transnational Cluster Initiatives in Business

It is possible to distinguish the following advantages of realization of transnational cluster initiatives in business, as compared to national cluster initiatives:

- larger volume of investments and total budget of cluster entity;
- wider diversity of accessible resources due to existence of certain relative advantages of countries;
- more effective exchange of knowledge, information, and technologies due to expansion of cooperation limits;
- favorable possibilities for presence in all countries of the cluster, which expands the sales market;
- larger share of market and higher competitiveness in the global markets, etc.

In order to use the stated advantages with maximal profit, this work offers to use the model of economic growth of Asian countries on the basis of realization of transnational cluster initiatives in business (Fig. 1).

It should be noted that perspectives of activization of transnational cluster initiatives in Asian countries are related to growth of mutual trust of Asian countries,



**Fig. 1** Model of economic growth of Asian countries on the basis of realization of transnational cluster initiatives in business

growth of tendency for regionalization in Asia, and growth of interest to fronting of new global markets.

## 5 Conclusion

Thus, it is possible to conclude that as of now, clusters form only a small share of GDP of Asian countries. Asian clusters are national, and they do not pay enough attention to realization of transnational cluster initiatives in business. A key reason for this phenomenon is unpreparedness for cooperation.

Under the influence of the process of globalization and global economic crisis, the process of regionalization of economy strengthens, which increases interdependence of countries from the same region. Therefore, it is possible to expect improvement of conditions for realization of transnational cluster initiatives in Asian countries.

As a result of the research, the offered hypothesis was proved, and it was proved that transnational cluster initiatives in business are really a top-priority direction of maximization of economic growth in Asian countries, as they provide additional advantages for development of Asian business and growth of its global competitiveness. Prioritization of transnational cluster initiatives in business, which supposes proclamation of regional course for their activation, will allow stimulating these initiatives, proving state support for them, and attracting attention of private investors.

Regarding perspectives of development of transnational cluster initiatives in Asian countries, it is possible to offer shifting the accents to expansion of limits of cluster entities. These could be global clusters with a center in Asian countries. Due to wide geographical cover, global clusters may allow enterprises from Asian countries to expand limits of their presence and significantly increase sales volumes.

It is also possible to create cross-sectorial clusters in Asian countries. While initially Asian clusters were created in the sphere of industry, it is possible that diversification of clusters' activities will allow increasing their economic effectiveness and reducing risk component of Asian business. In this context, special attention should be paid to clusters in service sphere, which forms the same share of GDP of Asian countries as industry.

The value of the performed research for science and practice consists in a possibility for using the developed proprietary recommendations for realization and development of transnational cluster initiatives in business in Asian countries for maximization of their economic growth. It should be concluded that results of the performed research are limited by general recommendations, so development of the system of specific measures for activation of transnational cluster initiatives in Asian countries and their realization are a perspective direction for further research.



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# Modeling of Eco-Economic Security With the Use of Tax Instrumentarium

Natalya N. Skiter

**Abstract** The article deals with analysis of a range of indicators which characterize eco-economic state of Volgograd region. It is established that the state of surrounding environment has passed from the list of exogenous parameters for economic system to the list of intra-economic characteristics, which changes the structure and character of methods of analysis and evaluation of influence of pollution on the environment. Analysis of instrumentarium of eco-economic regulation for the purpose of improvement of tax mechanisms for provision of ecological security is performed. Analysis of existing system of ecological taxes and payments in Russia is performed, and some directions for improvement of taxation in Russian ecological sphere are offered.

## 1 Introduction

Provision of security of eco-economic systems requires the presence of adequate mathematical models. Development of these models is possible with the use of statistical methods (Krass and Yurga 2012; Skiter and Rogachev 2009b; Skiter et al. 2014a), algorithms of fuzzy conclusion (Rogachev 2013; Skiter et al. 2015c), and other approaches (Popkova et al. 2013; Skiter et al. 2015b), but determination of regularities of these processes is most effective with the use of analytical economic & mathematical models (Rogachev and Skiter 2014; Skiter et al. 2014a).

## 2 Purpose of the Research

Development of economic & mathematical model of regulation of emissions of industrial sector for substantiation of parameters of security of regional eco-economic systems with the use of tax instrumentarium.

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The following allowances were taken into account during development of the model. The modeled federative state includes  $S$  subjects. Indices  $i, j = 1, 2, \dots, S$  denote indicators which characterize economic activities of regions. It is supposed that regions produce homogeneous products, production of which is accompanied by anthropogenic emissions. Production costs in each region are denoted by  $K_i(E)$ .

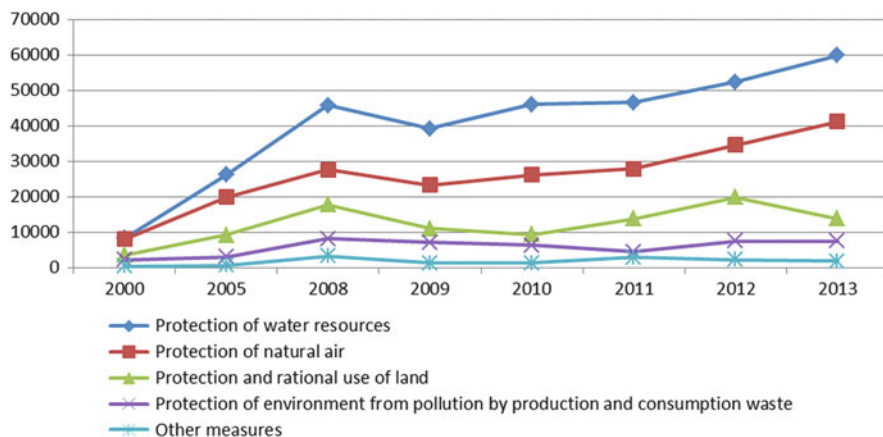
### 3 Methods of Modeling

Statistic research performed in recent years allowed determining direct correlation dependence between the growth of production and aggravation of the state of environment, on the one hand, and aggravation of the state of environment and growth of money expenditures for production, on the other hand. Thus, the state of environment has passed from the sphere of exogenous parameters for economic system to the sphere of intra-economic characteristics, which changes the structure and character of methods of evaluation and analysis of influence of pollution of environment on activities of specific enterprise.

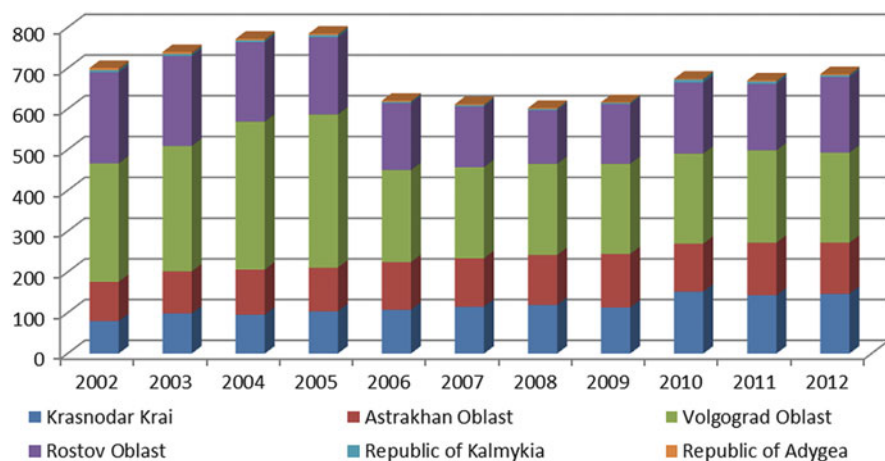
Investments into main capital, aimed at protection of environment and rational use of natural resources, are shown in Fig. 1; while expenses for environment protection in physical terms grew by two times from 2000 to 2013, they dropped by two times in % to GDP.

As to total level of emissions of the most widespread harmful substances into atmosphere, Volgograd Oblast—among similar industrial regions—is behind Ural and Siberia. (Fig. 2).

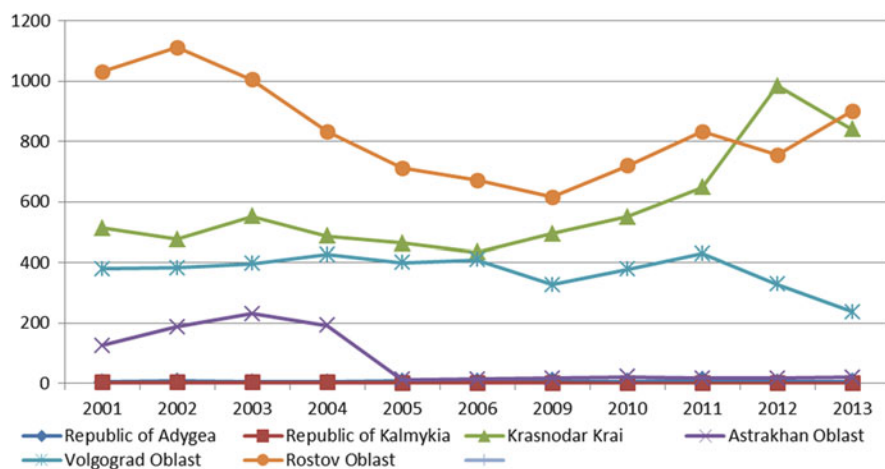
Total volume of emissions of harmful substances into atmosphere constituted 171,000 tons in 2012 (as compared to the basic 1990, reduction constituted 43.9 %),



**Fig. 1** Dynamics of expenses aimed at protection of environment and rational use of natural resources for 2000–2013, RUN million. Source: compiled by the authors on the basis of (<http://www.prirodnadzor-volgograd.ru>)



**Fig. 2** Emissions of harmful substances into atmosphere from stationary sources of subjects of the Southern Federal District, thousand tons. Source: compiled by the authors on the basis of [http://geo.1september.ru/view\\_article.php?id=200801517](http://geo.1september.ru/view_article.php?id=200801517)



**Fig. 3** Dynamics of the volume of reduced emissions of harmful substances ( $q^j$ ) for subjects of the Southern Federal District for 2001–2013, thousand tons. Source: compiled by the author on the basis of [http://geo.1september.ru/view\\_article.php?id=200801517](http://geo.1september.ru/view_article.php?id=200801517)

with 211,000 tons of flare substances, which pollute atmosphere, separated from stationary sources (reduction constituted 80%). Discharge of polluted sewage waters constituted 49.7%. The results of analysis of statistical data of reduced industrial emissions for subjects of the Southern Federal District are given in Fig. 3.

Emissions of the most widespread harmful substances into atmosphere (except for Rostov Oblast) are reduced, and, therefore, ecological security of regions is

improved, but, at the same time, payments for emissions are reduced. Harmful industrial emissions into environment are normed during development of mathematical model in such a way so products (in volume  $E$ ) and anthropogenic emissions are performed in such a way so that production of  $E$  items is accompanied by anthropogenic emissions into environment in the volume of  $E$  items, which could be reduced under the condition of investing additional expenses.

Expenses for reduction of emissions of industrial sector of region  $i$  are described by the function  $H_i(q, Q) = QA_i\left(\frac{q}{Q}\right)$ , where  $Q$ —full volume of emissions of industrial sector,  $q$ —volume of reduction of anthropogenic emissions, and  $A_i(\cdot)$ —function is strictly convex. Thus, function  $H_i(q, Q)$  is linear and homogenous (Skiter and Rogachev 2009a). Marginal expenses for reduction of anthropogenic emissions are described with the function  $A'_i(\cdot)$ . Let us determine that marginal functions for reduction of emissions of industrial sector become infinitely large with full exclusion of emissions, i.e., approach of relative volume of reduction of harmful industrial emissions  $t = \frac{q}{Q}$  to one,  $\lim_{t \rightarrow 1} A'_i(t) = \infty$ .

In the market of quotas for anthropogenic emissions, regional enterprises are price takers, as they do not have market power (Skiter et al. 2009b). Let us denote price of traded quotas for emissions with  $w$ , and initial quantity of permits for emissions of industrial sector, provided to  $i$ -th region ( $x^i > 0$ )—with  $x^i$ . Also, let us assume that region  $i$  must have one traded permit per unit of limit-exceeding harmful industrial emissions per production unit. Then,  $P^i$  is full quantity of remaining emissions of industrial sector, allowed in  $i$ -th region (for  $i$ -th region— $P^i = Q^i - q^i$ ). That's why net demand of  $i$ -th region constitutes  $P^i - x^i$  of traded quotas for harmful industrial emissions. It should be noted that if  $P^i - x^i < 0$ ,  $i$ -th region becomes the sole supplier of traded quotas for anthropogenic emissions.

## 4 Main Results of Scientific Research

State institutes which conduct eco-economic policy in  $i$ -th region have a right to set the sum of payments  $v^i$  for each unit of limit-exceeding anthropogenic emissions of industrial sector per unit of a certain product. That's why total payments for harmful industrial emissions, paid by companies of  $i$ -th region, will constitute  $v^i P^i$ . Let us denote the quantity of products required in the region  $i$  with  $E^i$ . Then it is possible to calculate the function of costs which includes expenses for correspondence to conditions of regulation of anthropogenic emissions at the state and federal levels:

$$C^i(E^i, v^i, w) = \min_{P^i} \left\{ K_i(E^i) + v^i P^i + w(P^i - x^i) + E^i A_i\left(\frac{E^i - P^i}{E^i}\right) \right\} \quad (1)$$

under the certain conditions, when  $P^i \leq E^i$  и  $P^i \geq 0$ . As marginal expenses for reduction of emissions of industrial sector comply with ratio  $\lim_{s \rightarrow 1} A'_i(s) = \infty$ ,

production enterprises do not fully eliminate limit-exceeding anthropogenic emissions per production unit. On the other hand, as  $w + v^i > 0$  and  $A_i'(0) = 0$ , the level of reduction of emissions of industrial sector in subjects of federation will not be negative. That's why full quantity of remaining harmful industrial emissions, allowed in  $i$ -th region,  $P^i(E^i, v^i, w)$ , could be represented with the following first-order equation for the function of expenses  $C^i(E^i, v^i, w)$ .

$$v^i + w - A_i \left( \frac{E^i - P^i}{E^i} \right) = 0 \quad (2)$$

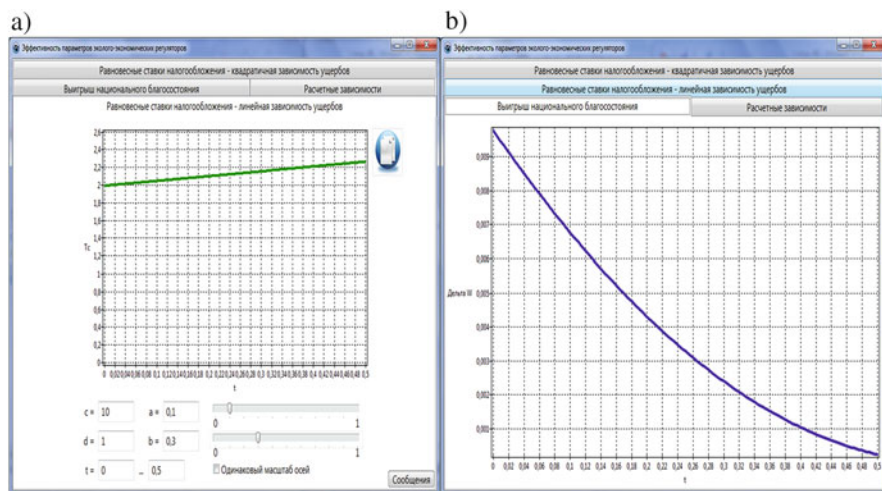
The expression (2) shows that for each region of the federation marginal expenses for reduction of emissions of industrial sector should equal the sum of expenses for purchase of additional permits for emissions and payments (set at the regional level) for a unit of limit-exceeding emissions. Also, the ratio (2) shows that a certain payment for anthropogenic emissions can induce any level of reduction of harmful industrial emissions which are above the level set under the condition of absence of due regulation at the regional level. Then, differentiating the equation (2), it is possible to characterize the influence of changes of the volume of products issued in a certain subject of the federation  $E^i$ , payments  $v^i$ , and the prices of traded quotas for emissions of industrial sector  $w$  on the level of emissions remaining in  $i$ -th subject of the federation, which minimizes the expenses,  $P^i(E^i, v^i, w)$ :

$$\frac{\partial P^i(\cdot)}{\partial v^i} = \frac{\partial P^i(\cdot)}{\partial w} = -\frac{E^i}{A_i''} < 0, \quad \frac{\partial P^i(\cdot)}{\partial E^i} = \frac{P^i}{E^i} > 0 \quad (3)$$

As the price for emissions remaining in  $i$ -th region constitutes  $w + v^i$ , the growth of payments for emissions of industrial sector or price of traded quotas for emissions leads to reduction of total emissions in  $i$ -th region, which is shown by ratio (2). The equation (3) determines that the level of anthropogenic emissions remaining in  $i$ -th region grows with the increase of volume of manufactured products in the region.

Due to awkwardness of the received analytical dependencies, study of their peculiarities was performed with numerous methods with the use of the computer program "Analysis of effectiveness of influence of parameters of eco-economic regulators", which interface is shown in Fig. 4 (Skiter 2013).

The practice shows that market economy has no material stimuli that provide ecological security. Business is aimed at realization of products (goods, works, and services) for the purpose of maximization of profits under the conditions of minimization of expenditures. Measures for minimization of emissions of polluting substances with high cost are not profitable, as they increase expenses of business but do not increase volumes of manufactured products and realized products (goods, services). In order to overcome this problem, the state uses economic mechanisms which reduce risks of destruction of environment. Provision of ecological security is one of the most important functions of the state which are



**Fig. 4** Windows of the interface of the software for analysis of influence of parameters of eco-economic regulators of pollution of environment. a) selection of parameters of regulators and determination of equilibrium tax rate; b) dependence of profit for national welfare from the level of coordination of eco-economic policy

realized in civil society. Accordingly, the budget that is formed for execution of these functions is built on tax income which may include ecological tax (Skiter 2015).

In some countries with effective mechanisms of provision of ecological security of the state and its subjects, the main source of financing is ecological payments and taxes. Increase of significance of these economic tools in some countries is seen as an important direction of optimization of tax system on the whole (Skiter 2011; Skiter et al. 2014b). In modern Russia, ecological payment and taxes can be tax and non-tax—as to their legal nature. Tax payments are implemented by the Tax Code of the RF, and non-tax payment act according to the resource laws of the RF. - Non-tax payments include payment for negative influence on environment, payments for mineral resource use, rental fees for land, and payment for use of water objects and forest fund (Skiter 2015). In Russia, mandatory ecological payments related to nature use are not distinguished legally into a separate system. Assignment of payments to tax or non-tax characterizes presence or lack of probability for application of coercive recovery measures for such payments and penalty fee and application of various tax sanctions. Thus, perfection of procedures of administration in the sphere of natural resources may consist in the fact that all ecological payments and taxes for natural resources use should receive the status of tax character, and, therefore, be systematized and regulated by the Tax Code of the RF—as payments of this kind are strictly regulated and the state has developed effective control over their levying, as compared to non-tax payments. This will allow controlling the process of their collection more effectively.

It should be noted that the mechanism of nature use should have market character, but its main parameters—rates, norms, prices for monopolists' products, etc. (“rules of the game”) should be set by the state.

The system of economic instrumentarium of nature protection activities covers the following directions (Skiter et al. 2015a): tax policy; concessional lending and subsidies; accelerated amortization of main funds of nature protection purpose; selling rights for pollution; use of principle “deposit-return”; fines; payments for pollution and placement of industrial waste.

There are four aspects in ecology-oriented tax system: sectorial, technological, regional, and food. With transition of economy to sustainable type of its development, ecologization, and structural transformation, the tax system should suppose increased taxes on nature-exploiting spheres and sectors which are at the beginning of natural and food chain or vertical, which will reduce economic effectiveness of investments into their development. In this case, taxes may, for example, perform the role of a press that suppresses nature-based activities or transforms these activities into well-balanced—from the point of view of ecology activities. In its turn, servicing, processing, and infrastructural spheres which are close to the end of nature and food chain or vertical can be imposed with reduced taxes which stimulate their further development. Such tax system is peculiar for flexible and strict types of economic mechanisms of nature use. Reduced taxes should be applied also for so called resource saving and/or low-waste (non-waste) technologies. Anthropogenic and nature-based productions and technologies should be imposed with increased taxes.

Regarding the issue of improvement of the whole tax system in this sphere, it is possible to distinguish a direction for significant improvement of natural resources share of taxes. Modern systems of taxes in Russia and the world are based on levying of taxes from the population, corporate income, added value, etc. Payment for the use of natural resources constitutes only several per cent of the revenue part of the total budget. Therefore, nature-exploiting activities are stimulated in a certain way. While preserving to total sum of taxes (so called “fiscal neutrality”), it is expedient to change proportions to the favor of increase of the share of taxes from nature use, primarily by means of payment for natural resources use—so called “green” taxes. According to experts' estimates, their share should grow a lot, which may constitute a significant share of the state budget revenues in future. This will allow taking into account the influence on environment and degradation of natural resources and will allow creating stimuli for reduction of nature resource intensity for the economy on the whole (Skiter 2015). In Russia this will lead to increase of nature rental fee, which should belong to the whole society; as of now, it is monopolized by nature-exploiting sectors, primarily, by fuel and energy complex.

The system of state subsidies for economy needs certain improvement as well. Investments must be provided primarily for the purpose of stimulation of ecologically balanced activities in national economy of the country. At present, subsidies perform a quite opposite, anti-ecology, role. It is especially seen in the two largest national economic complexes—fuel and energy complex and agro-industrial complex. Up until recent times, state subsidies stimulated destruction of environment,



stimulating development and implementation of new deposits, use of modern energy intensive technologies in industry, agriculture, and communal services, application of large quantity of mineral fertilizers, pesticides, heavy agricultural machinery, and irrational measures for irrigation and/or draining of lands of agricultural purpose, etc. Unfortunately, such anti-ecological policy is conducted as of now. Nature-intensive projects in energetics, including nuclear energetics, are subsidized, and subsidies are issued for manufacturers of ineffective agricultural equipment, etc. Quick amortization of main funds of enterprises is an approved measure for stimulation of top-priority directions of activities. Increasing amortization, the enterprise thus reduces the profit which is subject to taxation, which leads to growth of its net profit.

At present, Russia can become one of the world's largest sellers of quotas for emissions of greenhouse gases. Formation of international mechanisms of transfers for mutual settlement of the balance of carbon can bring significant profits for the country and attract additional foreign investments. The most popular economic tool in protection of environment is the deposit system or system "deposit-return". According to this system, when buying a certain product, we pay additional value which is then returned to us. This mechanism allows reducing pollution of environment (including toxic waste) and saving significant resources by means of utilization.

An important element of the system of eco-economic mechanism of nature use is payments for pollution of environment. Russia was one of the first countries to use these types of payments in practice. The process of development of theoretical and applied issues of levying of payments took a short time period. A pilot experiment was held in 1990, covering 29 subjects of the RF, and, beginning from 1991, payments for pollution were introduced as a mandatory tool. Payments for pollution have to compensate economic externalities (loss), done by enterprises to environment in the process of economic activities. Thus, the payments perform two main functions: firstly, they stimulate enterprises to reduce emissions of harmful substances and, secondly, they are a source of further accumulation of assets aimed for liquidation of negative ecological results of production. On the one hand, this mechanism is of "soft", or "overtaking" character. Being incorporated into the economic system, which is not oriented at ecological security, it has to weaken negative consequences of economic activities of enterprises. That's why the function of accumulation of money is the most important one, and it's easier to realize it. However, in perspective, stimulating role of payments in transition to nature-preserving industry should be increased.

At present, the following types of payments are used: payments for pollution of atmosphere, drop of harmful substances into water objects, and payments for waste placement. Pollution of the environment cannot be prohibited, as any economic activities that is related to nature use leads to its pollution. Still, it is possible and necessary to control the level of pollution. A very important fact is that payments for pollution of the environment does not free subjects of economic and other activities from execution of measures on its protection and compensation for harm. At present, payment for negative influence on the environment, made on the

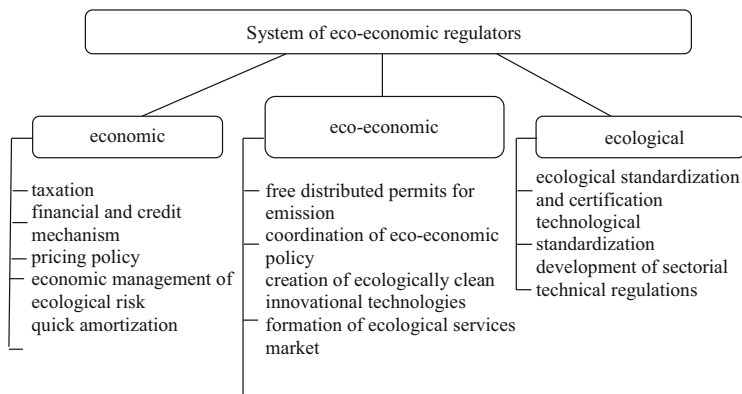
territory of the subject of the RF, goes to the federal, regional, and local budgets in the following proportion: 20 %—into federal budget, 40 %—into regional budget, and 40 %—into local budgets according to the location of the source which produces negative influence on the environment (Skiter 2015). As of January 1, 2015, budgets of all levels received from Volgograd Oblast more than RUB 285 million of payments for negative influence on the environment (growth of revenues, as compared to previous year, constituted 4.4 %; as compared to the basic 2009—15.7) (Table 1). The volumes of industrial and agricultural production grow in the region, which leads to increase of harmful emissions, drops, and waste into the environment.

The reasons that influence the indicators of revenues include incomplete data base of natural resources users. Though it was corrected during 2014—with 500 legal entities added—this work should be continued. The regional committee for nature recommended to perform inventory of all payers and objects of payment for negative influence on the environment and all natural resources users. A substantial help in this matter could be the creation of 3-level software which would include municipal level—department with the administration of municipal entity (it should collect requisite and address information and create new natural resources users in the data base); level of the subject of the Federation—the committee for natural resources and protection of the environment (supporting the data base of natural resources users, which are subject to the state ecological control of the subject of the RF), and the federal level—regional department of Federal Service for Supervision of Natural Resource Usage (support for the data base of natural resources users subject to the level of federal ecological control, general collection of information, preparation of analytical materials, etc.) (Skiter 2015).

Thus, modern state of ecologically substantiated economic development of Russia and its regions has not so much theoretical as practical nature. Ecological payments cannot and should not be viewed as just a source of replenishment of total revenues of the state—they must have a target character. So it is expedient to introduce a system of special ecological funds, which accounts will receive and issue assets for the protection of the environment and restoration and reproduction of natural resources. It is offered to distribute the assets from levying of ecological taxes and payments in the following way: 10 %—federal ecological fund, 30 %—ecological fund of the subjects of the Federation, 60 %—local ecological funds. At that, tax bodies should be administrators of incoming assets.

**Table 1** Payments for negative influence on the environment in Volgograd region for 2009, 2011, 2013, and 2014

Revenues	Sum, RUB thousand			
	2009	2011	2013	2014
Total revenues	246.4	293.0	273.3	285.2
including into federal budget	49.4	58.6	54.7	57.0
into oblast budget	98.5	117.2	109.3	114.1
into local budget	98.5	117.2	109.3	114.1



**Fig. 5** Structure of eco-economic regulators of ecological security

Therefore, it is offered to view the following system of eco-economic regulators for development of the range of adequate mathematical models (Fig. 5).

One of its economic elements is taxation. Methodological basis for economic & mathematical modeling was systemic analysis, as totality of methods and means of study of complex, multi-level, and multi-component systems, objects, and processes which are based on complex approach, consideration of interconnections and interactions between the elements of the system. Thus, we offered a system of eco-economic regulators as a totality of separate tools (elements) which are connected to each other and to the environment.

The viewed elements of optimization of the system of taxation in the sphere of protection of the environment and natural resources use will allow, on the one hand, regulating public relations in the direction of realization of the policy of ecological security, and, on the other hand, ensure formation of means necessary for natural resources protection purposes.

## 5 Use of Scientific Results

The results of the research are used in educational process of VolSAU, are included into the structure of courses “Statistics”, “Economic and mathematical modeling”, and “Economics of natural resources use”, and are accepted by the Volgograd branch of Russian R&D Institute of Water Engineering and Irrigation for research in the sphere of modeling of the processes of regulation and optimization of ecological situation at the regional level. The development are supported by the Grant from the Russian Foundation for the Basic Research and the Administration of Volgograd Oblast for the project “Mathematical modeling and improvement of the institute of tax mechanisms for provision of ecological security of Volgograd region in view of intersectorial externalities”, No. 15-46-02566 p\_Povolzhye\_a.

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# Formation of the System of Clustering as a Means of Perspective Development of Innovational Infrastructure of Region

Nadezhda A. Serebryakova, Natalya V. Dorokhova, and Mikhail I. Isaenko

**Abstract** The leading economies of the world entered the post-industrial stage of development, characterized by the dominating role of knowledge and information as production factors. The use of these resources in the process of creation of economic goods is performed through innovative activities. Its effectiveness determined competitiveness at all economic levels. The most perspective tool of realization of innovative activities in the modern conditions is clusters. Cluster may be characterized as a geographical proximate group of interconnected organizations (companies, universities, banks, etc.), suppliers of products, components, and specialized services, and infrastructure; R&D institutes; universities and other organizations. Clustering ensures vertical integration of enterprises and, as a consequence, growth of their competitiveness. Development of clusters is especially important in agro-industrial complex, as it ensures realization of modern approach to food security, which supposes security of food products at all stages of its manufacture, realization, and consumption.

Under the modern conditions, economic indicators of region's development largely depend on innovative activities.

Innovative activities are a totality of certain scientific, technological, organizational, financial, and commercial measures aimed at commercialization of accumulated knowledge, technologies, and equipment.

Innovative activities could be performed at micro-, meso-, and macro-levels. At micro-level, innovational enterprise is the one that implements product or process innovations, regardless of the author of innovations—employees of this organization or external agents (external owners, banks, representatives of the federal and local authorities, R&D organizations and providers of technologies, other enterprises).

Innovations are a complex economic and organizational process which is based on the use of two types of potentials—scientific, the newest technologies and

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equipment, on the one hand, and intellectual potential, related to management's capability to implement innovations at all stages of production and commercial activities, on the other hand. An important element of this process is its investment provision—search and rational use of significant financial assets. Attraction of private, state, or mixed investments with their certain reserves, which can compensate for the high risk, ensures entry into the higher economic level. Besides, as the experience of less developed countries showed, successful transition to innovational model of functioning of national economies is possible only under the condition of its implementing the innovations. This model won't be effective without reforming the economic environment on the whole on the basis of deep transformation of economic mechanism of the country (Serebryakova 2014a, b).

In order to develop successfully, any enterprise has to invest its financial resources into innovational programs of perfection of its potential.

In the modern quickly developing society, with dominating role of science-intensive technologies, a huge role belongs to formation of the system of clustering as a means of perspective development of innovational infrastructure of the region (Dashkova and Dorokhova 2013).

Infrastructure of innovational activities is a totality of innovational activities which ensure conditions required for performance of innovational activities and functioning of various innovational processes.

Under the market conditions of economy, enterprises which want to solve various tasks face the necessity for integration. This is caused primarily by necessity for achievement of financial sustainability of enterprises under the conditions of strong competition. The most perspective form of integration is creation of clusters.

Cluster a geographical proximate group of interconnected organizations (companies, universities, banks, etc.), suppliers of products, components, and specialized services, and infrastructure; R&D institutes; universities and other organizations which supplement each other and strengthen competitive advantages of separate companies and of the cluster on the whole. In a general form, it is a product of modern human cooperation, involvement of enterprises into various regional associations with a more complex hierarchy of submission. Multiple studies all around the world prove positive influence of cluster on activities of cluster companies.

A classic definition of a cluster is the one by M. Porter: “A cluster is a geographical proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and externalities”.

Study of clusters in economies received huge development in 1980's in the USA due to increase of competitive positions of Japan and US losing some markets, which actualized the study of international competitiveness. In practice, application of cluster organizational technologies within specific territories and spheres was performed in late 1970's in the famous “Silicon Valley” in the USA; during the formation of timber and paper, packing, and polygraphic clusters in Finland, which united a range of territories and spheres of the country; ship building cluster in

Norway, which played a key role in modernization of coastal regions; in “industrial centers” of Italy, which ensured restructuring of depressive territories.

In some countries, cluster policies were implemented only recently, while in other countries they have been conducted since 1990’s. In recent years, wider possibilities opened for exchange of leading experience between countries, trans-border cooperation, and coordinated policy between regions and countries.

Cluster policy is a component of economic policy of the state. Its goals are support for development of clusters on certain territories by means of creation of additional conditions for increase of competitiveness and effective interaction of cluster members. A peculiarity of cluster policy, as compared to industrial policy, consists in orientation only at competitive types of activities of a region of any country. Cluster is peculiar for mutual competition between its members, formation of unique competences of the region, and formation of concentration of enterprises on a certain territory. Cluster approach to development of economy is used by governments of the USA, the UK, Canada, France, Sweden, South Korea, Japan, and Kazakhstan. In Russian economic science, the most valuable are the works by M. Afanasyev, L. Myasnikova, and S. Sutyryna.

For national economies, clusters perform the role of growth points of internal market which, in their turn, increase international competitiveness of the country, as it is based on strong positions of separate clusters, without which it could occupy a medium position in the global economy.

There are many examples which prove that in the modern economy, participants of competitive struggle are not separate companies but clusters with participation of small, medium, and large enterprises. Actuality of the cluster approach is that large transnational companies, for example, during placement of assembly lines, choose—all other conditions being equal—the regions with clusters of suppliers and corresponding infrastructure. The flow of investments is larger in regions with formed clusters, as they work more actively.

Clusters are one of the form of interaction between organizations and social groups within the common value chain. Clusters should be differed from holdings, professional associations, technological parks, industrial parks and districts, regional innovational systems, territorial and production complexes, and industrial agglomerations.

Being a part of the region’s economy, modern territorial and sectorial clusters form on a certain territory (not always within the existing administrative and territorial limits) and actively participate in the common system of territorial division of labor. Economic and technological unity of such clusters is created by productive ties between enterprises, use of region’s natural and informational resources, and the general system of settlement. Thus, clusters provide vertical integration of enterprises and are a tool of development of innovational potential of the region.

Development of innovational potential of region in the sphere of agro-industrial complex is very important for provision of food security. A special role belongs to development of innovational potential in agro-industrial complex in Voronezh Oblast, as the structure of the region’s economy is dominated by the sphere of

agriculture and food industry. It is necessary to create conditions for sustainable development of existing infrastructure in agro-industrial complex, as well as to create new objects—technological parks, territories of quick development, economic areas, and clusters. In our opinion, the most effective variant for sustainable development of the region on the whole and agro-industrial complex, in particular, is clusters. Their development ensures economic and food security, which is the most important task of national economy. As the tendencies of market activities of Russian and foreign industrial companies show, security becomes more and more important factor of not only their functioning but of formation of conditions for targeted growth. Actuality of solving of this task grew recently due to significant changes of political and foreign economic situation (Bogomolova et al. 2013).

Agro-industrial clusters include firms and organizations connected by issue of final products and geographical location. Such geographical proximity is viewed as a place of accumulation of “critical mass” of human capital and scientific, innovational, and production potential. Investments into R&D, innovations, and cooperation into the R&D. Clusters are a key element and a tool of modern innovational policy of enterprises’ activities.

The necessity for strengthening of innovational component in activities of agro-industrial sector through clustering of national economy leads to necessity for search for new approaches and directions of strategic development, one of which is clustering. Today, the share of products of agrarian production in the structure of GDP of the Russian Federation constitutes only 4%, while for most urbanized countries this indicator constitutes 10–14%. At that, agrarian enterprises are characterized by insufficient level of turnover of invested capital, low investment attractiveness, high labor intensity, and financial instability of economic subjects.

The most important component of agro-industrial complex is the grain sphere, which determined the basis of economic security of the country. Grain is one of the main types of agricultural raw materials. Russian grain market is peculiar for inequality of territorial placement of production with more equal distribution of consumers on Russian territory with the main centers of consumption in the large industrial cities, which determined stable product flows of grain.

Modern state of the Russian grain market is a consequence of the processes of its formation under the conditions of transition of agricultural sphere to market relations with simultaneous weakening of the role of the state. On the whole, division into regional and transregional levels, which is peculiar for the Russian grain market, is a reason for administrative limitations for movement of grain between the regions.

In our opinion, this leads to the following tendencies and problems of the grain market:

- reduction of state purchase of grain and re-orientation of the system of realization from the state to alternative sales channels;
- significant changes of market prices for grain, depending on crop and seasonality of production, which destabilizes the grain sphere on the whole;



- emergence of a large number of intermediary structures in the market, which dictate to agricultural manufacturers unprofitable pricing conditions;
- significant share of barter transactions, caused by the necessity for payments to enterprises and organizations for supplies of oil products, lubricants, fertilizers, and seeds;
- weak informational transparency of the market and, as a consequence, lack of equilibrium price which determines real demand and offer.

Besides, the most important task of development of the grain sphere consists in increase of quality and nutrient value of products of grain and in increase of production effect during its processing into high-quality products and preservation of the received products with long terms of storage.

It is important to note that the factor of stability of enterprises in the market depends on reliability of the channel of distribution and possibilities of enterprises to adapt under the conditions of changing external environment. Presence in the market is primarily a reflection of consumer's trust to manufacturer.

As to the production chain of agro-industrial complex, it is very important to preserve and process effectively agricultural products, turning it into final products and raw materials with high quality and high demand. Observing the set norms at the output, a consumer has to receive products that correspond to the established standards and satisfy a wide specter of market needs.

The state has to stimulate implementation of the methods of quality management and form civilized market relations between members of production and rules of realization and consumption of products of agro-industrial complex. At present, manufacture and processing of grain are performed by private companies, and grain was and is one of the most important components of Russia's food security. That's why management of grain quality requires strengthening of centralization and state control (Salikov and Isaenko 2014).

A leading role in realization of the general idea of a cluster of agro-industrial complex belongs to the system of standardization, metrology, and certification, which should become a foundation providing high quality and competitiveness of products of all cluster-building spheres for achievement of food security of the country.

Quality of food industry products should be evaluated not only by the final products (bread and flour products) but also at the initial stage—during planting of winter crops, quantity of fertilizers, share of nitrates, and quality of flour manufactured from grain cultures. A consumer is primarily oriented at products of domestic manufacturer, considering it of better quality that imported goods. This is one of the main advantages of food industry of the RF.

The general indicator of food security is the dynamics of manufacture of grain products on average per capita. In recent years, according to the Federal State Statistics Service, consumption of bread products in Russia, has been constituting 120–121 kg per capita per year. At that, there is a tendency of reduction of physical volume of flour market, which shows the reduction of the quality of population and growth of income, which stipulates long-term change of the model of nutrition to

the favor of reduction of consumption of bread and bread products and corresponding increase of volumes of consumption of meat and meat products, fish, dairy products, fruit, and vegetables.

The regulations of the EU No. 178/2002 dated January 28, 2002, which sets the general principles and requirements in food law and creation of the European body on security of food products and establishment of the procedure of provision of food products, view a range of important issues. In particular, for the purpose of provision of security of food products, all aspects of the production chain of food products are viewed in the regulations in their interconnection, beginning from initial production to sales, accordingly, to the transition of food products to a consumer, as any participant of this chain can potentially influence the security of food products.

Besides, for the purpose of provision of corresponding level of health protection, the EU has implemented the principle of preservation of environment and created limitations of free turnover of food products and forage. Thus, the single foundation for application of this principle is created in the EU.

A mandatory condition of the regulations is the control over stages of processing and manufacture of food products which, together with other parameters, should take into account toxicological, microbiological, and chemical influence on food products, as well as influence of the results of genetic engineering activities.

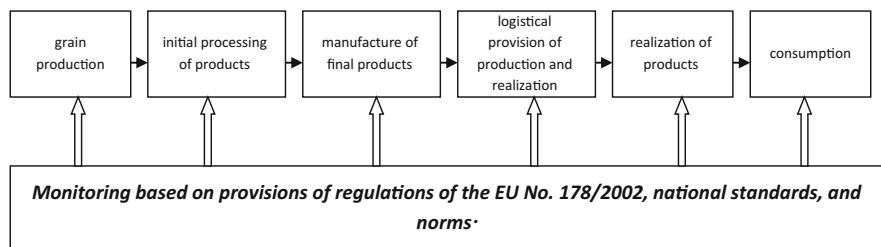
This regulation emphasized the important role of society, non-government organization, sectorial associations, international trade partners, and trade organizations in provision of security of food products for protection of consumers' interests. Consumers and trade partners' trust should be ensured through open and transparent development of food law and through the authorities' informing the society on sufficient suspicions regarding a food product being dangerous for consumers' health.

In our opinion, these conditions and rules should be taken into account during solving of strategic tasks of formation of regional grain and food cluster. However, observation of the regulated provisions requires the presence of effective informational system on monitoring and control in such socially responsible and economically significant sphere as production of grain and grain products.

Based on the Regulation of the EU No. 178/2002 dated January 28, 2002, it is necessary to create the system of monitoring at the regional level "from field to plate", which could be effectively done with the help of a cluster.

It should be noted that as compared to isolated functioning of market subjects, uniting them into clusters allows receiving significant effect due to combination and cooperation of enterprises, rational use of natural and labor resources, secondary raw materials, transport networks, reduction of construction cost of additional and servicing structures, and construction of engineering communications and socio-cultural objects.

Unfortunately, modern state of the spheres of agro-industrial complex does not stimulate quick formation of a cluster—nevertheless, they still have potential possibilities. Each sphere has positive changes which require their strengthening and



**Fig. 1** Scheme of practical realization of the principle “from field to plate” in agro-industrial complex

targeted coordination, and there are negative factors the action of which should be leveled.

Enterprises’ interest in results of its activities is caused by necessity for increase of competitiveness of the issued products, which requires improvement of work of all services and departments of an economic subject (Fig. 1).

Thus, increase of volumes and quality of manufacture of grain products is a high-priority task at the national economic level and regional level, including the level of the Central Black Earth region. The initial task of development of regional agro-industrial complex is provision of competitiveness for any economic subjects and regions on the whole. At that, it is important to use corresponding methods and mechanisms of increase of competitiveness which recommended itself in economic practice of successful countries.

Such high-priority tools include cluster approach to concentration, integration, and mobilization of resources of innovational development of territory and the sphere. Realization of cluster approach requires the state support at various levels, depending on significance of each specific cluster project. Taking into account the Russian model of state management, bodies of executive power of the Subjects of the Federation must become the main initiators of cluster projects (Salikov et al. 2013).

Cluster approach requires elaboration and substantiation of instrumentarium for creation and management of new structures according to requirements of external environment, specifics of uniting sphere, and peculiarities of territories of their location. Development of cluster structures requires creation of managerial approaches which will stipulate sustainable development of various spheres and achievement of significant economic results of activities of region, sphere, cluster, and its enterprises.

Clusters possess greater capability for innovations due to the following reasons: cluster enterprises can quickly and adequately react to buyers’ needs; membership in cluster stimulates access to new technologies used by enterprises at various levels of economic activities; suppliers, consumers and enterprises from other spheres enter the innovational process; as a result of cooperation of cluster organizations, costs for R&D reduce; enterprises in cluster are under intensive competitive

pressure, which is aggravated by a possibility of constant comparison of own economic activities to the work of similar companies.

Unification into a cluster on the basis of vertical integration forms not a spontaneous concentration of diverse scientific and technological inventions but a certain system of distribution of new knowledge and technologies. At that, the most important condition of effective transformation of inventions into innovations and of innovations into competitive advantages is formation of the network of sustainable connection between all cluster members (Serebryakova 2014a, b).

The main drawback of functioning of enterprises in a cluster is competition between them in view of horizontal integration. This means that cluster, in its turn, has to be a platform for partnership on a mutually beneficial basis and bring all manifestations of competition down to minimum.

As a rule, clusters in agro-industrial complex are an open business system with fuzzy contours, which is characterized by lack of strict connections between cluster members which would be fixed legally. At that, clusters are constantly under the influence of internal factors related to specifics of members and external objective factors caused by macro-economic situation. Intensity of their influence determined the stability of cluster as a system (Salikov et al. 2013).

Effectiveness of a cluster is total efficiency of activities of its members as to individual activities and as to other forms of integration and interaction of economic subjects. Agro-industrial cluster forms a complex combination of competition and cooperation. At the regional market of agricultural clusters, there are networks and competition, as single agents—which allows them oppose the destructive tendencies of the global competition, which is increased due to Russia entering into the WTO and, in particular, due to reduction of barriers for import of agricultural products.

An advantage of agro-industrial clusters consists in novelties and growth of labor efficiency in agricultural production in the mid-term and the long-term, as compared to geographically isolated agricultural manufacturers. Agricultural enterprises which a within a cluster receive profit from concentration of initial agricultural manufacturers which could unite into cooperative and establish sustainable connections within a cluster.

Agro-industrial clusters could found their activities on three attributes:

- geographical localization;
- interconnection between enterprises of the sphere;
- technological interconnection between different spheres for manufacture of the final product.

Unification factors of economic interests of creation of cluster could be:

- 1) conduct of unified pricing policy in the commodities market;
- 2) expansion of the volume of manufacture of goods and services by its members;
- 3) conduct of unified marketing policy;

- 4) implementation of innovational technologies as a result of integration and cooperation of manufacture of products and its realization in commodities markets.

In the RF, creation of agro-industrial clusters should suppose provision of conditions for technical re-equipment of the sphere and attraction of investments on the basis of existing commercial mechanisms, as well as active application of innovations in technological and managerial processes for the purpose of sustainable development of cluster subjects.

In view of the above provisions and conditions, it is expedient to form within the Central Black Earth region (in particular, on the basis of Voronezh Oblast) a large grain cluster. Such cluster will stimulate not only the improvement of coordination of actions and overcoming of complex problems of agro-industrial development at the regional level but will allow contributing into solving the actual problem of provision of food security of the country.

Food security is one of the main conditions and a component of national security of the state. Therefore, the state has to include into the plans of budget financing of agrarian sector the clearly formulated targeted indicators connected to indicators of food security and to perform control over their execution.

At present, absence of the system of monitoring at the macro- and meso-level is a significant restraining factor of coordination of actions, including for the formation of cluster relations. At that, this monitoring is necessary for solving the issues of targeting and scale of state support for enterprises of agro-industrial complex at the regional level.

This monitoring could be performed by a special structural department created in the system of government bodies of the region which work in this sphere. At that, interference of the state with market economy is admissible within the limits which stimulate the increase of economic effectiveness. The system will allow not only evaluating the quality of new crop but also protecting interests of grain manufacturers in the process of its realization, which is especially with grain export.

Thus, formation at the regional level of the system of clustering and monitoring of grain sector of agro-industrial complex is aimed at strengthening of informational provision in part of quantitative and qualitative characteristics of grain market, improvement of commodity and consumer attributes of grain, increase of quality and security of grain and products of its processing, and effective coordination of activities of members of potential cluster—at that, institutionalization of cluster relations can actively stimulate the development of infrastructure within the region and establishment of sustainable and mutually profitable association of companies: manufacturers and suppliers of components, raw materials, and specialized services; R&D institutes; universities and organizations which supplement each other and strengthen competitive advantages of separate companies and the cluster on the whole.

Protective measures of Russian manufacturers are used more often, through implementing the quotas and custom fees and return sanctions on the imported food and raw materials, used by Russian enterprises for manufacture of food

products. The industry takes measures for creation of modern specialized production and performance of wise trade protectionism which does not allow dumping in the internal market from foreign exporters and unfair competition.

The main direction of development in the sphere of food industry is strengthening of competitive advantages as compared to foreign products in the internal and external markets and acceleration of the growth rates of manufacture of main types of food products. The spheres pay a lot of attention to improvement of quality and expansion of assortment of manufactured products, implementation of innovational technologies, and mastery of new methods and packaging. These measures will allow conquering not only the Russian manufacturer but increasing the volumes of export for specific positions. Russia exports flour, macaroni products, pastry, beer, sunflower oil, and other products. For the further growth of indicators, enterprises need to endure competitive struggle both within the country and abroad. At present, cluster policy is viewed as one of the key tools of regional development.

Thus, perspective development of innovational infrastructure of region's clustering should be based on formation of the system of clustering. The processes of clustering are especially important in agro-industrial complex, as they stimulate the growth of competitiveness of cluster enterprises and ensure realization of modern approach to food security which supposes security of food products.

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# Concept of Innovational Development of Entrepreneurial Potential of Small Enterprises

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**Abstract** The purpose of the article is to develop a concept of innovational development of entrepreneurial potential of small enterprises. The authors offer a proprietary methodology of evaluation of entrepreneurial potential of small enterprises which allows determining its structure that includes consumer, investment, social, and contractor potential. The authors define the notion and sense of entrepreneurial potential as an economic category, determine specifics of entrepreneurial activities of small enterprises, develop conceptual foundations of formation of innovational development of entrepreneurial potential of small enterprises, and prepare a map of competences of modern entrepreneur in the sphere of small business. As a result, the authors come to the conclusion that specifics of small enterprise determine a key role of entrepreneur in formation of entrepreneurial potential. That's why the level of its realization depends on effectiveness of entrepreneur's activities, which emphasizes the necessity for the use of the offered competence-based approach.

## 1 Introduction

Under the conditions of post-crisis development of modern global economy, small enterprises are an important source of economic growth. Minimal requirements for starting business and high level of flexibility make small enterprises universal

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economic objects which are optimal for dynamically changing conditions of market environment. It is the development of small business that many experts consider to be a tool for overcoming the economic crisis and entering a new level of economic development.

Possibilities of development of small enterprises are reflected by their entrepreneurial potential. Without such potential, enterprise loses capability for attracting resources and expanding business, as well as for perfecting production and organizing the products sales. Possession of entrepreneurial potential pre-determined expediency of doing business and perspectives of growth of its effectiveness.

Despite the obvious importance and necessity for management of entrepreneurial potential, this issue is not studied well in science and practice. Due to this reason, small enterprises do not pay enough attention to formation of its entrepreneurial potential, which restrains the rates of their development and economic growth of the country and the global economy on the whole. This is the reason for actuality of study of perspectives related to development of entrepreneurial potential of small enterprises.

According to the authors of this article, successful development of modern small enterprises requires innovational development of their entrepreneurial potential, which corresponds the most to the criterion of anti-crisis management. That's why the purpose of this article is to develop the concept of innovational development of entrepreneurial potential of small enterprises.

## 2 Literature Overview

Innovational development of business supposes flexible approach to entrepreneurial activities (Doroshenko et al. 2015a), constant conduct and implementation of results of scientific research and developments into production, marketing, and managerial activities of enterprise (Doroshenko et al. 2015b), and offering innovational products and services.

Under the conditions of development of modern global economy according to the market type and establishment of the global competition in most markets, innovational development is an inherent aspect of success of business, which is proved by materials of the research by (Kalenskaya and Shafigullina 2014), (Skrypko 2014), (Leybert and Vanchukhina 2013), (Nadochey 2010), etc.

Entrepreneurial potential is characteristics of business which reflects its capability for development and self-improvement (Etemad 2015). It is determined by internal capabilities of enterprise's development (Komelina and Chaikina 2015) and its capability for using external situation for to its own benefit (Goorha 2015). Entrepreneurial potential is studied in the works by (Ahmetoglu et al. 2015), (Jayawarna et al. 2014), (Popkova et al. 2015), etc.

Specifics of activities of small enterprises consists in lack of possibility for "economy on scale" (Harris et al. 2015) and necessity to specialize on satisfaction of certain needs of clients (Hess and Cottrell 2016) and activities in the targeted segment of the market (Agyapong et al. 2015), (Spence 2016), (Mazzei et al. 2016).



The performed literature review on the topic of the research showed that as of now, only separate fragments of the problem of innovational development of entrepreneurial potential of small enterprises are studied, which causes necessity for its complex research.

### 3 Research Methods

It is offered to use in this work the proprietary methodology of evaluation of entrepreneurial potential of small enterprises, which supposes the use of the following economic & mathematical model of entrepreneurial potential, which could be presented in the following formula form:

$$EP_{SE} = CP + IP + HRP + PP \quad (1)$$

where

$EP_{SE}$ —entrepreneurial potential of small enterprise;

$CP$ —consumer potential of small enterprise;

$IP$ —investment potential of small enterprise;

$HRP$ —social potential of small enterprise;

$PP$ —partner potential of small enterprise.

Let us view the structural elements of the given model in detail. Consumer potential is the maximally possible volume of demand for goods and services of small enterprise. It determines the upper limit of the volume of sales and profit of small enterprise. It characterizes small enterprise as a subject of provision of products and services and corresponds to the market of commodities and services in which this small enterprise operates.

Investment potential is the maximally possible volume of attraction of investments; it characterizes small enterprise as an object of investments. It corresponds to the market of investments. Social potential reflects maximum possibilities of enterprise for attraction and use of human resources (in quantitative and qualitative expression). It characterizes small enterprise as an employer and relates to labor market.

Partner's potential is maximum capabilities of small enterprise for receipt of resources and development of relations with partners (business partners—suppliers of raw materials). It characterizes small enterprise as an object of business cooperation and relates to resource market.

For evaluation of the level of realization of existing entrepreneurial potential, each of the above intermediary indicators and/or final indicator could be compared to current achievements of enterprise in this sphere. For example, in order to find the level of realization of investment potential of small enterprise, it is necessary to find the ratio of current volume of investments to the potential one.

It should be noted that the provided model has a conceptual character, contains qualitative indicators, and is not adapted for direct practical application; it is given

in order to reflect the general approach to determination of entrepreneurial potential. However, this model could be the basis for development of methodologies for measurement of entrepreneurial potential of specific small enterprises with the use of quantitative and formalized indicators.

## **4 Results**

### ***4.1 Notion and Sense of Entrepreneurial Potential as an Economic Category***

Entrepreneurial potential reflects maximum capabilities of enterprise for conduct of economic activities and achievement of success in the market. The main condition of entrepreneurial potential of enterprise is such production factor as entrepreneurial capability.

Talent and activity of entrepreneur directly influence effectiveness of organization of business, optimization of business processes, attraction and management of production factors, and successfulness of execution of mission—satisfaction of public needs—and the goal—maximization of profit.

It is worth noting that potential is not a fixed indicator; it could decrease or increase depending on influence of certain internal and external factors—activities of rivals, partners, state, and employees and management of enterprise.

It should be noted that possession of significant entrepreneurial potential does not mean successful business, but is only a sign of availability of possibilities and perspectives of its development. At that, real state of affairs of enterprise might not be so successful. That's why it is necessary to evaluate not only entrepreneurial potential but the level of its realization and develop corresponding strategies for its achievement.

### ***4.2 Specifics of Entrepreneurial Activities of Small Enterprises***

In the modern global economy, small enterprises are very important and very often they are the key players in economic system. They stimulate increase of employment and self-employment of population, stimulate competitive market environment, and are important sources of tax revenues into the state budget and factors of the growth of GDP.

Despite its small size, small enterprise possesses significant advantages, as compared to large enterprise, such as simplicity of doing business, simple approach to conduct of finances, simple management due to unbranched organizational structure, quickness in decision making, flexibility of reaction to smallest changes of external environment, etc.

At that, small enterprises, as a rule, possess a small share of the market, so they cannot influence product's price and experience difficulties with attraction of resources and development and implementation of innovations into production.

### 4.3 Conceptual Foundations of Formation of Innovational Development of Entrepreneurial Potential of Small Enterprises

Innovational development of entrepreneurial potential of small enterprise supposes the use of leading solutions and technologies in the process of formation of its main components.

As is seen from Fig. 1, the common tool for formation of innovational development of all components of entrepreneurial potential small enterprises within the offered concept is clustering. It makes attraction of clients and sales of products easier, thus developing consumer potential, and stimulates attraction of investments, thus developing investment potential.

Small enterprises in cluster have more possibilities for development of human resources, which raises their social potential. It is also easier for small enterprises to develop relations with suppliers and business partners while in a cluster, which increases their partner.

The main tools of innovational development of consumer potential of small enterprises are effective system of management of quality of manufactured products and provided services, the system of marketing communications and management of consumers' loyalty, and the system of implementation of innovations into production.

Innovational development of investment potential of small enterprises is achieved by means of implementation of the system of management of liquidity and payment capacity of small enterprise, system of informing the potential investors on perspective development of small enterprise, and systems of marketing communications with investors.

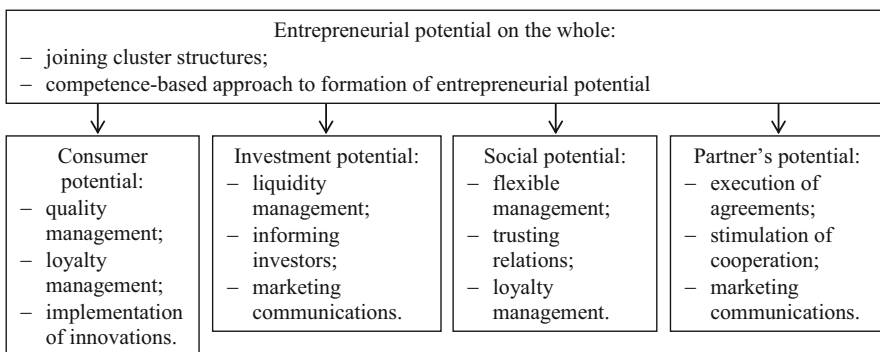


Fig. 1 Concept of innovational development of entrepreneurial potential of small enterprises

**Table 1** Map of competences of modern entrepreneur in the sphere of small business

Competences	Description of competences
<i>Basic competences</i>	
Leadership competence	Skill to persuade other people and lead others
Analytical competence	Possession of analytical capabilities
Forecasting competence	Far-sightedness, capability to forecast changes of market situation
Risk competence	Capability to evaluate and accept allowable risk level
<i>Professional competences</i>	
Managerial competence	Skill of management of enterprise's personnel
Communicative competence	Capability to conduct business negotiations
Production competence	knowledge of peculiarities of production of the enterprise
Financial competence	Capability to manage enterprise's finances

Methods of innovational development of social potential of small enterprises include flexible approach to management, trusting relations with employees, and the system of management of enterprise employees' loyalty.

For provision of innovational development of partner potential of small enterprises, it is offered to implement the system of strict execution by small enterprise of the terms of contracts with partners, the system of marketing communications with partners, and the system of stimulation of long-term trusting relations with partners.

Within this concept, it is offered to use competence-based approach to formation of entrepreneurial potential of small enterprise at the highest level, which allows ensuring high effectiveness and market success of business (Table 1).

As is seen from Table 1, under the modern economic conditions, entrepreneur in the sphere of small business should possess the following basic competences: leadership, analytical, forecasting, and risk. He should also possess the following professional competences: managerial, communicative, production, and financial.

Competences reflect all main aspects of doing business and main types of resources which an entrepreneur should manage. The competences stimulate successful formation of the determined components of entrepreneurial potential of small business. As entrepreneur is the manager of enterprise, he should realize the necessity for development of the above competences.

## 5 Conclusions

The developed concept of innovational development of entrepreneurial potential of small enterprises constitutes a foundation for development and realization of practical strategies of management of this potential for achieving the goals of development of small business.

Due to the detailed study of the structure of entrepreneurial potential, it was possible not only to prepare general recommendations for innovational development of entrepreneurial potential on the whole but to develop methodology for analysis and development of its components.

It is especially important, as most of small enterprises face in practice the problems of development of separate elements of entrepreneurial potential. The given concept allows determining perspectives of increase of entrepreneurial potential of small enterprise and realizing it.

It should be concluded that specifics of a small enterprise predetermines the key role of entrepreneur in formation of entrepreneurial potential. That's why the level of its realization depends directly on effectiveness of activities of entrepreneur, which emphasizes the necessity for the use of the offered competence-based approach.

Taking into account the conceptual character of this research, its limitation is the theoretical direction. During the further research in the sphere of entrepreneurial potential, it would be expedient to analyze empirical data and develop applied strategies of innovational development of entrepreneurial potential of small enterprises on the basis of the developed concept.

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# Problems and High-Priority Directions of Realization of Innovational Strategy of Development of Fuel and Energy Complex Enterprises

Lilia V. Ermolina and Larisa A. Ilyina

**Abstract** The purpose of the article is to study the problems and to determine high-priority directions of realization of innovational strategy for development of enterprises of fuel and energy complex by the example of modern Russia. The research methodology is based of systemic and problem analysis and the method of SWOT-analysis. The authors determine specifics of functioning of enterprises of fuel and energy complex and their role in economy of modern Russia and substantiate the necessity for modernization of enterprises of fuel and energy complex of modern Russia. The authors determine the main problems and perspectives and develop recommendations for realization of innovational strategy of development of enterprises of fuel and energy complex of modern Russia.

## 1 Introduction

A range of countries, including modern-day Russia, realize the model of raw materials development of economy. This model supposes orientation at intensive extraction and export of natural fuel and energy resources. At that, the share of fuel and energy complex in the structure of entrepreneurship, GDP, and tax revenues of state budget and export is very high (more than 20 %).

Attractiveness of this model for economy is caused by simplicity of using the natural potential, relative stability of demand for fuel and energy resources in all spheres of economy, slow development of replacements, and lower risk components as compared to manufacture of goods and services.

However, realization of the model of raw materials development of economy is connected to a range of difficulties and negative aspects. The key aspect is that modern Russia is not only one of the largest exporters of fuel and energy resources but also their importer. Due to low level of development of processing production,

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Russia exports raw materials—e.g., crude oil—and after its processing purchases final products, e.g., gasoline.

As a result, there's no chance for development of domestic entrepreneurship in the sphere of processing of fuel and energy resources, dependence on import of final fuel and energy resources is established, and domestic consumers have to purchase them for higher prices due to long chain of added value.

Due to the above reasons, determination of barriers for development of processing industry in fuel and energy complex of modern Russia and ways of their eliminations is the actual directions for scientific research. The purpose of the article is to study the problems and determine high-priority directions of realization of innovational strategy of development of enterprises of fuel and energy complex by the example of modern Russia.

## 2 Materials and Method

Under the conditions of increase of volumes of global production (Nadtochey 2010) and maximization of rates of economic growth (Popkova et al. 2015a), the role of fuel and energy resources grows (Kuznetsova and Kuznetsova 2015), as they are one of the most important components of infrastructure of any economic sphere (Tsybatov and Vazhenina 2014).

The countries that do not have their own fuel and energy resources, are obliged to import them (Chibilev et al. 2012), while the countries with developed fuel and energy complex are in a better position for development of industry and economy on the whole (Qiushi 2011).

The sense and specifics of functioning of fuel and energy complex are studied in detail in the works by (Laldjebaev et al. 2015); (Niakolas et al. 2016); (Bouzarovski and Petrova 2015); (Baniasad Askari et al. 2015); (Popkova et al. 2015b); (Popkova et al. 2015c), etc.

Literature overview on the topic of the research showed that most of studies are devoted to substantiation of importance and actuality of development of of fuel and energy complex. At that, the problem of development of innovational and entrepreneurial activities in this sphere is not paid sufficient attentions, which requires conduct of further research.

The research methodology consists of the methods of systemic problem and SWOT analysis, method of strategic planning, and the method of modeling of development of economic systems (fuel and energy complex by the example modern Russia).



### 3 Results

At present, the Russian Federation is realizing the innovational strategy of development of fuel and energy complex, set by the Decree of the Government of the RF dated December 8, 2011, No. 2227-r. According to this strategy, it should be modernized, which supposes increase of extraction and resources use efficiency, transition to modern types of raw materials and fuel, and cooperation with leading international companies (Strategy of innovational development. . . , 2011).

Specifics of functioning of enterprises of fuel and energy complex in modern Russia consists in the following:

- unfavorable macro-economic situation and business climate complicate development of enterprises of fuel and energy complex;
- fuel and energy complex has monopoly which is caused by natural reasons and corresponding state policy;
- enterprises of fuel and energy complex strive for getting maximal profit with minimal risk and do not want to create processing production which supposes organization of complex production process and active role of human resources which are a cause of unpredictability and errors.

Role of enterprises of fuel and energy complex in economy of modern Russia consists in formation of substantial part of GDP, provision of large number of jobs, provision of revenues of the state budget, and provision of export activities, as it is the key export direction.

Necessity for modernization of enterprises of fuel and energy complex of modern Russia is determined by the fact that high dependence on import of final resources threatens economic security of the country, and lack of own processing production hinders the development of entrepreneurship.

At present, there are five main problems of realization of innovational strategy of development of enterprises of fuel and energy complex in modern Russia. The first problem is high dependence on import of final fuel and energy resources. Instead of strengthening of own position at all stages of the chain of added value of creation of fuel and energy resources, Russia still occupies the initial stage only.

The second problem is strong limitation of means and direction of export of fuel and energy resources. Dependence on transit of fuel and energy resources through the territory of certain countries leads to additional complications and costs. That's why it is necessary to look for additional means of transportation of fuel and energy resources—for example, through neutral waters, etc.

The third problem is low effectiveness of extraction of fuel and energy resources at each object. Lack of technical possibility for full use of each object (source) of fuel and energy resources and constant transition to new objects cause lead to lost profit and depletion of natural resources to the extent which is greater than necessary.

The fourth problem is low effectiveness of storage and transportation of fuel and energy resources. Aging of infrastructural objects leads to escape of fuel and energy

resources in the process of their storage and transportation, which also leads to loss of profit and creates the necessity for extraction of larger volumes of natural resources than is necessary.

The fifth problem is lack of development of alternative fuel and energy resources. At present, active R&D and search for alternative fuel and energy resources are conducted in many countries of the world, which creates the threat of appearance of replacements for Russian resources in the long-term and even mid-term. Lack of own research may lead to Russia losing competitiveness in this sphere, in case of success of this R&D.

The sixth problem is insufficient attention to ecological activities of fuel and energy enterprises, most of which evade from works for liquidation of polluting emissions from exploited objects, as it is a labor-intensive and expensive process.

Perspectives of realization of innovational strategy of development of enterprises of fuel and energy complex in modern Russia are related to overcoming the ineffectiveness and elimination of lost profits, caused by lack of processing production and necessity for importing the final products of fuel and energy complex.

The goal of realization of innovational strategy of development of enterprises of fuel and energy complex in modern Russia consists in provision of high competitiveness in the global markets in the long term and stable and sustainable development of high effectiveness of fuel and energy complex. Therefore, in authors' opinion, high-priority directions of this strategy are the following:

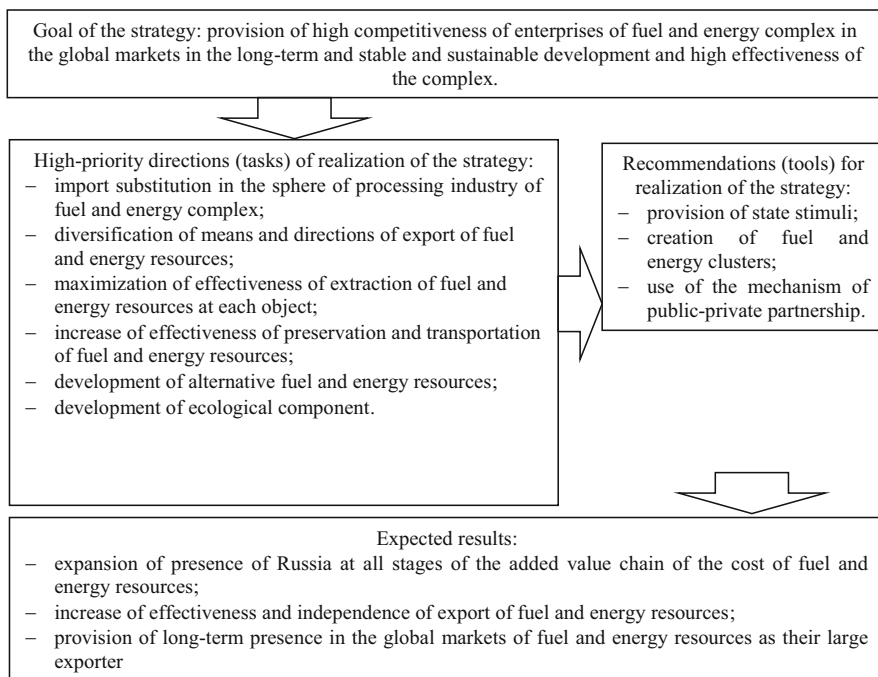
- import substitution in the sphere of processing industry of fuel and energy complex—creation of own network of enterprises in the sphere of modern processing production of fuel and energy resources and import of final products, not raw materials;
- diversification of means and directions of export of fuel and energy resources—search for alternative possibilities for transportation of fuel and energy resources, bypassing the problem areas for the purpose of maximization of export's independence of transit territories;
- maximization of effectiveness of extraction of fuel and energy resources at each object—development of innovational technologies and equipment for search and extraction of fuel and energy resources which allow minimizing losses and unused resources;
- increase of effectiveness of preservation of and transportation of fuel and energy resources—modernization of infrastructural object that ensure storage and transportation of fuel and energy resources;
- development of alternative fuel and energy resources—conduct of scientific R&D aimed at determination of new sources of fuel and energy, the cost and complexity of extraction, transportation, storage, and use of which would not exceed the same indicators of resources that are widespread now.
- development of ecological components for provision of sustainable development of fuel and energy complex—allocation of assets from liquidation funds of users of mineral resources for development and use of innovational technologies which allow minimizing the damage to environment caused by their activities.

For successful realization of the above directions, this work offers the following recommendations for realization of innovational strategy of development of enterprises of fuel and energy complex of modern Russia:

- state stimulation of creation of enterprises for processing of fuel and energy resources, which supposes provision of tax subsidies, concessional lending, etc.;
- creation of fuel and energy clusters which allow joining experience and efforts of extracting enterprises and R&D institutes for joint development of new technologies, equipment, alternative resources, extraction means, transportation, etc.;
- use of the mechanism of public-private partnership for attraction of private investments into modernization of infrastructural objects of transport and energy complex.

This work offers the following scheme of realization of innovational strategy of development of enterprises of fuel and energy complex in modern Russia (Fig. 1).

As is seen from Fig. 1, high-priority directions are the tasks, and recommendations are the tools of the strategy realization. It should lead to expansion of Russia's presence at all stages of the added value chain of cost of fuel and energy resources, increase of effectiveness and independence of export of fuel and energy resources,



**Fig. 1** Scheme of realization of innovational strategy of development of enterprises of fuel and energy complex in modern Russia

**Table 1** SWOT analysis of development of enterprises of fuel and energy complex in modern Russia

Pros (advantages) of fuel and energy complex – abundance of natural fuel and energy resources; – low cost of factors of production and competitive price of resources; – high accessibility of production factors and wide possibilities for development of complex.	Cons (problems of development) of fuel and energy complex – large dependence on final resources; – limitation of means and directions of export of resources; – low effectiveness of extraction; low effectiveness of storage and transportation of resources; – lack of development of alternative resources.
Possibilities and perspectives for development of fuel and energy complex – import substitution in the sphere of processing industry; – diversification of means and directions of export; – maximization of effectiveness of extraction; – increase of effectiveness of storage and transportation of fuel and energy resources; – development of alternative fuel and energy resources.	Threats for development of fuel and energy complex – critical reduction of economic security as a result of excessive dependence on import of resources; – depletion of resources; – impossibility for export of resources due to growing tension in relations with the transit countries; – emergence of alternative resources (replacements) and loss of positions in the global market.

and provision of long-term presence in the global markets of fuel and energy resources as their large exporter.

In order to show the necessity for modernization of fuel and energy complex of modern Russia and expediency of realization of the offered innovational strategy of development of enterprises of fuel and energy complex, let us use SWOT-analysis (Table 1).

As is seen from Table 1, in case of refusal from realization of the offered innovational strategy of development of enterprises of fuel and energy complex, the threats for development of this complex in modern Russia become real, which include critical reduction of economic security as a result of excessive dependence on import of resources, depletion of resources, impossibility of export of resources due to growth of tension in relations with the transit countries, emergence of alternative resources (replacements), and loss of positions in the global market.

## 4 Conclusion

Thus, it is possible to conclude that expediency of modernization of enterprises of fuel and energy complex of modern Russia is determined by necessity for development of processing industry which allows manufacturing highly competitive products of fuel and energy complex and growth of independence from activities of other members of the global markets.

It should be concluded that realization of the model of raw materials development of economy in the long-term could become a cause of serious crisis in Russia, as excessive dependence on extraction and export of natural resources hinders development of entrepreneurship in other spheres of national economy.

The functioning of Russian fuel and energy complex largely depends on the situation in the global markets which are characterized by high level of competition of not only buyers but also suppliers, active development of replacements, strong influence of political factors, etc. Therefore, such model of international production specialization cannot provide stability and sustainability of development of economy.

Impossibility of instant refusal from the model of raw materials development of economy and its re-orientation at manufacture of competitive products and services, which are in demand in the global markets, leads to expediency of maximization of effectiveness of entrepreneurship in the sphere of fuel and energy complex and its innovational development, which supposes realization of the offered high-priority directions and recommendations.

Despite the general character of the high-priority directions and recommendations for realization of innovational strategy of development of enterprises of fuel and energy complex, they are prepared in view of specifics of modern Russia, which causes their limitation. A complex study of possibilities and perspectives of modernization and development of entrepreneurship in the sphere of fuel and energy complex in the countries which realize the model of raw materials development of economy is the high-priority direction of further research in this sphere.

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# Biotech Cluster as a Criterion of Food Security Formation

Irina V. Cheremushkina, Andrey N. Ryazanov,  
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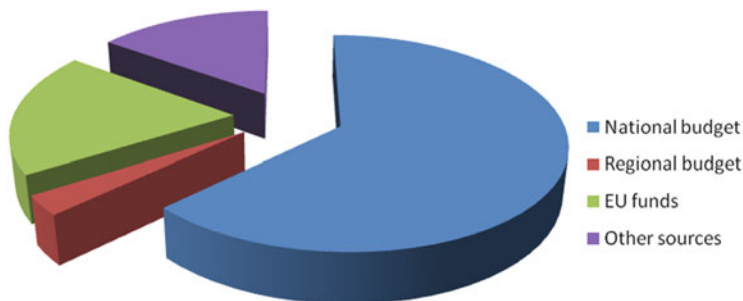
**Abstract** The article deals with the issues of innovative development of national economy through the implementation of cluster policy. It considers the importance of federal programs as the mechanism of the formation of favorable conditions for cluster development and studies consumer preferences, indicating a focus on consumption of safe, fresh, and high-quality products. The authors show the value of innovative developments for improving food security in the country.

Globalization of the world economy, for reasons of both economic and political nature, is directly related to the increased competition. This fact leads to the revision of the principles of economic policy and radical difference from the previously predominant model of centralized governance. The main source of growth in a modern economy is innovation. The most important tasks are the revitalization of the support of regions, transition to cluster form of economic management, strengthening of the strategic management system of development, ensuring the increase of complexity and balance in the development, and allocation of productive forces. Recently, clusters have become a new form of development and competitiveness of regions, as well as of their economic growth and transition from the raw economy to the innovative economy. The most widespread definition of a cluster is given by Michael Porter (2005): “Cluster is a geographically concentrated group of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated organizations (e.g., universities, standards agencies, and trade associations) competing in particular fields, but also leading joint work”.

Russia recently has seen an awareness of the importance and prospects of the cluster approach for solving problems of modernization and technological development of economy and practical implementation of innovative approaches. This fact can be explained by a widespread positive experience of clustering economies in many developed countries of the world. As of now, the largest number of clusters is concentrated in Europe. The development of clusters is provided by the national

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**Fig. 1** Sources of financing of cluster programs

programs of more than twenty EU countries, and the main source of funding of these programs is the budget (Fig. 1).

One of the tasks of modernization of the economy in “The Strategy of innovative development of the Russian Federation until 2020” is stimulation of demand for innovations and research results, as well as creation of conditions and preconditions for the establishment of sustainable research and production linkages and clusters. The success of the implementation of the innovative development of the Russian Federation, as noted in the Concept of long-term socio-economic development of the Russian Federation, depends primarily on “intensive technological renewal of all basic sectors of the economy”, and it is “a condition of the success of innovative socially oriented development and the nation’s success in global competition”. Such condition is the support of cluster initiatives aimed at achieving the cooperation of the organizations—suppliers of equipment and services, research and educational organizations in the framework of clusters.

In the perspective, the development of regions should be innovative, with the increasing role of new centers of economic growth and with high concentration of human and technological capabilities that will significantly affect the allocation of labor resources.

The state has developed measures aimed at improving the competitiveness of cluster participants, in particular the promotion of the development of programs of cooperation of enterprises in the financing and implementation of research and development, design works, partial subsidizing of the costs of enterprises on the establishment, registration and legal protection of inventions—particularly, abroad—the provision of benefits on payment of taxes, the creation of special economic zones at the regional level, implementation of joint educational programs, etc.

For the purpose of formation of favorable conditions for cluster development, the state has consistently pursued funding for innovations under the Federal target programs, in particular the Federal target program “Research and development on top-priority directions of development of scientific & technological complex of Russia for 2014–2020”. The program aims to achieve the following objectives:



- formation of advanced scientific and technological interdisciplinary orientation according to priorities of development of scientific and technical sphere, based on fundamental research and which is in demand by the national economy;
- provision of the system planning and coordination of research and development on the basis of formulation of priorities of development of scientific & technical sphere, based on a system of technological forecasting and taking into account the development priorities of the sectors of the economy;
- providing the sector opportunities for research and development of new and more complex scientific and engineering problems, as well as increase the effectiveness of R&D;
- providing the integration of the Russian sector of R&D in a global innovation system based on the balanced development of the international scientific-technical relations of the Russian Federation;
- improving the effectiveness of R&D sector by ensuring unity of its infrastructure, coordination of directions of development of infrastructure with a system of priorities for development of scientific and technical sphere”.

The comprehensive program of biotechnology development in the Russian Federation until 2020 defines biotechnologies as “key directions of innovative development of Russian economy”. The strategic goal of the Program is Russia’s acquiring the leading positions in the field of biotechnology, including certain areas of biomedicine, agricultural biotechnology, industrial biotechnology, and bioenergy and establishment of globally competitive sector of bio-economy. This program is financed both from budget and extrabudgetary sources on the basis of parity.

The biotechnology market in Russia is developing at a rapid pace. Almost all segments have shown high growth rates in the last few years, following the global trends. Currently, the level of development of biotechnology and the degree of elaboration of problems of biological safety are the most important criteria for assessing the economic status of the state.

In the sphere of agriculture, the introduction of biotechnology would increase food security in the country. Meat and meat products have a very important physiological and social importance in human ration. This product contains proteins, polyunsaturated fatty acids, vitamins, macro- and microelements, and mineral substances, which stipulates a high level of consumer qualities of the product and the importance of including it into a daily ration. Normative daily demand for meat (for children up to 15 years old) ranges from 10 to 120 g, for teenagers aged 15–18—about 200 g, for adults—from 200 to 300 g. Thus, an integrated socio-economic development of the meat industry is one of actual and priority tasks of the modern economy and, in the framework of the doctrine of food security, it is directly linked to ensuring an adequate level and quality of life of the population.

Currently, in accordance with the laws, the provision of consumers with domestic meat and meat products should not be less than 85 % of the total volume of commodity resources, whereas today the figures are the following: total—78 %; poultry—97 %; pork—83 %; beef—65 %.

A retrospective analysis showed that currently the world market of meat and meat products is one of the most important, promising and dynamically developing markets. Strategic national interests of Russia in the field of food security define the tasks for the development of the domestic meat industry not only within meeting the domestic consumer demand, but also to ensure a positive export balance of supply of certain types of meat and meat products.

Modern technology of animal breeding and poultry allows not only for quantitative increase of the volume of domestic meat production in a short time, but for expansion of the range. Domestic production will be able to have the absolute competitiveness and potential for export to foreign countries.

A top-priority task of the development of modern domestic meat industry is responding to consumer demand for high-quality, complete, balanced, and safe food products. Under conditions of shortage of raw materials and economic difficulties in relations with foreign partners and suppliers of raw materials, domestic manufacturers of meat products should more actively and productively use in their work the fundamental, scientific, and applied developments of our scientists and world experience of commercialization.

Product innovations, new safe technologies, and the intensification of the production process of the meat industry are mostly focused in the following areas:

- production of ecologically harmless and safe meat products of mass consumption;
- manufacturing of products of medical and special purposes taking into account modern medical-biological and physiological requirements;
- development of functional and balanced products for baby nutrition.

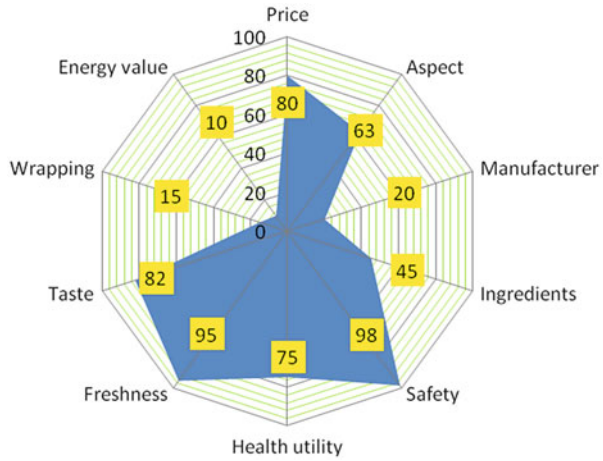
Safe technology is a complex of innovative technological solutions aimed at improving the process of growing livestock, meat processing, and conforming to modern environmental standards and requirements of the international safety management system of the finished product.

It is very important now to conduct studies aimed at identifying consumer preferences and forming the improved product qualities of meat and meat products.

For any food products, including meat products, formation of indicators of quality, safety, and consumer performance are determined by several factors. The priorities are the safety of raw materials and the quality of technological processes of conversion of raw materials and components. The process of modeling of technological processes and safety systems should be based on the approach “from the general to the particular”, which takes into account the practice of solving technological problems from the particular to the general.

Practical implementation of technological solutions in the field of security systems is carried out under the conditions of limited information and uncertainty due to the precarious safety performance of raw materials, constantly changing production conditions, and consumer preferences. Consumers want meat and meat products to stay in the product segment of retail business and to meet strictly the criteria of the international safety system.

**Fig. 2** Sector of distribution of consumer commodity priorities forming consumer properties of meat and meat products, %



For 98 % of consumers of meat products, the safety is the sole criterion, 95 % of them are oriented primarily at the factor of the freshness of the product, 82 % of the respondents noted the taste of the product as one of the most important criteria, and 80 % prefer the price criterion. Consumers (3–4 times out of 10) noted the dissatisfaction with the quality and safety of meat and processed meat products.

Figure 2 presents a multi-dimensional chart with the distribution sector of consumer priorities of the commodity segment, forming consumer properties of meat and processed meat products.

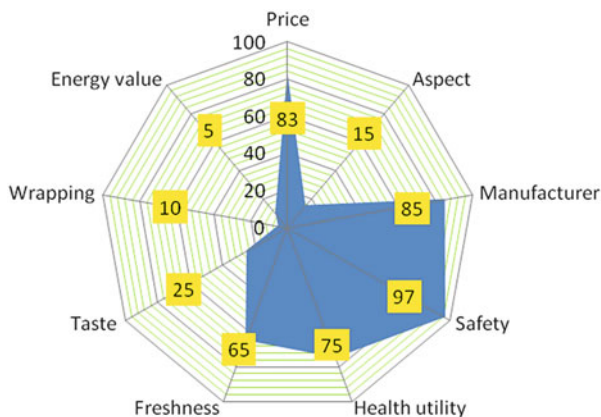
Based on the data presented in the figure, the development of a systematic approach of improving existing technologies of the production of safe food is required.

According to the news Agency SoyaNews and “AB-Center” expert-analytical center of agribusiness, the poultry is sold in the following way: 43 % of total volume is sold in carcasses (of which 60 %—chilled), 40 %—natural semi-finished products (of which 59 %—chilled) and 18 %—in the form of sausage and culinary products, including chopped semi-finished products, delicatessen semi-finished products in dough coating, canned food, and meat products. Thus, the main trend of consumer market development of the industry is the increase in the production of chilled products in the commodity meat sector, as well as in the sector of natural semi-finished products and meat products processing. It was also found that more than 70 % of buyers prefer products of regional enterprises with a relatively short implementation period of not more than 10 days.

Despite high consumer properties of meat and by-products in the product category of food of animal origin, we identified dissatisfaction criteria of consumers in the qualitative and quantitative parameters of the finished products (Fig. 3).

Consumers of meat and by-products (97 %) are frustrated by their quality and safety. So, 85 % of consumers are dissatisfied with the ingredients of products and 83 % of consumers are not sure in the adequateness of such consumer

**Fig. 3** The study of consumer dissatisfaction with properties of meat and products of its industrial processing, %



characteristics as price and quality of products. For 75% of the respondents, the criterion of health utility is doubtful, for 65% it's freshness, 25% of meat production consumers are concerned about the taste, and 15%—about the appearance.

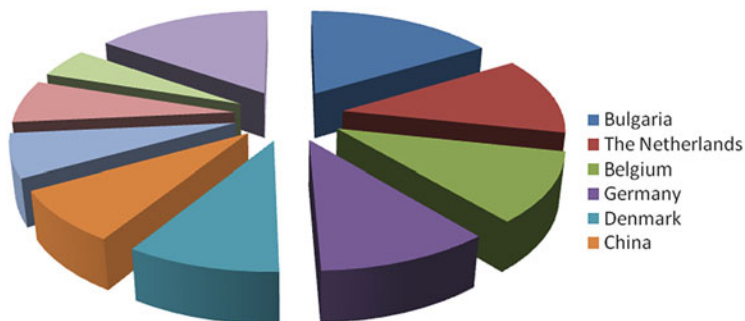
Based on the literature data, it can be concluded that consumers focus on consumption of safe, fresh, and high-quality products. Moreover, the definition of “high quality and safe product” for the modern consumer is a product which does not contain harmful substances, produced from natural and safe raw materials, without foreign smell and taste, production technology of which meets the highest standards of quality and safety.

To minimize the existing dissatisfaction of today's customers in the consumer properties of the products of meat processing, one needs to search for promising directions of improving the quality characteristics of commercial products on the basis of improving safety of raw materials and transformation of technological processes from the perspective of improving the usefulness and quality of the finished products.

In this regard, the integrated development of new feed additives has become an important task, the significance of which has increased significantly recently due to the refusal or restriction of the use of feed antibiotics in the diets of farm animals and poultry, as well as the need for improvement of the quality and safety of the final product.

The standard classification of feed additives is formed mainly not by consumers but by producers and sellers, and therefore reflects rather the positioning of the product on the market than biological functions. So the European Association of producers of feed additives and premixtures (FEFANA) identifies five major groups: technical additive affecting directly the food, for example, organic acids; sensory additives affecting the palatability of feed—for example, flavors;

nutritional supplements that provide the necessary levels of amino acids, vitamins, and minerals in the diet; zootechnical additive, improving the feed nutrients—for example, enzymes; coccidiostats and histomonostats.



**Fig. 4** Structure of the market of feed additives in Russia, %

Previously, they also distinguished a group of feed antibiotics and growth promoters (before the prohibition of their use in the European Union).

In the Russian market of feed additives, the share of foreign companies accounts for 74.1 % of the total consumption. The most numerous foreign companies supplying biomodified feed are from the European countries (Fig. 4). Such export of domestic products is missing.

The zootechnical additives, having the ability to break down plant polymers, not available to the digestive systems of animals and birds are of greatest interest. It should be noted that after the ban of feed antibiotics in Switzerland, enzyme preparations are considered as an alternative. Enzyme preparations do not act directly on intestinal flora, but destroy non-starch polysaccharides of cell membranes, making components of the feed more available to the digestive system (Cheremushkina et al. 2010a, b, 2013).

A great number of suppliers, such as AgroGreen Concept, Agroros, Agro-Food RTF, Alliance Group, Belkorm, Biovet-Enzyme, Biotrof, Bioenergy, VITA, VitaSol, Kapital-Prok, Feed Additives, Corpus the Addition of Mkorma, Baseproduct, Provet, Sibbiopharm Ltd, Symbio, Feedland Group, Huvepharma, Niagra, Fontanka, and others offer feed additives for Russian companies. Russian firms supply a rather narrow range of feed additives, which are often made of imported components.

As part of projects, in particular within the Federal Target Program “Research and development on top-priority directions of development of scientific-technological complex of Russia for 2014–2020”, under the Agreement No. 14.577.21.0139 for a subsidy (a unique identifier for scientific research and experimental development RFMEFI57714X0139) complex feed additives have been developed (Cheremushkina et al. 2010a, b, 2013). The synergistic effect of which can be represented in the form of a diagram (Fig. 5).

The obtained results allow promoting the integrated feed additives within the biotechnology cluster not only in the domestic market for the purpose of import substitution, but also open up perspectives for deliveries of production for export. Thus, the development of the biotech cluster is an innovation of the economy and requires a new approach to the organization of scientific research.

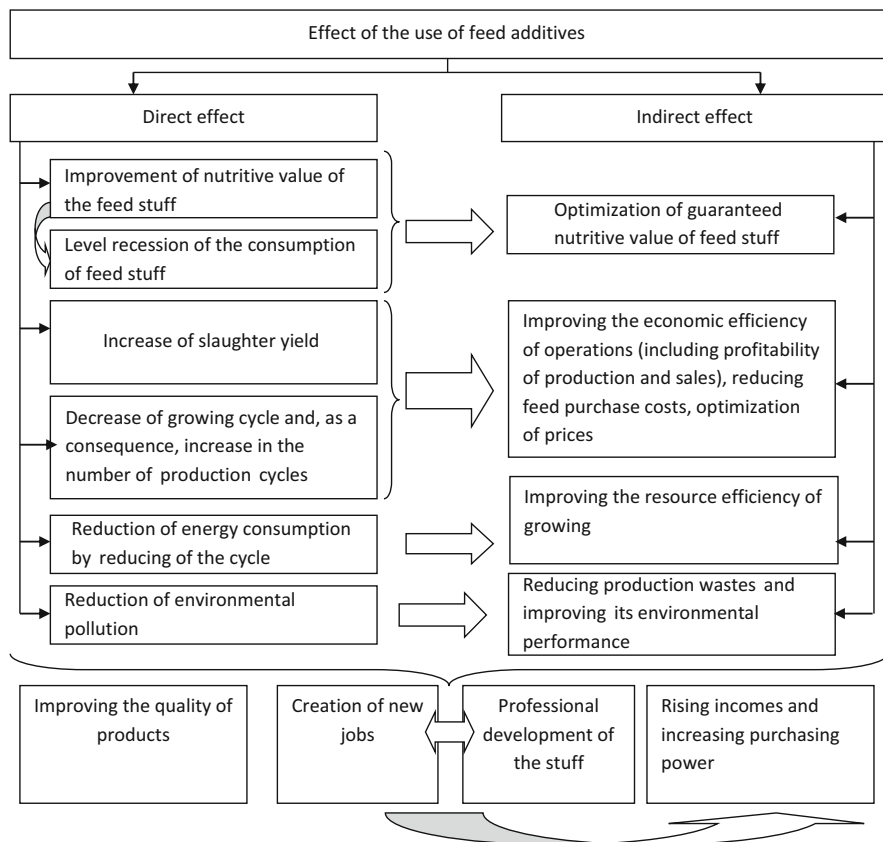


Fig. 5 Synergetic effect of the use of feed additives

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# Education as the National Safety Element in the Globalizing World

Tatiana N. Shestakova, Liudmila M. Sukhorukova, Maksim V. Ivchenko, and Nikolay I. Fokin

**Abstract** Interconnection between education and national safety system is analyzed. Modern tendencies of globalization help the world to become more and more integral and interdependent because of objective integration processes.

Under globalization processes, the influence of the problem of interdependence between national education system efficiency and safety condition of the country is becoming more and more important. Now the aim of the countries is to provide competitive advantages on the international scene. The state of educational system and its potential plays the main role in this regard.

Government safety is provided by all the means and resources which the government has. But amid them human resources occupy a special place. The role of education in national safety system is important as sustained development and support for possibilities of intelligent, economic, and industrial facilities on a high level, which is necessary to realize reliable satisfaction of requirements during the time of peace and war.

At the beginning of the third millennium, the importance of economic and scientific-technical human facility has increased dramatically, accelerating post-industrial civilization formation. Modern tendencies encourage the world to become more integral and interdependent because of objective integration processes and as a result, politico-social climate is changing. These processes are encouraging the economic growth to simultaneously raise risk factor significance and extend danger space both in government economy and functioning. In the case of crisis in some region of earth it comes fast to the others, for example, as it happened in the end of 1997 when the financial South-Eastern Asia crisis got Russia involved and then influenced the economy of the developed countries (Senchagov 2005).

Within this framework, the Russian Federation being one of the biggest world countries with rich cultural traditions and centuries-old history, in spite of hard international situation and internal difficulties, continues to play important role in

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the world processes having significant economic and scientific-technical facilities and also unique geopolitical location.

Nowadays, under the conditions of globalization, the problem of interdependence between efficiency of national education system and condition of country safety is becoming more important. Now the aim of the countries is to provide competitive advantages at the international scene. The condition of educational system and its potential plays the main role in this problem decision. These reasons led to the growth of interest to the modern education problems and its interconnection with national safety.

Understanding that educational system's potential determines government position in modern world and the position of a person in a society made the role of education in the modern world more important. This can be seen in the world tendencies of economic development depending on governmental educational policy.

Today education is both a service sphere and a public good, as well as the key mechanism of formation and strengthening of society creative power. Under the modern conditions, the education problem should be considered as strategic referring to one of national priorities realizing provision of national safety (Gurba and Sukhorukova 2008; Sukhorukova 2011).

Government safety is provided by all the strengths, means, and resources which the government has. Amid them, human resources occupy a special place. Safety as itself cannot exist. Safety is a result of person conscientious and purposeful efforts. A person is the only active element. All the other elements—money, materials, equipment, and energy—don't create or change anything until a person being a worker of the least qualification or top manager takes them on service (Gurba 2010; Scriabina 2012).

The role of education in the national safety system is important; sustained development and support of possibilities of intelligent, economic, and industrial facilities on a high level should conform to requirements during the time of peace and war, which is determined by the condition of educational sphere.

It can be confirmed that national safety of Russian Federation depends on the educational level of young people, which is determined by cultivating culture skills, social values, moral ideals, and professional development. The government in its turn should organize sphere for education to develop efficiently.

Nowadays, there is a situation in which, on the one hand, the government should provide safety of education and, on the other hand, structural use of educational process plays a key role in providing national safety in a country.

Under the conditions of globalization processes, education—as many other social institutions—is becoming more open for international cooperation attaining global meaning.

However, as scientists claim, educational system under modern conditions is threatened by: human resources loss; narrowing of activity space (loss of staff training profession, decrease of general availability of educational knowledge level, fall of qualitative indicators, characterizing functioning of the system: the education content and level of students residual knowledge, involved academic staff



qualification, their activity motivation); increase of system's dependence on policy of its own government and other governments academic systems: external financial support, attraction of foreign staff and equipment from abroad because of impossibility to get education on some professions on the ground of the government strengths. As a result, due to above-listed dangers, the government loses a possibility to prepare by itself specialists in the spheres of modern innovation-based economy, defense industry, to exploit purchased foreign machines and equipment without attraction foreign specialists and work forces. Specific mechanism of safety supplying in educational sphere is built due to power of potential and real dangers, the probability of their occurrence, taking into account life cycle of the system (origin, formation, matureness, transformation) and its specific condition (crisis, depression, increase), due to the available financial, tangible, staff possibilities of the country, based on the balance of public, government, groups, and individual interest (Rudakov 2012).

Modern tendencies of cultural and social development in our country are such that almost all aspects of society life are in critical condition and it is impossible to escape from this situation without providing favorable condition in education system. The analysis of the Russian Federation's regulatory framework in the educational and safety spheres shows that aims and tasks of government development registered in these documents are very similar. This allows making a supposition that successful combination of government policy in educational and Russia's safety assurance spheres will allow achieving more efficient results in future.

Nowadays, Russia is in the zone of maximum risk on the character and level of external and internal threats of national safety. Such situation dictates the necessity to modernize whole education system which would let both to decide efficiently prior tasks of government development and would help to make national education competitive on the international level.

According to some researchers, the main problem of educational sphere development is that its development speed and structure don't suit completely the national safety assurance system needs and increasing economy demand for high technologies and qualified staff. "It's all about the people." This Japanese postulate is up to date more than any time in the past. The problem of qualified staff shortage has touched all the spheres of modern economy in our country. However separate scientific results of world level offered by Russian research and development sector don't find use in consequence to general low national accessibility to innovations. Such situation keeps threats connecting with deformation of science and technology potential up to date (Belyakov 2011).

Under such conditions, society and government put before the system of education the following tasks:

- providing conditions for successful socialization and self-actualization in changing world;

- turning from mass-procreation to active education system which would be able to create necessary conditions for discovery and formation of modern specialist creative individuality;
- both giving knowledge and teaching studying and cultivating skills of self-education according to the principle declared by UNESCO: “Lifelong Learning”;
- providing real generality of compulsory education, to raise low level of education of society; to bring up moral guidelines, to form cultural behavior of practical skill corresponding to civil society principles;
- providing equality of possibilities, developing conditions through accessibility of education in framework of social and economic differentiation strengthening;
- modernizing general education system from organization to technologies in use according to existent changes in the country and the world.

In Russia, there are specific demands besides the general ones—they are caused by transition period of formation of market economy and democratic open society: bringing up of moral guidelines, formation of culture and social behavior standards, practical social skills, corresponding to civil society principles; provision of equality of self-realization possibility (starting conditions) through education availability under the conditions of social and local strengthening differentiation; modernization of general education system itself—from organization to technologies in use—suitable for social, cultural, economic, scientific, and technical existing changes (Bobylo 2011).

Along with new possibilities, the processes of globalization and internationalization of education also create new threats setting tasks for society connecting with provision and support of national safety on necessary level. Globalization and unification of national education systems are two interconnected processes.

Accepting a number of standard regulations, Russia chose the Western way, realizing transition to two-level education system and introducing the Unified State Exam.

Therefore, there is a question: could all the best Western education systems be combined with valuable experience of national education system. Of course, it is not only possible but must be done.

Secondly, education plays an important role in society. It is always necessary to remember that the foundation of future is laid today and we should act ambitiously to realize future. An efficient means for achieving this should become a perspective education and the younger generation upbringing system. General educational level, professional knowledge, skills, and abilities of people broaden their mind increasing their need and possibility to expand social connections; it is necessary to achieve social consent and increase of civil responsibility, as well as to improve ability of government as an organism to self-preservation under the conditions which threaten its existence.

No wonder that the importance of safety as global value of humanity is constantly increasing. It is determined by social and economic life conditions,

increasing amount of information, environment condition, and working conditions (Vlasova 2011).

Thirdly, national safety is directly connected with the context of globalization and consequently with the problem of the Russian Federation's geopolitical status as the intersection of Western and Eastern civilization as locus of heterogeneous political systems and traditions crossing.

On the whole, according to U. Beck, the increase of public attention to the problems of keeping safety and existing risks means the transition to the stage which can be named "society of risk". The transition to "society of risk" from the point of view of the risk science represents regularity of civilization development of the Western type society that is social and political modernization. Formation of social safety conception reflects tendencies of Russian society modernization, relative growth of its reflexivity. In the degree that this occurs, modern Russian society, represented by its elite, begins to refer to self-protection and self-reproduction problems more attentively; this was stated by V. Kuznetsov explaining the introduction of "culture of safety" concept for denotation of social thinking type suitable for up-to-date tasks. It seems that efficient governmental education system could be considered as an element of its national safety system (Bespalenko 2009).

It is well-known that governments and civilizations neglecting the history challenges ended their existence extremely miserable. Within this framework it is reasonably to remind the Byron's remark, who, being romantic, knew the history quite well: "A thousand years scarce serve to form a state, an hour may lay it in the dust".

Within the framework of the modern world, using intelligence potential in forming of which education system plays a key role, the Russian Federation can become a powerful generator new ideas and practical conceptions. Being a great multinational country with a variety of confessions and religions, Russia can make a contribution to this discussion about necessity to extend dialogue between cultures and civilizations. Within this framework, it can offer many things and it plays a key role in the "international business of the day" in the twenty-first century.

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# Formation of Creative Approach to Economic Activities as One of the Goals of Professional Training of Future Economists

Margarita S. Irizepova

**Abstract** The purpose of the article is substantiation of necessity for development of foundations of creative approach to future practical activities with future economists. This purpose can be achieved with the help of methods of theoretical analysis of scientific literature on the problems of pedagogical creativity, training of graduates, generalization of leading experience of teachers which use the development of creative approach with the students of various specialties, psychological and pedagogical analysis of creative direction of economists' training, and development of theoretical model of the process of training the readiness for realization of creative approach to economic activities. The main results of the research are creation of classification of economists on the basis of use of creative approach in professional activities and building a model of a graduate of economic department of university, in which the structure of graduate's personality is presented on the basis of modern ideas of integrity, versatility, and harmony. As a result of research, the authors come to conclusion that creativity is not a separate part of economic labor but its most significant and necessary characteristics. Stimulating with students-economists such types of activities as studying, R&D work, and practical work during studying, the basis of creative approach to future economic activities of to-be specialists is determined. In their concentrated form, the foundations of creative approach of students to solution of various economic tasks and their creative potential are stimulated in R&D work.

## 1 Introduction

Problems of development of creative capabilities were raised by prominent teachers of the past. For a long time, it was informally considered that creative element in educational and bringing-up process was desirable but not necessary, and the main thing to achieve was bringing each graduate to average norm.

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Inefficiency of such approach became obvious. At present, everyone understands that a person who possesses creative qualities, knows the sense of creative process and uses its methods and ways, is more competitive in modern economic environment.

Present time requires that university form with to-be specialists, including economics, the basics of creative approach to organization and management of business activities. This is an important approach of work of higher educational establishments in specialists' training.

Modern society requires from higher education the training of competent, creative, and well-conducted people. These requirements can be fulfilled only under the condition of high-quality training of students in universities. Activities of economists in our time acquire new content, determined by complication of market relations in economy and expansion of the sphere of its activities.

In its turn, it leads to the necessity for improvement of the character of economists' training which should give the students theoretical knowledge, introduce them to economic activities, develop professional thinking, bring up active personality ready for creative work in the sphere of economic activities.

## 2 Materials and Methods

Research on higher school pedagogics includes studies of a range of aspects of creativity of future specialists. Ways of application of educational pedagogical tasks in various spheres of formation of university graduates are developed. Multiple studies show possibilities of university education for preparation of students for creative activities, and issues of creative origins in educational and perceptive activities are widely studied (Comunian and Faggian 2014; Murphy 2015; O'Connor 2013).

Despite a wide range of research in the sphere of training of creative specialist, a university graduate, universities still produce specialists who cannot think creatively. The main drawbacks of mass pedagogical practice in universities include: monotonous forms, insufficient and unskillful training of innovations of independent creative work, irrational methods of teaching, and transition of another's experience without changing the conditions.

Most university teachers are sure that the most important thing for to-be specialist is knowledge of basics of disciplines, while creativity is formed by itself. Many researchers, while studying the problem of improvement of specialists' readiness for creative labor, use only the potential possibilities of psychological and pedagogical disciplines (De Beukelaer 2014).

At the same time, it should be noted that use only of disciplined of narrow specialization allows solving just some general pedagogical tasks during preparation of students for creative activities, as graduate is viewed as narrow specialist. The main work that modern university should perform is missing. In our opinion, many authors of the research in this issue omit the issue of development of creative

approach with graduates (for example, economists) for use of their specialty in practice.

Analysis of the state of this issue showed a contradiction. On the one hand, there has been an increase of attention to independent work of students, and in recent years various types of research activities cover more stuff; on the other hand, the number of practically significant studies is still small. Besides, the results of R&D work often have a purely academic nature and are not aimed at future economic activities.

Thus, the problem of teaching the to-be graduates—in particular, economists—the creative approach to future practical activities is very topical, but insufficiently studied by science. Practical university training of specialists has substantial drawbacks of theoretical and practical aspect. These provisions determined the content and structure of this research.

The methodological basis of the research includes ideas of humanization of education and democratization of teaching process in higher educational establishments. The work is based in the theory of systems, the concept of comprehensive process of personality formation (Klimstra et al. 2012; Kornyejeva and Boehnke 2013; Nurullin 2014), etc., theory of higher pedagogical education of Fischer (2015), Fraser (2015), Messenger (2015), etc.

The article uses the complex of interconnected and supplementary methods of research, among which are the following: theoretical analysis of scientific literature on the problems of pedagogical creativity, training of graduates, generalization of leading experience of pedagogues which use the development of creative approach with students of various specialties, psychological and pedagogical analysis of creative direction of economists training, and development of theoretical model of the process of training the students' readiness for using creative approach in economic activities.

This research studies the creative process of solving economic tasks which consists of two stages: first stage—capability for conducting economic research, based on theoretical knowledge of the studies science, second—entrepreneur's skills of “economic inventions” characterizes the highest level of creativity and their capability for modeling of economic processes and development of ways and methods of solving the set tasks, which leads to economic inventions.

On the basis of use of creative approach in professional activities, classification of economists is built, including reproductive specialists characterized by reproduction of main theoretical provisions, particular notions, description of facts on the basis of emotional perception without sufficient understanding of significant connections between them and preferring to perform actions according to the sample or recommendation; creative and reproductive specialists characterized by understanding of leading economic ideas and system of economic notions, which can determine internal connections, systematize facts, theoretically apprehend the system of methods and means of work of their colleagues and their own actions; creative economists characterized by understanding of regularities of economic process, capability for analysis of facts and notions, projection of methods of their activities, use of theoretical knowledge in new situations, variability of decisions,

capability for correction of their experience on the basis of economic theory, and search for new creative means of work.

From the positions of creative direction at economic activities, the model of graduate of economic department of university is built, in which the structure of graduate's personality is presented on the basis of modern ideas of integrity, diversity, and harmony. This model includes three parts: requirements to person which express their moral position, requirements to knowledge of student which is comprehensive scientific picture of future activities and which is based on their professional sphere, and graduate's possession of the system of skills necessary for future economic activities.

### 3 Results

Modern economy sets for higher school the aim of preparation of specialist which can actively participate in economic processes. One of the main requirements to graduate under the modern conditions is increase of its creative potential. Idea of creation being activity is very popular both in Russia and abroad.

Creation is human's capability—which is born in labor activities—to turn the given material into new reality which satisfies varied public needs. This is possible only on the basis of perception of laws of objective world.

Thus it can be concluded that creation is not an autonomous act of isolated individual but active process of human's changing the external world, which is accompanied by constant self-development and self-improvement of human. According to A. Newell, G.S. Simon, and J.S. Shaw, creation of any form has common features and attributes. Solution of a task can be assigned to creative thinking process if it conforms to the complex of the following conditions:

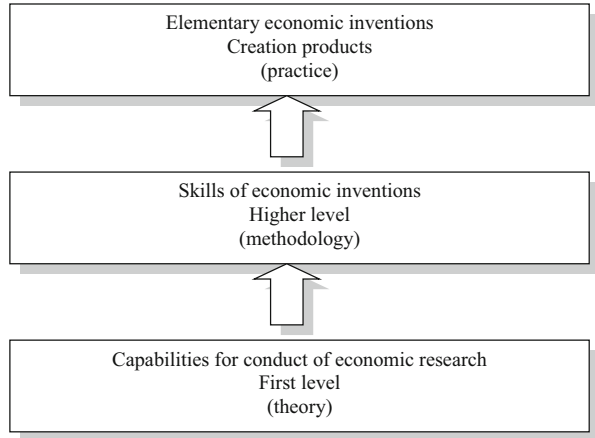
- product of thinking activities should have novelty and value;
- thinking process is characterized by strong motivation and stability;
- the set problem is obscure and unclear, so it needs to be re-formulated;
- thinking process requires transformation or withdrawal from ideas that were approved earlier (Newell et al. 1958).

The sense of economic creation is manifested in its multilevel structure and in the fact that its products include elementary economic inventions and research, which are always aimed at perfection and optimization of various economic processes (Fig. 1).

Capability for conduct of economic research is the first level of creative process of solving economic tasks, based on theoretical knowledge of the studied science. On the next stage of the creative process, the entrepreneurs' capabilities for "economic inventions" characterizes higher level of creativity and their capability and methods for solving the set tasks.

"Economic invention" can emerge spontaneously, on the basis of economist's realizing the non-conformance between aims which are set before him and means,



**Fig. 1** Creative process of economic tasks solution

forms, and methods which he possesses. At the same time, economic research is responsible and purposeful search for perfection of economic process (Colander 2011).

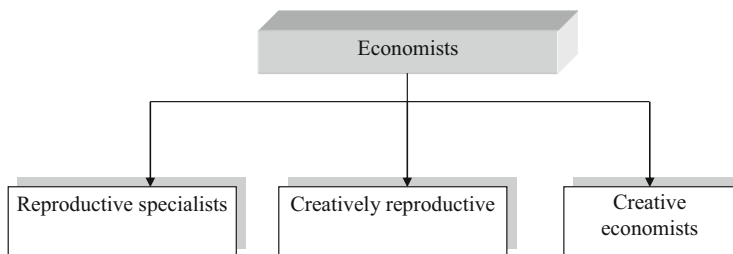
In our opinion, students' involvement with scientific work can become a starting point for development of interest to creative economic activities. Interest in science in student years, supplemented by practical work during holidays, is a precondition for the birth of economist-creator. Creative style of mind is built largely under the influence of R&D work of students.

It is important that every university have the atmosphere of scientific search and interest in science, conditions for work connections between student scientific associations and profile establishments and organizations. While the object of activities of economist is a certain economic process, the pedagogue of higher school should orient the student at the necessity for through development of his work's technology, related to his specialization (Popkova et al. 2015a).

That is, the level of understanding of the sense of economic process, knowledge of its main components, and capability for managing them determine the economist's possibilities for influencing the object of his activities, at which predicted and easily forecasted results could be expected (Batabyal and Beladi 2015).

Improvement of any sphere of activities is achieved by studying the process of labor and its results. Knowledge of variables of economic process and their interconnection allow the economic to creatively realize his labor and determine the depth of his study of various issues of economy. However, in practice, we see economists who perceive their labor in various ways, i.e., who are at various levels. We have conventionally divided them into three groups (Fig. 2).

First group—reproductive specialist (economists). They are characterized by reproduction of main theoretical provisions and particular notions and description of facts on the basis of emotional perception without sufficient understanding of significant connections between them. They prefer to perform actions according to samples and recommendations.



**Fig. 2** Classification of economists on the basis of use of creative approach in professional activities

Second group—creatively reproductive. They are characterized by perception of leading economic ideas and system of economic notions. They can determine internal connections, systematize facts, and theoretically perceive the system of methods and means of work of their colleagues and their own particular actions. They have a large interest to independent search for effective ways of solving economic tasks.

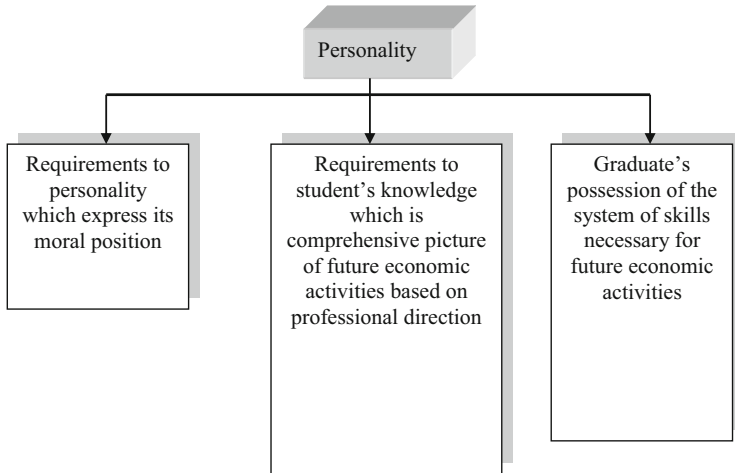
Third group—creative economists. They are characterized by apprehension of regularities of economic process, capability for analyzing facts and notions, projecting methods of their activities, use theoretical knowledge in new situations, variability of solutions, capability for correction of their experience on the basis of economic theory, and search for new creative methods of work. We abide by the opinion that skills and creation are two important sides of any activity, including economic one.

Economic activities are a complex multifactorial process of performing the system of actions for solving various economic tasks. The object of economic activities has a clearly expressed dual nature: on the one hand—positive economic result, on the other hand—elements of economic culture, which the economic possesses and uses for profit (Popkova et al. 2015b).

The most important characteristics of economic activities consists in the fact that it is always an organization of one subject or a group of activities of other subjects—at that, it is the organization that always aims at getting profit from economic activities. Specifics of economic activities consists in the fact that it should stimulate other types of human activities. That is, the better the person wants to live, the more he should know and be capable of (Savina et al. 2015).

Thus, stimulating with students-economists such types of activities as studying, R&D work, and practical work during studies, the foundation of creative approach to future economic activities of to-be specialists is determined.

Creative focus at economic activities in university is an integrative core of professional training of specialist. Let us describe the model of graduate of economic department of university from these positions. In it, the structure of graduate's personality is shown on the basis of modern ideas of integrity, diversity, and harmony. The model consists of three parts:



**Fig. 3** Model of university economic department graduate

- requirements to personality, which express its moral position;
- requirements to student's knowledge which is comprehensive scientific picture of future activities emerging on the basis of their professional direction;
- graduate's possession of the system of skills necessary for future economic activities (Fig. 3).

In first part, the personality of graduate has requirements to formation of striving for economic activities as a creative process. The basic quality of graduate's personality is high level of general culture that supposes the skill for orientation in economic values of our society.

The main aspect of the second part is scientific picture of comprehensive process of formation of student's personality, which is a synthesis of acquired knowledge on the basis of its focus at professional activities. University should pay serious attention to studying of special discipline and various types of R&D works. Student must know his science perfectly well and be able to use the necessary material in future work. Only such studying of special disciplines is accepted by student responsibly and positively.

In the third part of the model, a system of necessary skills is viewed which graduate should possess and use in future work. In order to develop creative approach to future work with students of economic specialties, let us determine the structure of this quality of economic as a specialist.

## 4 Conclusions

Thus, it is possible to conclude that creation is emergence of something new on the basis of transformation of perceived, new process, or original ways and methods of its receipt, i.e., process. The process of economic activities does not stand samples and standards. Thus, creativity is not a separate side of economic labor but its significant and necessary characteristic.

Stimulating with students-economists such types of activities as studying, R&D work, and practical work during teaching, it is possible to determine the basis for creative approach to future economic activities of future specialists. From the position of creative focus on economic activities, the structure of personality in the model of graduate of university economic department can be presented in the following way:

- requirements to personalities which express its moral position;
- requirements to student’s knowledge which is comprehensive scientific picture of future activities and which emerge on the basis of their professional focus;
- graduate’s possession of the system of skills necessary for future economic activities.

In concentrated form, foundations of students’ creative approach to solving various economic tasks and their creative potential are stimulated in R&D work. Each university specialty has its peculiarities, due to the fact that its topic, possibilities, and results should be connected to the practice. In regard to students of economic specialty, all types of R&D work should be connected to business or economic activities.

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# Marketing Instrumentarium of Provision of Food Security

Z. Kozenko, Y. Kozenko, K. Kozenko, N. Ivanova, and I. Shmyreva

**Abstract** The purpose of the article is to develop marketing instrumentarium of provision of food security. The work uses the proprietary marketing methodology of evaluation of food security which allows determining sustainability of economy to changes in the internal and global food markets. The authors evaluate the level of food security of modern Russia with the help of the developed methodology and develop marketing model for provision of food security. As the result of the research, the authors come to the conclusion that perspectives of provision of food security under the modern economic conditions are related to the use of corresponding marketing instrumentarium. Benchmarking and branding are offered as perspective tools.

## 1 Introduction

Despite the growth of the role of globalization in modern global economic system and transition of most of countries to the path of formation and development of globally oriented economy, they all seek their own interests and strive for preservation of independence. A vivid confirmation of this is multiple subjects' striving to separate from their country and gain independence.

One of the most important aspects of independent functioning of economy is its food security, i.e., capability for self-provision with food when necessary—for example, in case of violation of international economic ties as a result of crisis, etc. At present, the most popular tool of provision of national food security among the countries of the world is foreign trade regulation.

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Such regulation supposes conduct of the policy of protectionism for national manufacturers of food products, through establishment of quotas and custom fees for import. As a result, national food enterprises are isolated from the global competition and, without influence of corresponding market stimuli, cease to develop.

National food sphere is not able to participate in international competition and in case of forced canceling of protectionist measures, for example, under the influence of requirements of international organizations, like the WTO, gets into a crisis, which leads to loss of national food security. Ineffectiveness of the policy of protectionism predetermines actuality of development of new and more effective (in the long-term) instrumentarium of provision of food security.

This article offers a hypothesis that perspectives of provision of food security under the modern economic conditions are related to use of corresponding marketing instrumentarium. The purpose of the article is to verify this statement and to develop marketing instrumentarium of provision of food security.

## 2 Materials

Food enterprise is a business structure which operates in the sphere of food production (Mutenje et al. 2016). It could be an agricultural or agro-industrial enterprise (Schroeder and Meyers 2016), i.e., it could be at any stage of the chain of added value of food products (Nelson et al. 2016).

At present, despite diverse formulations, national food security is defined as country's possessing production capacities necessary for satisfaction of internal demand for food (Regmi and Paudel 2016).

According to this definition, food security is measured by comparing the total volume of manufacture and consumption of food products in this country. This approach is described in materials of multiple research of such authors as Nadochey (2010), Willetts and Tsioumani (2016), Von Witzke and Noleppa (2016), Moss et al. (2016), Kuzmin (2016), Thor and Lafarga (2016), Zilberman and Jin (2016), Hertel (2016), Simonelli and Paladino (2015), Popkova et al. (2015a, b), Strange (2016), Fraser (2015), etc. Marketing instrumentarium is not paid enough attention in works devoted to the issues related to food security.

However, with strengthening of the process of globalization, contradiction and narrowness of this approach are more obvious—it reflects only the current level of national food security and does not allow evaluating perspectives of its changes in future. Thus, it is necessary to correct the definition and modernize the method of measurement and instrumentarium of provision of national food security in the long-term.

### 3 Method

This article offers to use the proprietary marketing methodology of evaluation of food security which allows determining sustainability of economy to changes in the internal and global food market. This methodology supposes the use of the following formula:

$$FS_{\text{country}} = (PFP * IC + EPP * GC) / TIN \quad (1)$$

where

$FS_{\text{country}}$ —level of food security of the country;

PFP—volume of production of food products for internal consumption;

IC—level of competitiveness of manufactured food products in the internal food market;

EPP—volume of production of food products for export;

GC—level of competitiveness of manufactures food products in the global food market;

TIN—total internal need for food.

As is seen from formula (1), the level of food security of the country is determined as ratio of the volume of production to the volume of consumption of food products, taking into account that in case of a crisis, the exported products could be used for internal consumption. At that, not only production level but level of competitiveness of food products are taken into account.

This is required for determination of demand for these products in the market, as uncompetitive products is not in demand, and its manufacturers have to cease their operations, which may lead to reduction of volumes of manufacture of food products. The level of competitiveness is determined in shares of 1, as compared to the object selected for comparison. It could be the market leader or average market value.

The advantage of the offered methodology, as compared to existing methodologies, is the fact that it allows not only determining the current capability of national food market for satisfaction of internal need of economy but also allows conducting monitoring, forecasting, and control over the state of food security in view of tendencies and changes of market situation.

### 4 Results

Let us evaluate the level of food security of modern Russia with the help of the developed methodology. The data for various segments of the food market could be incomparable, so the object of the research will be the meat products market (poultry, beef, and pork). According to the official statistics, in 2014 Russia manufactures for internal consumption 4,475,000 tons of meat, for export—



85,000 tons of meat; the level of consumption constituted 6,216,000 tons of meat (Rosstat 2015).

Competitiveness of Russian meat is rather high—both in foreign and internal markets—due to ecologically clean technology of production. That’s why, in order to simplify calculations, let’s assume it equals 1. According to the given data, calculation of the level of food security of Russia in the sphere of meat in 2014 has the following form:  $FS_{\text{meat\_Russia (2014)}} = (4475 * 1 + 85 * 1) / 6216 = 0.73$ .

The received value of food security shows that in 2014 Russia was capable to satisfy the internal demand for meat only by 73 %. This is a rather high indicator. However, at many other segments of food market, the level of food security is very low. Thus, food security in vegetables market constituted 0.6 as of 2014, in fruit market—less than 0.3.

It should be noted that the reason of the low level of food security in most of segment of the Russian food market is not so much low level of production due to unfavorable geographical conditions as low level of competitiveness of products in internal and global markets, which predetermines reduction of demand and bankruptcy of domestic food enterprises.

This proves the necessity for correction of state food policy which supposes active use of protectionist measures. For this, the work offers marketing model of provision of food security (Fig. 1).

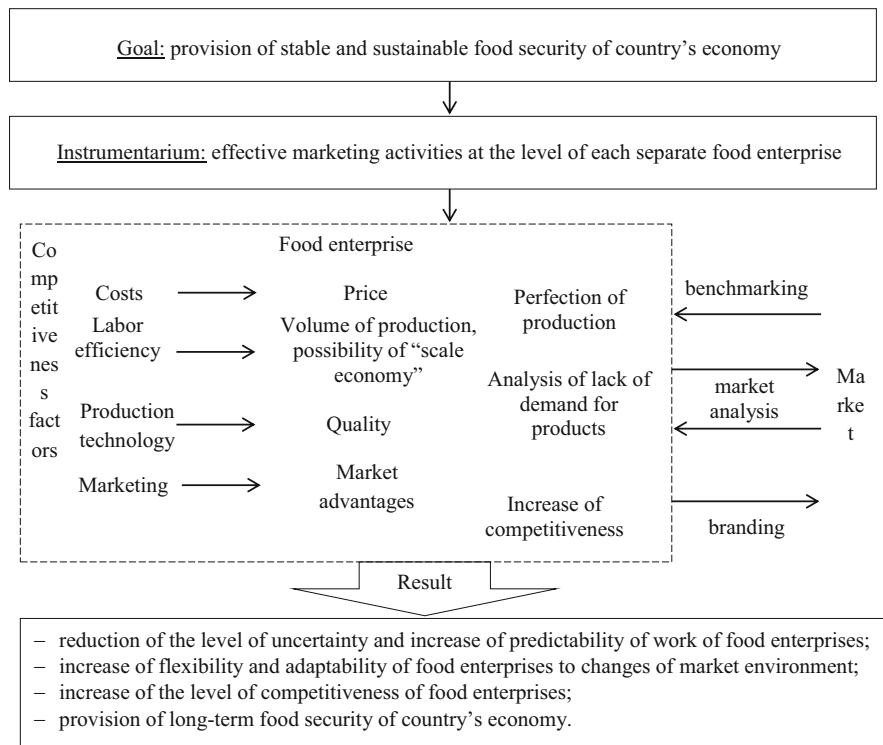


Fig. 1 Marketing model of provision of food security

As is seen from Fig. 1, according to the given model, provision of stable and sustainable food security of country's economy requires effective marketing activities at the level of each separate food enterprise.

Among the most important factors of its competitiveness are management of expenses which influences the price of manufactured products, labor efficiency which determined the volume of products manufacture, and possibility of "saving on scale" which influences the price for products and profit of enterprise.

Besides, competitiveness factors are production technology, which determines quality of food products, and character of implementation of innovations, as well as marketing activities of food enterprise which determine its market advantages (shares, special offers, loyalty systems, etc.).

The most important marketing tools of provision of food security in this model should be benchmarking and branding. Benchmarking allows comparing food enterprise and its products with rivals and determining perspectives of development and perfection of production. Branding allows attracting consumers' attention to food enterprise, increasing their knowledge of its products, and providing their loyalty to the enterprise.

In addition to this, food enterprise has to constantly analyze the market situation, in order to evaluate the risk of lack of demand for products in the market due to rivals' actions, change of demand, change of macro-economic situation, etc.

As a result of realization of the offered measures and use of the stated tools, there will be reduction of the level of uncertainty and increase of predictability of the work of food enterprises, increase of flexibility and adaptability of food enterprises to changes of market environment, increase of the level of competitiveness of food enterprises, and provision of long-term food security of country's economy.

It should be noted that the state can support domestic manufacturers of food products through co-financing or subsidized crediting of their marketing activities—primarily, in the sphere of benchmarking and branding. This will stimulate their development in market method and won't contradict requirements of international organizations.

## 5 Conclusion

As a result of the research, the offered hypothesis was proved and it was shown that perspectives of provision of food security under the modern economic conditions are related to the use of corresponding marketing instrumentarium. The work offers benchmarking and branding as perspective tools.

Thus, it could be concluded that despite the special role of food sphere in the development of national economy and state's inclination to its prioritization and use of unique means of stimulation of its development, this sphere could successfully develop in the long-term—like other spheres of economy—but under the market conditions.

That's why measures of state support for food enterprises should be aimed at development of their marketing activities in domestic and foreign food markets,

as well as at conduct of anti-monopoly measures and support for high level of competition. This will ensure the effect from necessary market stimuli for development of domestic food enterprises and will allow reducing expenses of state budget for their support.

It should be noted that a certain limitation of results of the performed research is the generalized character of the offered recommendations and theoretical character of the developed marketing model of provision of food security. A perspective direction for the further research is determination of perspectives of implementation of this model into practical activities of modern food enterprises, as well as accumulation of experience of use of the offered marketing instrumentarium of provision of food security.

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# Innovational Approach to Management of Human Resources of Cluster Entity

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**Abstract** The purpose of the article is to develop an innovational approach to management of human resources of a cluster entity, characterized by high effectiveness. For this, the work uses specially developed proprietary method of evaluation of effectiveness of management of human resources of a cluster entity. The authors of the research offer an innovational approach to management of human resources of a cluster entity, which supposes combination of efforts for management of human resources and performance of such management at the level of cluster entity, not of each separate member. In the process of the research, the authors conduct comparative analysis of traditional and innovational approaches to management of human resources of cluster entity and prove that traditional approach to management of human resources has low effectiveness in terms of cluster entity, which causes necessity for transition of modern clusters to usage of the offered innovational approach. In order to achieve maximal effectiveness of management of human resources of cluster entity, the authors offer the corresponding recommendations.

## 1 Introduction

Clusters are created for provision of certain advantages of their members. As a rule, this is optimization of business processes by means of establishment of more effective relations between members of various stages of the added value chain of manufactured products, strengthening of positions in the market by means of combination of efforts and market power of cluster members, simplification of access to necessary resources, and possibility for realization of investment and innovational projects that are inaccessible in case of individual conduct of business.

In order to gain profit from unification into cluster, its members must work together and strive for cooperation on as large number of issues as possible. Due to differences in interests of large diversity of cluster members, lack of coordination of

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their actions may lead to destructive forces. This supposes necessity for use of special approach to cluster management and its resources. Thus, cluster entities function on the basis of labor division and have a certain structure and hierarchy with determination of cluster core, peripheral elements, etc.

As is known, human resources play an important role in economies of post-industrial type, which are peculiar for the process of active clustering of economy. That's why they should be paid special attention in the process of cluster entity management. This article offers a hypothesis that traditional approach to human resources management, realized successfully by individual members of the market under the conditions of a cluster entity, has low effectiveness. This research seeks the aim of verification of the offered hypothesis and development of innovational approach to human resources management of a cluster entity, characterized by high effectiveness.

## 2 Literature Review

Human resources management (at micro-level) is a process of management of employees of a business structure for the purpose of maximization of effectiveness of labor activities (Kayl et al. 2013). Such management supposes selection of the personnel (Kayl and Epinina 2014), distribution of authorities and responsibilities between employees of the business structure (Kayl et al. 2015), development of intra-company hierarchy and organizational structure (Kayl and Epinina 2015), etc.

Management of human resources of a business structure is performed on the basis of corporate HR policy (Kayl and Bakhracheva 2015). In modern economy, success of a business structure is largely determined by effectiveness of management of human resources (Vivares-Vergara et al. 2016), which are one of the key factors of production (Konrad et al. 2016) and the most important production resource (Tung 2016).

Cluster is a form of integration union of enterprises, in which they coordinate their actions (Knop 2015) but preserve full economic independence (Veselovsky et al. 2015), which allows them to gain advantages from cooperation without losing a capability for independent management (Ganushchak-Yefimenko 2015b) and seeking individual goals (Ganushchak-Yefimenko 2015a). The structure of cluster (Lai et al. 2014) and the style of its management (Morkovina et al. 2014) could be different, but their effectiveness influences its success in the market (Popkova et al. 2013; Nadochey 2012).

As a result of literature review on the studied topic, it is possible to conclude that separate issues related to management of human resources and functioning of cluster entities are studied well. However, specifics of human resources management of a cluster entity are not sufficiently studied.

### 3 Research Methods

Apart from general scientific methods of research—analysis, synthesis, induction, deduction, formalization, etc.—this work uses a specially developed proprietary method of evaluation of effectiveness of human resources management of a cluster entity. This method supposes the usage of the following formula:

$$E_{MHR} = (LC + LE + IA)/S_{MHR} \quad (1)$$

where

$E_{MHR}$ —indicator of effectiveness of human resources management of a cluster entity;

LC—level of competence of employees of enterprises which are members of a cluster entity;

LE—labor efficiency of employees of enterprises which are members of a cluster entity;

IA—innovational activity of employees of enterprises which are members of a cluster entity;

$S_{MHR}$ —total spending for human resources management of a cluster entity;

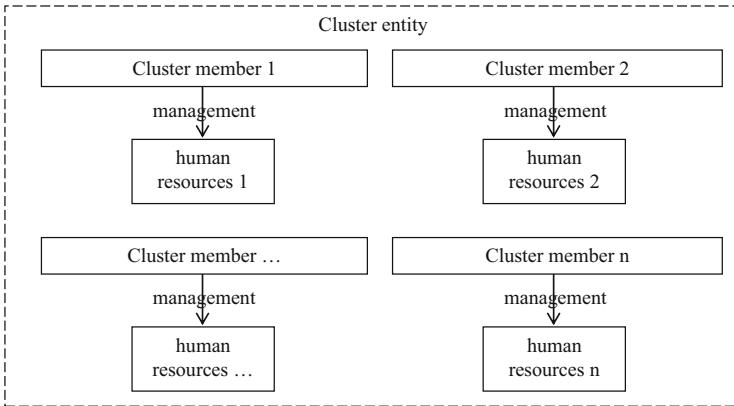
As is seen from formula (1), it has a standard form for calculation of effectiveness—ratio of the result of human resources management of a cluster entity—which is level of competence—labor efficiency and innovational activity of employees of enterprises which are members of a cluster entity to expenses for such management.

It should be noted that due to combination of easily formalized quantitative indicators with quantitative indicators which are difficult to formalize, this formula is provided and used not for precise evaluation and finding the final result of indicators of effectiveness of human resources management of a cluster entity but for comparing various approaches to their management.

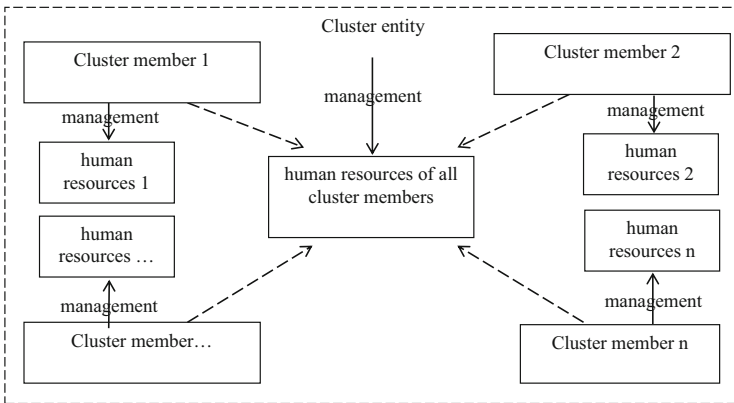
### 4 Results

At present, most clusters are so old, and while general management of cluster is modified during its formation, human resources management is performed by each enterprise separately and does not differ from individual conduct of business (Fig. 1). Within a cluster this leads to doubling of business processes and violation of condition of optimality of resources management, which reduces general effectiveness of functioning of cluster and hinders the receipt of maximal profit by its members.

As is seen in Fig. 1, within the traditional approach to human resources management of a cluster entity, each enterprise in a cluster (1,2, . . .n) controls its own



**Fig. 1** Traditional approach to human resources management of a cluster entity



**Fig. 2** Supposed innovational approach to human resources management of a cluster entity

human resources. At that, human resources do not unite. As a result, total expenses for human resources management of the cluster are rather high, but there is no cooperation or exchange of experience. That's why, having a know-how, a cluster member does not share this information with other members, and they have to make inventions themselves, which leads to constant doubling of the performed work.

That's why this research offers an innovational approach to human resources management of a cluster entity, which supposes unification of efforts for human resources management and performance of such management at the level of a cluster entity, but not each the members separately (Fig. 2).

As is seen in Fig. 2, within the offered innovational approach to human resources management of a cluster entity, human resources of all members of a cluster (1,2,...n)

**Table 1** Results of comparative analysis of traditional and innovational approach to human resources management of a cluster entity

Criteria of comparison	Approach to human resources management of a cluster entity	
	Traditional	Innovational
Type of management	Individual	Collective + Individual
Organizational structure of human resources management	Functional (single subjection, one manager)	Project (double subjection, two managers)
Correspondence to criterion of optimality and labor division	Does not correspond due to doubling of functions	Corresponds, there is no need for doubling of functions
Possibilities for exchange of experience	Almost none	Wide possibilities
Total expenses for management	HIGH	Low
Management efficiency	Low	High

are united and managed jointly, i.e., the common management policy is performed and cooperation and exchange of experience are conducted. At that, each enterprise manages its own human resources.

Within the supposed approach, it is possible to reduce the number of human resources, as there is no necessity for doubling of their functions—repeating needs of various cluster members could be satisfied by common human resources. This allows reducing expenses for human resources management. By means of exchange of experience, it is possible to raise the level of qualification of employees of enterprises which are members of a cluster entity and growth of total labor efficiency in a cluster. Apart from that, there is increase of innovational activity of employees of enterprises of the cluster by means of their unification into teams.

With the help of the developed method of evaluation of effectiveness of human resources management of a cluster entity, it is possible to evaluate effectiveness of such management within traditional approach in the following way:  $(LC + LE + IA) / S_{MHR} = E_{MHR}$ . Within the offered innovational approach, we have the following formula:  $(2 * LC + 2 * LE + 2 * IA) / 0.8 * S_{MHR} = 6 * E_{MHR}$ .

By means of doubling of each indicator and reduction of expenses by 20% within the innovational approach, it is possible to achieve 6X effectiveness of human resources management of a cluster entity, which proves expedience of the use of this approach. For illustrative purposes, let us perform comparative analysis of traditional and innovational approaches to human resources management of a cluster entity (Table 1).

As is seen from Table 1, according to all the given criteria, the innovational approach to human resources management of a cluster entity has advantages and larger effectiveness than traditional approach, which allows recommending the offered approach to be realized by contemporary cluster entities.



## 5 Discussion

Thus, the offered hypothesis is proved and it's shown that the traditional approach to human resources management has low effectiveness within a cluster entity, which causes necessity for transition of contemporary clusters to the offered innovational approach. In order to achieve the maximal effectiveness of human resources management of a cluster entity within the offered approach, this work offers the following recommendations:

- Training events for building team spirit of human resources of a cluster. This will allow achieving better results in the sphere of cooperation and exchange of experience and conducting joint projects with higher effectiveness;
- Establishment of the system of stimulation of human resources at the level of a cluster. It could be material stimulation, expressed in payment of bonuses or non-material stimulation, expressed in public praise and career progression. A system of managerial offices could be created at the level of a cluster, which could be occupied only by the most successful and efficient employees human resources.

The offered recommendations will allow strengthening the authority of general cluster management and increasing its effectiveness.

## 6 Conclusion

The main conclusion of this research is proving the uniqueness of economic clusters as economic systems. That's why successful functioning and development of cluster entities require modernization of approaches to their management in all aspects of economic activities, including in the sphere of human resources management.

Within the offered innovational approach to human resources management of a cluster entity, a new organizational structure of human resources management of a cluster is formed which is similar to project structure. However, it possesses unique peculiarities, which allows distinguishing it as a new form of organizational structure—cluster structure.

Analogs of such organizational structure are enterprises with branches. The only difference is that presence of branches supposes wide scatter of branches of the enterprise in region, country, or even the world, which usually makes impossible the general management of human resources of the whole business structure, unlike a cluster entity.

The research contributes into development of the concept of economic clustering and the concept of human resources management, which determines its scientific value. Practical significance of the work consists in application of the developed recommendations for perfection of the process of human resources management in activities of contemporary cluster entities.

The performed research is limited by its generalized character, due to which the practical implementation of the offered innovational approach to human resources management of a cluster entity and the authors' recommendations require their detalization and adaptation to peculiarities of economic activities of specific cluster entities. Approbation of the authors' conclusions and recommendations constitutes the basis for conduct of the further studies.

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# Young Specialists Labor Market in Modern Russia: Analysis, Problems, and Perspectives

N.N. Skiter, I.N. Sherer, and E.I. Metelkova

**Abstract** The article is devoted to problems and perspectives of labor market of young specialists and graduates of Russian higher educational establishments. The purpose of the article is to determine the role of higher education in formation of labor resources of the country and its qualitative characteristics, and, as a result—in demand in labor market. The purpose is reached with the help of the following tasks: qualitative analysis of youth labor market, determination of problems of this market, and development of mechanism of formation of civilized market of young specialists in Russia. The authors analyze programs and informational systems of various levels which allow adapting to post graduate life. Opinions of graduates and employers are viewed. Statistics for 2006–2014 is provided. In order to determine the need for highly qualified specialists in the labor market, a sociological research on the topic “Specifics of employment of university graduates” was conducted. The research had the form of questionnaire survey. The research was conducted among students of Moscow and Moscow region, St. Petersburg, as well as the Central, Volga, Siberian, Ural, Far Eastern, and Southern Federal Districts. Analysis of results showed that according to universities, the employing companies’ need for graduated did not change over recent years. Surely, there are certain positive changes, but they are not significant. A key conclusion of the conducted research is the proof that crisis in labor market significantly changes the structure of various employers’ demand for graduates.

The problem of graduates employment appeared back in 1990, when central employment of graduates of educational establishments was canceled. From that time on, this problem has been of a social character. A new system of support for

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employment of graduates of Russian universities did not solve the problem. The need for highly qualified specialists in the labor market is preserved up to this day. This category includes young specialists who received higher or secondary specialized education. Share of these employees influence the level of labor market. Thus, there's a necessity for study of socio-educational mechanism in the youth labor market over the recent years.

Qualitative characteristics of labor resource are expressed by presence of professional education and its distribution from primary (PPE), secondary (SPE), and higher (HPE). In our opinion, young people with higher education have higher status in labor market. The term "higher education" means totality of systematized knowledge and practical skills which allow solving theoretical and practical tasks in the training profile, using and creatively developing modern achievements of science, technology, and culture, as well as preparation of specialists of higher qualification for sectors of economy, science, technology, and culture in various higher educational establishments. Besides, higher education supposes that university graduates must possess high level of cultural development. This cultural mission of universities is traditional and is even fixed in the law regarding higher education (Federal law "On higher and postgraduate professional education").

American economist Theodore Shultz developed a theory of calculation of labor force cost, including expenses for education, and of cost of labor lost during studying (Shultz 1968, pp. 26–28).

Americans act very wisely, thoroughly studying rankings and mistrusting opinions of neighbors and friends, whose daughter "graduated from Princeton and could not find a job. So, our son won't study there".

Firstly, they understand that for all practical goals, there is no difference between the first and the twelfth university.

Secondly, what's important is not general ranking of a university but its rankings in a certain specialty. To-be engineers can enter more accessible universities, not MIT or Stanford.

Thirdly—what's very important—it is better to be an A student in average university than mediocre student in prestigious university.

GPA (grade point average) plays an important role during search for the job.

In Russia, grade point average is not taken into account during search for a job. (Sherer 2011, p. 97).

At the conference at Bauman Moscow State Technical University, devoted to increase of effectiveness of employment of graduates of higher educational establishments under the conditions of market economy of Russia, on December 1, 1990, more than 80 % of students needed help during employment. There are 76 regional centers for support for graduates employment in 75 subjects of the RF. There are also other important state documents and programs, realization of which leads to a positive result. Still, the number of unemployed youth with diplomas is great.

A lot of graduates, leaving their universities, are at a loss. They used to live according to schedule compiled by the dean's office, received a diploma and freedom of actions—but they cannot select either a job or a way to find it. Graduates are especially surprised by employers' attitude towards diploma

with honors. Due to unexplained reasons, employers are not interested in five pointers in diploma—they need the graph “experience” to be filled with something. In this case, success in employment is reduced. Unemployment cannot be avoided even with the help of a name of prestigious educational establishment. Under the modern conditions, it is very difficult to find a job that corresponds to the profile of received education. The research by the Center for marketing and sociological studies of the Superjob HR agency showed that only 50 % of universities graduates are employed according to their specialty in Russia. The rest work wherever they could find a job. There’s a necessity for obtaining additional education, including second higher education on completely different specialty. This negative aspect leads to additional loss of time, assets, and nerves. One of the reasons of this state of affairs is young people’s lacking professional orientation and authentic information on demand and offer in the Russian labor market.

Employers have their own opinion. Very often, they are irritated by graduates’ mood and high demands—comfortable work place, 20 K wages, clearly fixed office instructions, observation of the Labor Code of the RF, etc. “That is too much for people with no experience at all,” certain employers think. For employers have to hire a pig in a poke. It is not known what knowledge a graduate received in the process of studying and whether he would be able to use them in practice. After young specialist’s stating the above requirements, he, most probably, will be refused a job. Employers say that universities are to blame for such high self-esteem—they lead to students’ thinking that they receive brilliant educations and are in high demand in labor market.

Students who pay for education receive information that in future their expenditures will be returned due to a well-paid job. Ways of getting such job are usually not specified. It should be noted that search for a job is also a job. At present, employer reasons his requirements to employee on the basis of interests and profits of his own business. Knowledge, which to-be future employee received in university, could be interesting for him only if they could somehow correspond to these needs. That’s why very strict requirements are set to job-seekers (Skiter 2015, p. 34). Employers set such high planks that it is not always possible to reach them without practical experience. Hence employers’ issues with universities. According to the Rator ranking agency, 65 % of employers think that university graduates require additional training. But only large companies are able to train young specialists and actually do that. Small companies cannot afford such procedures, so they look for competent employees which need not additional training. Rectors of universities and representatives of HR agencies think that it is possible to overcome the existing situation. There’s a necessity for contact between employers and universities: participation in universities’ teaching graduates and development of own criteria of evaluation of graduates training.

In 1999, by the initiative of Bauman Moscow State Technical University, the Ministry of Science and Education of the RF created the Transregional Coordination and Analytical Center for problems of employment and adaptation to market of graduates of professional education establishments.

The Center's tasks are: creation of effective system for support for employment of graduates; creation of data bases of educational services markets; creation of the system of informational support for employment of graduates.

Using the informational system, developed by the Center, an applicant or graduate receives actual information on the labor market, availability of jobs, perspectives of getting a job on a given specialty, normative, legal, and social issues, and on the possibility of studying in the corresponding profile. Employer can also find necessary employees with the use of this system—for that, it contains data base of employers' vacancies and job-seekers CV's with information on labor markets of all subjects of the RF. This data base is stored in the central server of the system and in every university of the RF that applied for it (Chuprov et al. 2001, p. 32). Besides, there are 266 centers for supporting employment of graduates in 341 universities under the Federal Education Agency. In 2005–2006, four volumes of “Encyclopedia for employment support” were published. The fifth volume of “From applicant to specialist. Building a successful career” is planned for publication. It contains information necessary for establishment of a young specialist at three stages: selection of profession; selection of educational establishment according to the selected profession; selection of a job according to the obtained education and requirements of labor market and building successful career.

Recently, a program “Five-year plan of cooperation between leading university and HR industry of Russia” was developed. Its purpose is to form civilized market of young specialists in Russia. Tasks: ensure positive influence on the process of employment of university graduates under the conditions of market economy; improve quality of employment of technical universities graduates; increase competitiveness of students and graduates of Bauman MSTU by means of special preparation of students for the conditions of Russian labor market.

All work for solving problems of graduates employment was conducted by the Coordination and Analytical Center of Bauman MSTU with own assets. Still, the university cannot cope with this problem alone.

Since 2004, an international system “Profiles International” has been working in Russia—a global leader in the sphere of assessment and certification of personnel, which has been working in the market for 15 years. This system could be effective for assessment of professional availability of university graduates. It allows measuring thinking and rationality, behavior features, and professional interests and comparing it to profile of specialist's job—so, it would be very helpful for young people who are not afraid of experimenting.

Within conduct of monitoring of the state of labor market—in particular, expected employment of graduates, the Ministry of Education and Science of Russia has been regularly requesting corresponding information from regional bodies of executive power.

In January 2009, the Ministry established the Action Plan for additional training of unemployed graduates of educational establishments by snap course of training for popular professions and advanced professional training.

The action plan contains a range of measures aimed at complex solution of the issue of employment of graduates of professional education establishments. Among the supporting measures, the state offers the following:

- increase of accessibility of higher education by means of preservation of state-funded places of resident departments of universities at the level of 2008, despite demographic decline;
- increase of state-funded places at master’s program up to 34,400 places (at present—19,000); postgraduate study—up to 29,000 (increase by 3000 places);
- sending students from Russian universities to leading universities of Europe and the USA for studying by master’s educational programs and internship (more than 1500 people);
- change of structure of training in universities and secondary specialized colleges—state-funded places are increased among the most popular technical specialties and cut for specialties in the sphere of economics, management, and humanitarian sciences.

As of March 1, 2009, the information on expected employment was received from 81 of 83 subjects of the Russian Federation (information from Moscow and the Republic of Dagestan did not conform to required form).

According to the 2010 data, almost 1.5 million intramural students:

- planned to continue studies: 10 % of university graduates, 20 % of graduates of secondary vocational education establishments, and 12 % of graduates of primary vocational education establishments;
- working career was started by: 69 % of university graduates, 56 % of graduates of technical schools and colleges, and 59 % of vocational schools.

Thus, in 2010, 89 % of university graduates, 90 % graduates of technical schools and colleges, and 90 % of vocational schools were employed.

In 2010, we conducted sociological research on the topic “Specifics of employment of university graduates”. The research was performed in the form of questionnaire survey among the students of Moscow and Moscow region, the Central, Southern, Volga, Siberian, Ural, Far Eastern Federal Districts and St. Petersburg. Thus research showed that the employing companies; need for graduates did not changed significantly in 2010, as compared to 2009. Obviously, there are certain positive changes, but they are not that important. The following are the data of the research. Who needs graduates?

- large Russian commercial companies (2007—71 %, 2009—50 %, 2010—43 %);
- large foreign commercial companies (2007—43 %, 2009—30 %, 2010—20 %);
- small Russian commercial companies (2007—42 %, 2009—49 %, 2010—59 %);
- small foreign commercial companies (2007—6 %, 2009—6 %, 2010—9 %);
- government organizations (2007—56 %, 2009—67 %; 2010—61 %) (Sherer 2010).

As a result of study and analysis of structure of demand for graduates and young specialists for 2007–2010, we saw that there were significant changes in the structure of demand for graduates among various employers by 2010.

In 2013, among economically active graduates, who graduated from educational establishments in 2010–2012, the total share of graduates with higher professional education constituted 60.9 %, among employed in economy—61.9 %. This shows that graduates of higher educational professional establishments have the highest percent of economic activity, employment, and the lowest share of unemployed (Economic activity of population in 2014).

Analysis of statistical data showed the following main tendencies of development of the system of professional education in Russia:

- number of state and municipal educational organizations of higher education reduced by 30 objects, while the number of private educational organizations of higher education increased by 11 objects. The total number of educational establishments of higher education constituted 950, thus reaching the level of 2000.
- the number of students of educational organizations of higher education decreased in state, municipal, and private educational organizations. The total number of students in the system of higher education in 2014 constituted 5,209,000; at that, number of students of intramural and extramural programs is equal—2,575,000 and 2,475,500, accordingly.

At that, it is necessary to note the tendency for reduction of the number of employed employees in the total number of economically active population. Thus, according to the Federal State Statistics Service, in 2013, among the age group of 15–19 the share of employed constituted 0.9 % (to compare: in 2006, it constituted 2.5 %). The share of economically active population in the age 20–24 in 2013—9.2 % (in 2006—10.0 %). In the age group 25–29 in 2013—14.3 % (in 2006—13.0 %) (Mitina et al. 2015).

Thus, tendencies of formation of professional level of Russian youth are pre-determined by development of educational system. This process was viewed for 2012–2014 by the following parameters: growth of the number of professional educational establishments; growth of the number of educational establishments in view of ownership forms; change of the number of students of various levels of education; dynamics of the number of students at various levels of professional education as to modes of study; dynamics of the number of students for 10,000 people; dynamics of the average number of students for one educational establishments as to ownership forms. In 2014, the number of students of state and municipal educational organizations of higher education constituted 4,405,500 (91.3 %—as compared to 2013). Private educational organizations of higher education had 803,500 students in 2014 (90.6 %). Reduction of the number of students is caused by the process of optimization of the number of educational organizations of higher education.



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**Part III**  
**Effectiveness of State Management and**  
**Economic Growth in the Context of Global**  
**Integration and Clustering**

# The Substance of a Rational Approach to Entrepreneurship Socio-Economic Development

Sergey A. Korobov, Viktor O. Moseiko, Elena Y. Marusinina, Ekaterina G. Novoseltseva, and Veronika S. Epinina

**Abstract** Making managerial decisions is the most difficult stage within entrepreneurial systems. The research authors suggest the resource-factorial approach, based on the human, technical-technological, natural, institutional, organizational and informational resources differentiation as the research methodic fundament. Cognitive modeling is applied to investigate the way the resources influence each other in the course of production. The authors make up a cognitive map, which is a scheme of cause-effect relations, defining the way the resources influence each other in the course of production. The authors suggest an algorithm for determining the figures, indicating how the resources influence each other. The article suggests an overview of how each separate resource influences the others and a method of regulating the share of the resources' influence indicators, which is also applied in engineering forecasting. In conclusion, the authors define the substance of a business's managerial decision, expressed in the order the resources are developed in the course of production.

## 1 Text

System (in Greek—whole, consisting of components)—a number of elements consistently linked with each other, forming a unity. From system analysis point of view, there are several types of systems: in a form of management subject and object, a black box, interrelated structural elements, strata elements, external and internal environment collaboration. The term “entrepreneurial system” doesn't have a single united definition. The word “entrepreneurial” is understood in the Russian language as “characteristic of an entrepreneur”. Formally, such notions as “entrepreneurial system” and “entrepreneurship system” are if various sources are viewed differently, but mostly they are viewed as synonyms.

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The main role in conducting entrepreneurial activity belongs to the system structural organization and goods and services production and reproduction management, their exchange and distribution. The following functional features are characteristic of the entrepreneurial activity: the freedom to choose directions, solutions and methods; freedom and self-sufficiency; legal liability for the economic actions and their consequences; economic, financial, social and other risks; direct vector targeting at achieving commercial success and, as a consequence getting economic profit (Frolov et al. 2015).

The deep substance of entrepreneurship as a complicated and multiform socio-economic phenomenon, oriented at getting entrepreneurial profit and meeting the demands of as many consumers as possible, is a special economic risk organization form, which in corresponding historical and socio-economic conditions provides the social reproduction with the necessary dynamics.

A famous Scottish economist Adam Smith was one of the first to conduct a system investigation of the entrepreneurship's issues, taking into account economic development in the eighteenth century. In his main research work "Investigating the nature and reasons of the nations' wealth" Smith elaborated the "free entrepreneurship" doctrine, where he emphasized the economic independence and self-sufficiency of a business's activities (Smith 1982). Adam Smith underlined that an entrepreneur's desire to implement his/her interests is the main economic development vector, what in the end promotes the entrepreneur's welfare and the welfare of the society. Besides, Smith's suggestions devoted to the fiscal system and customs services happened to be economically important.

A serious contribution to the entrepreneurship economic theory was made by a French economist Jean-Baptist Say, who reconsidered the "Investigating the nature and reasons of the nations' wealth" research work and expressed his point of view of the economic entrepreneurship laws. Say formulated four main laws of the free market: the more capacious the market is, the more extensive the production is and the more profitable the market is, as the price is directly dependent on the demand growth; each producer pecuniary interested in another producer's success, what stimulates and rewards general development; goods import promotes exchange development, as foreign products can be bought only after selling the local goods; those society layers, who don not contribute into the economy's welfare growth are automatically ruining it (Say 1971).

The society's welfare source, according to Jean Baptist Say are the three production factors: labour, land and capital. Being an economic agent, an entrepreneur uses the existing production factors and exploits available resources to achieve the highest results, expressed in the amount of profit gained.

Jean Baptist Say paid special attention on to the entrepreneurship's innovation, which was connected not only with searching necessary resources and factors, but with searching for their various combinations for achieving the economic and financial optimum. This point of view was widely acknowledged and was further reflected in other works on entrepreneurial theory by such famous scholars as F. Hayek, J. Schumpeter, P. Drucker and others.

Austrian economist and the Nobel Prize winner August Hayek was adherent to liberal Economics and free economic market. He thought that an entrepreneur, being an economic subject, behaves differently and strives for finding new ways of getting profit (Hayek 1989). Hayek put special stress on the fact that in the economic terms entrepreneurs function under the high competition conditions with the full accordance to the natural selection.

Another Austrian and American economist Joseph Schumpeter, the pioneer in the innovative entrepreneurship theory, states that an entrepreneur's economic function is not constant unless the combination of entrepreneurship activity economic factors becomes traditional. First of all, Schumpeter emphasizes an entrepreneur's innovation function (Schumpeter 1982). Entrepreneurs should be distinguished from managers, who don't deal with innovations, but do their routine job.

An outstanding American scientist Frank Knight, specializing in methodological assessment of uncertainty and risks, views entrepreneurship as economic activity, aimed at getting the profit as an award for an entrepreneur's risks (Knight 2009).

Nowadays, modern society still considers entrepreneurship to be something "unfair", something that is opposed to Soviet times' institutional rules and norms, in particular fair working life in reasonable. But it is very important for the public consciousness to understand the fact that fair working life happens in risk-free economic space, where accumulating family capital occurs according to an economic tradition with minimal social costs. An entrepreneur acts in a risky environment, moreover, he takes on the responsibility for his employees, what requires not only intelligence but certain psycho-physiological abilities on standing against stress which is always there in an entrepreneur's life (Novoseltseva and Marusinina 2011).

That is why an entrepreneur's income is his award for the risk he faces with the earlier the society admits it, the more positive an entrepreneur's image will be.

The first interpretations of the notion "individual entrepreneur" appeared in Russia before the 1917 Revolution. Then, the notion "individual entrepreneur" was understood as a person, risking everything he/she had in favour of his/her business. The basic entrepreneurial features can be defined: the consumer value of a product or service, high personal responsibility for the decisions made, high economic risks, moral and financial satisfaction with the efforts made (Epinina 2012).

The modern economic theory is closely connected with Ronald Harry Coase, an American economist, Nobel Prize winner, who introduced a new economic notion "transactional costs", which are worth considering from an entrepreneurial point of view.

Investigating the entrepreneurship's characteristic features, we can claim that a system of controlling transactional costs and minimizing them is the key for the small and medium businesses' subjects.

From the classical point of view, transactional costs are understood as the costs following the legal process of the market agents' economic interaction.

Thus, any market agents' entrepreneurial transaction is supported with a legal document (Contract) and the less an entrepreneur spends his own resources (financial and labour) on making, supporting and finishing agreements, the less transactional costs will be caused.

According to a well-known theorem by R. Coase, the more exact each market member's property rights are described, the less transactional costs each market member will bear (Coase 1960). Going into details of this theory, we can conclude that in a socialist society in terms of planned economy each market member's transactional expenses are minimized, as the state's economy stand out as a guarantee of such transactions and their legal framework lies in a risk-free economic space.

In the capitalist society the role of transactional costs in an entrepreneur's activities is of great importance, in particular when studying the pricing policy of contracts relations on the local, regional, federal and international levels.

It is obvious that the higher the economic systems' cooperation level is, the higher the transactional costs of organizing the exogenous economic factors interrelation, involved in transforming the property right of entrepreneurs will be, when carrying out an economic transaction.

This dependence can be represented in a form of an exponential dependence of classical transactional costs' amount, aimed at the financial-economic maintenance of the market agents' interaction legal process, from the economic system's interacting level set by the transaction.

The main principles of transactional costs' management theory are:

1. In any entrepreneurial activity the transaction costs are positive or equal to 0.
2. Transactional costs of an entrepreneur cannot be considered apart from the transformational costs, i.e. in all forms of entrepreneurial activity, when getting the goods, work or services in value or physical terms, these types of costs are interconnected.
3. An entrepreneur's transactional costs will differ from 0 within any agents' cooperation terms.
4. Transactional costs are typical of any business pattern, including peasant (farm) enterprises (individual entrepreneurs).
5. The transactional costs' role an amount can be of a diverse character for entrepreneurs, depending on the scope and scale of their activity, i.e. the mechanism for controlling the big businesses' transactional costs will be significantly different from the small and medium businesses' (further SMB) transactional costs controlling mechanism.

The transactional costs theory, like the institutional theory, is one of the weakly investigated theories, if speaking about regulating entrepreneurial structures. So far, the process of controlling the state regulatory and entrepreneurial support system from the institutional theory basics point of view has been studied weakly.

When regulating the socio-economic systems, one of the most important, crucial and complicated phases of elaborating and implementing management decisions is the phase of forming management decisions' substance. This phase's complexity is

determined by the fact that the tasks which are hard to formalize are solved in its framework. These tasks' result is concrete management decisions' substance (Moseiko et al. 2015b).

In order to understand the occurring economic processes on the micro-level, we will carry out a theoretical investigation of the entrepreneurial structure, by means of system analysis, institutionalism theory, evolutionary Economics and economic genetics. The study will be based on the main science works by O.V. Inshakov (2004) and Inshakov and Fesyun (2014).

The methodological substance of the economic system's economic model (according to O.V. Inshakov) implies applying of the resource-factorial approach to studying the endogenous economic behavioural dependences of the system itself.

Natural objects and conditions in the course of their development first become resources and then production factors, which finally transform into the final product.

M. Weber distinguished two types of an entrepreneur: rational and adventurist (Weber 1978). In our opinion, the key feature here is the concept "rationality". Rationality is opposed to irrationality and implies a reasonable, logical and optimal decision.

M. Weber suggested distinguishing formal and substantive rationality (Weber 1978). We would like to stop at formal economic rationality as an ability to make the best appropriate economic decision in terms of the resources' limitedness. Let's consider the notion "rationality" from the "management" process point of view.

Socio-economic processes management is a process of managing the use and/or development of natural objects and conditions within production processes.

Producing a certain product or service is the main function of an entrepreneurial (economic) system. So, an entrepreneurial system's basics is production, in the framework of which various production resources and factors are developed. Thus we can say that the process of managing entrepreneurial systems is production resources and factors 'rational development. When managing the production, an entrepreneur's rational management decisions or influences are targeted at implementing the changes in the course of concrete resources and factors effective development.

Developing the resources, while they are being transformed into production factors and finally into the final product, is of a complex character. In other words, each resource cannot be isolated from as all resources are interconnected.

A concrete resource influences the development of other resources within the production process. It is obvious that such influence is mutual.

The assessment of resources' mutual influences will be viewed within the system's entrepreneurial activity by the example of the technical-technological factor.

When acquiring hi-tech equipment, an entrepreneur strives at enhancing the technical features of the product or service, thus improving his technical-technological resource. An entrepreneur needs highly professional staff for working with such equipment. The staff should be trained, thus the company will enhance its

human resource and its transformation extent in a corresponding entrepreneurial endogenous factor.

Thereby, the T resource is used directly and the development of the A resource happens indirectly under the influence of the T resource.

We can assume that the direct development of the technical T resource in production can indirectly influence the development of other factors, for example:

- *institutional factor* *Ins*, when formal and informal rules of working on the equipment acquired form within an entrepreneurial system;
- *information factor* *Inf*, when the enterprise's workers and structural subdivisions strive to find, accumulate, transfer and use diverse information on working with technical equipment;
- *organizational factor* *O*, when a certain organizational structure, taking into account the peculiarities of working with the equipment in order to implement the technical equipment's potential;
- *material-resource factor* *M*, when a corresponding system of material-technical production support is used in order to implement the technical equipment's potential;

In the course of rational selection the entrepreneurial system's managing body faces the analysis of a resource's attractiveness for its further development and producing a product.

It is evident, that *functional and economic effectiveness*, provided by certain resources while they are being developed, should be viewed as the rational (resource) attractiveness' basics. The notions of functional and economic effectiveness were actively used by a well-known expert in the sphere of effectiveness enhancement and management tools, I. Adizes (1992).

Under *functional effectiveness* of a certain resource, we suggest understanding *its ability in the course of development to influence the application of other resources' products*. The stronger this influence is and the stronger the concrete resource's influence on other resources is, the higher this resource's effectiveness is, the more functional this resource is, as the resources', used in the production, main function is to be fully developed.

Economic effectiveness of a certain resource when it is being developed in the production process is viewed as its ability to be economical. A resource is considered to be the most economically effective if it is less costly. In other words, resource is more economically effective, if its development during the production process is less affected by other resources (or even totally unaffected).

According to the above mentioned theses, defining the application of the resource-factorial approach, we can assume that the substance of an entrepreneur's management decisions is determined by a rational way of developing the resources in the production process. That is why forming the development and the substance of management decisions should be done, basing on the way the resources influence each other during the production process.



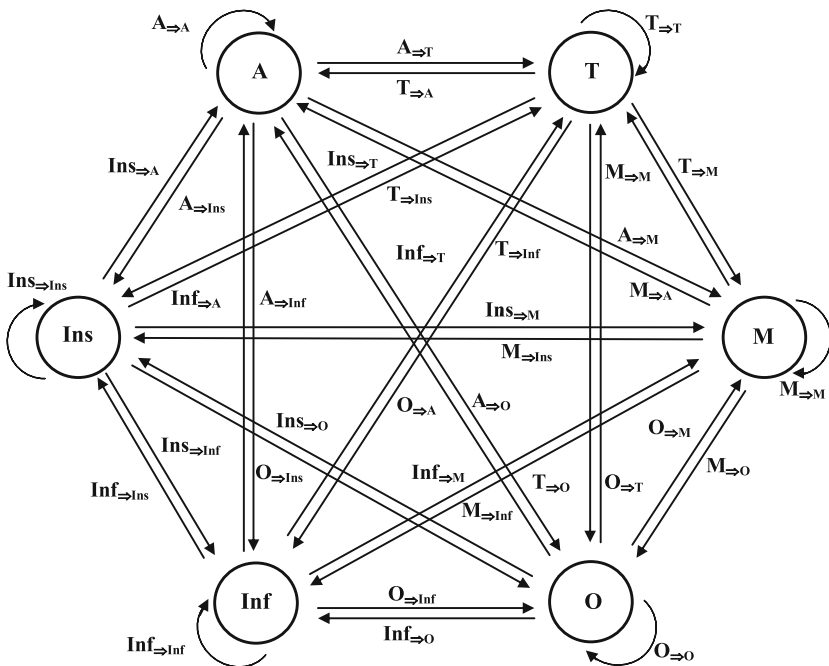
In order to investigate the way resources influence each other in the production process, we suggested using the cognitive approach, applied in this research as a cognitive model.

The cognitive model, being the result of cognitive structuration is a convenient instrument for studying and better understanding the weakly structured problems, which determine the tasks of rational management decisions in entrepreneurial systems (Moseiko et al. 2015a).

In the framework of the cognitive approach the cognitive map is made. The map is structured system of cause-effect relations, defining the resources mutual influence while they are being developed in the production process.

On the scheme below you can see the resources developed in the production process, which are interpreted as the graphs' nodes, the resources' mutual influence is depicted as arcs. Marking each arc's is made with a combined symbol, including the symbol of the affecting resource (the symbol before the arrow  $\Rightarrow$ ) and the other resource, being affected (the symbol after the arrow  $\Rightarrow$ ). For example, the influence of the human resource A on developing the technical resource T will be marked as  $T \Rightarrow A$ . The whole cognitive map of the resources' mutual influence is depicted in Fig. 1.

The amount in which these resources influence each other in the cognitive map are interpreted by the level indicator of the graph's nodes interconnection.



**Fig. 1** The cognitive map of the resources' mutual influence while they are developed in the production process

Relatively for marking these resources' influence on each other we'll be using the corresponding arcs.

On the cognitive map the indicators of the level of the resources' influence are not depicted in order to simplify our task. Let's imagine that these resources influence each other positively.

According to the map, it is worth paying attention to the way the resources influence themselves. Such situations occur quite often.

Thus, for example, the level of the managing personnel qualification, will obviously influence the enterprise's personnel professional skills (influence  $A \Rightarrow A$ ). The application of better aggregates and mechanisms facilitates the more efficient work of the others, for example better bearing promote the longer life of the mechanisms which use them (influence  $T \Rightarrow T$ ).

The application of more efficient materials might promote better use of other materials, for example, using modern building materials helps saving energy resources when exploiting houses (influence  $M \Rightarrow M$ ) and so on.

Let's consider the subject content of each separate influence of one resource on another. If there are six resources in total, then the overall number of all separate influences will equal to 36 (See Fig. 3—the arcs between the nodes).

The influence of one resource on the other during their development will be called only with corresponding adjectives. For example, the human resource's influence on the development of the technical resource will be called "*human on the technical*". This influence's level indicator will be marked with the corresponding combined symbol  $A \Rightarrow T$ .

We analyze the influence of some other resources in their development in the production process from the perspective of the entrepreneurial approach:

1. *Interaction of "human on the human"* indicator of the level of influence  $A \Rightarrow A$ . The interaction, which resulted in the development of human resources is the ability, skills and abilities of individuals promotes the use of skills and abilities of others and/or other skills and abilities of the same people.
2. *Interaction "human on the technical"* indicator of the level of influence  $A \Rightarrow T$ . The reaction, which resulted in the development of human skills and abilities promotes the use in the production process equipment and technology.
3. *Interaction "human on the material-resource"* indicator of the level of influence  $A \Rightarrow M$ . The reaction, which resulted in the development of human skills and abilities promotes the use in the production of natural and other resources and materials.
4. *Interaction "human on the organizational"* indicator of the level of influence  $A \Rightarrow O$ . The reaction, which resulted in the development of human skills and abilities promotes the use in the production of various organizational technologies.
5. *Interaction of "human on the information"* indicator of the level of influence  $A \Rightarrow Inf$ . The reaction, which resulted in the development of human skills and abilities promotes the use in the production of various means of information support.

6. *Interaction “human on the institutional”* indicator of the level of influence  $A \Rightarrow_{Ins}$ . The reaction, which resulted in the development of human skills and abilities promotes the use in the production of various rules, regulations, rules, etc.
7. *Interaction “technical on the human”* indicator of the level of influence  $T \Rightarrow_A$ . The interaction, which resulted in the development of technology, equipment and technology contributes to use in the production process of different skills and people skills.
8. *Interaction “technical on the technical”* indicator of the level of influence  $T \Rightarrow_T$ . The interaction, which resulted in the development of technology, equipment and technology contributes to use in the production of other equipment, tools, machines and other equipment.
9. *Interaction “technical on the material-resource”* indicator of the level of influence  $T \Rightarrow_M$ . The interaction, which resulted in the development of technology, equipment and technology contributes to use in the production of natural and other resources and materials.
10. *Interaction “technical on the organizational”* indicator of the level of influence  $T \Rightarrow_O$ . The interaction, which resulted in the development of technology, equipment and technology contributes to use in the production of various organizational technologies.
11. *Interaction “technical on the informational”* indicator of the level of influence  $T \Rightarrow_{Inf}$ . The interaction, which resulted in the development of technology, equipment and technology contributes to use in the production of various means of information provision.
12. *Interaction “technical on the institutional”* indicator of the level of influence  $T \Rightarrow_{Ins}$ . The interaction, which resulted in the development of technology, equipment and technology contributes to use in the production of various rules, regulations, rules, etc.
13. *Interaction “material on the human resource”* indicator of the level of influence  $M \Rightarrow_A$ . The reaction, which resulted in the development of natural and other resources and promotes the use of materials in the production process of different skills and people skills.
14. *Interaction “material-resource on the technical”* indicator of the level of influence  $M \Rightarrow_T$ . The reaction, which resulted in the development of natural and other resources and promotes the use of materials in the production of various equipment, tools, machines and other equipment.
15. *Interaction “material-resource on the material-resource”* indicator of the level of influence  $M \Rightarrow_M$ . The reaction, which resulted in the development of natural and other resources and promotes the use of materials in the manufacturing process of such funds or other raw materials.
16. *Interaction “material-resource on the organizational”* indicator of the level of influence  $M \Rightarrow_O$ . The reaction, which resulted in the development of natural and other resources and promotes the use of materials in the production process of different organizational technologies.

17. *Interaction “material-resource on the information”* indicator of the level of influence  $M \Rightarrow_{\text{Inf}}$ . The reaction, which resulted in the development of natural and other resources and promotes the use of materials in the manufacturing process of various means of information support.
18. *Interaction “material-resource on the institutional”* indicator of the level of influence  $M \Rightarrow_{\text{Ins}}$ . The reaction, which resulted in the development of natural and other resources and promotes the use of materials in the manufacturing process of various rules, regulations, rules, etc.
19. *Interaction of “organizational on the human”* indicator of the level of influence  $O \Rightarrow_{\text{A}}$ . The interaction, which resulted in the development of organizational technologies and promotes the use of tools in the production process of different skills and people skills.
20. *Interaction “organizational on the technical”* indicator of the level of influence  $O \Rightarrow_{\text{T}}$ . The interaction, which resulted in the development of organizational technologies and tools facilitates use in the production of various equipment, tools, machines and other equipment.
21. *Interactions “organizational on the material-resource”* indicator of the level of influence  $O \Rightarrow_{\text{M}}$ . The interaction, which resulted in the development of organizational technologies and tools facilitates use in the production of a variety of natural and other resources and materials
22. *Interaction “organizational on the organizational”* indicator of the level of influence  $O \Rightarrow_{\text{O}}$ . The interaction, which resulted in the development of organizational technologies promotes the use in the production process of other organizational methods, technologies, tools, etc.
23. *Interaction “organizational on the information”* indicator of the level of influence  $O \Rightarrow_{\text{Inf}}$ . The interaction, which resulted in the development of organizational technologies and tools facilitates use in the production of various means of information support.
24. *Interaction “organizing on the institutional”* indicator of the level of influence  $O \Rightarrow_{\text{Ins}}$ . The interaction, which resulted in the development of organizational technologies and promotes the use of tools in the process of production of various rules, regulations, rules, etc.
25. *Interaction “information on the human”* indicator of the level of influence  $\text{Inf} \Rightarrow_{\text{A}}$ . The interaction, which resulted in the development of information technology and promote the use of tools in the production process of different skills and people skills.
26. *Interaction “information on the technical”* indicator of the level of influence  $\text{Inf} \Rightarrow_{\text{T}}$ . The interaction, which resulted in the development of information technology and promote the use of tools in the production of various equipment, tools, machines and other equipment.
27. *Interaction “information on the material-resource”* indicator of the level of influence  $\text{Inf} \Rightarrow_{\text{M}}$ . The interaction, which resulted in the development of information technology and promote the use of tools in the process of production of various natural and other resources and materials.

28. *Interaction “information on the organizational”* indicator of the level of influence  $\text{Inf} \Rightarrow \text{O}$ . The interaction, which resulted in the development of information technology and promote the use of tools in the production process of different organizational methods, technologies, tools, etc.
29. *Interaction “information on the information”* indicator of the level of influence  $\text{Inf} \Rightarrow \text{Inf}$ . The interaction, which resulted in the development of various information technology promotes the use in the production process, or other similar information technologies and tools.
30. *Interaction “information on the institutional”* indicator of the level of influence  $\text{Inf} \Rightarrow \text{Ins}$ . The interaction, which resulted in the development of various information technology tools and promotes the use in the production of various rules, regulations, rules, etc.
31. *Interaction “institutional on the human”* indicator of the level of influence  $\text{Ins} \Rightarrow \text{A}$ . The interaction, which resulted in the development of various institutional norms, rules and regulations promote the use in the production process of different skills and people skills.
32. *Interaction “institutional on the technical”* indicator of the level of influence  $\text{Ins} \Rightarrow \text{T}$ . The interaction, which resulted in the development of various institutional norms, rules and regulations promote the use in the production of various equipment, tools, machines and other equipment.
33. *Interaction “institutional on the material-resource”* indicator of the level of influence  $\text{Ins} \Rightarrow \text{M}$ . The interaction, which resulted in the development of various institutional norms, rules and regulations promote the use in the production of various natural and other resources and materials.
34. *Interaction “institutional on the organizational”* indicator of the level of influence  $\text{Ins} \Rightarrow \text{O}$ . The interaction, which resulted in the development of various institutional norms, rules and regulations promote the use in the production of various organizational technologies.
35. *Interaction “institutional on the information”* indicator of the level of influence  $\text{Ins} \Rightarrow \text{Inf}$ . The interaction, which resulted in the development of various institutional norms, rules and regulations promote the use in the production of various means of information support.
36. *Interaction “institutional on the institutional”* indicator of the level of influence  $\text{Ins} \Rightarrow \text{Ins}$ . The interaction, which resulted in the development of various institutional norms, rules and regulations promote the use in the production process of these or other institutional norms, rules and regulations.

Resource Definition influence levels on each other during their development in the production process is carried out in two stages.

Algorithms for the first and second stages, respectively, shown schematically in Figs. 2 and 3. Each of these schemes is based on the square matrix is the matrix form of representation of the digraph.

At the first stage, the influence level expert ranking of each resource in turn all individually reclaimed resources reclaimed during manufacture. In other words, the

	A	M	T	O	Inf	Ins
A	A $\Rightarrow$ A	A $\Rightarrow$ M	A $\Rightarrow$ T	A $\Rightarrow$ O	A $\Rightarrow$ Inf	A $\Rightarrow$ Ins
M	M $\Rightarrow$ A	M $\Rightarrow$ M	M $\Rightarrow$ T	M $\Rightarrow$ O	M $\Rightarrow$ Inf	M $\Rightarrow$ Ins
T	T $\Rightarrow$ A	T $\Rightarrow$ M	T $\Rightarrow$ T	T $\Rightarrow$ O	T $\Rightarrow$ Inf	T $\Rightarrow$ Ins
O	O $\Rightarrow$ A	O $\Rightarrow$ M	O $\Rightarrow$ T	O $\Rightarrow$ O	O $\Rightarrow$ Inf	O $\Rightarrow$ Ins
Inf	Inf $\Rightarrow$ A	Inf $\Rightarrow$ M	Inf $\Rightarrow$ T	Inf $\Rightarrow$ O	Inf $\Rightarrow$ Inf	Inf $\Rightarrow$ Ins
Ins	Ins $\Rightarrow$ A	Ins $\Rightarrow$ M	Ins $\Rightarrow$ T	Ins $\Rightarrow$ O	Ins $\Rightarrow$ Inf	Ins $\Rightarrow$ Ins
	$\Sigma(I_i \Rightarrow A)$	$\Sigma(I_i \Rightarrow M)$	$\Sigma(I_i \Rightarrow T)$	$\Sigma(I_i \Rightarrow O)$	$\Sigma(I_i \Rightarrow Inf)$	$\Sigma(I_i \Rightarrow Ins)$

Fig. 2 Matrix quality expert ranking mutual enterprise resource system

ranking is based on comparing the levels of peer influence each resource individually to all resources used.

For example, human resource A in the diagram (Fig. 2) shaded arrow on the appropriate line of the matrix shows the order of the ranking process. The cells that line indicate values of ranks— $R_{A \Rightarrow A}$ ,  $R_{A \Rightarrow T}$ ,  $R_{A \Rightarrow M}$ ,  $R_{A \Rightarrow O}$ ,  $R_{A \Rightarrow Inf}$ ,  $R_{A \Rightarrow Ins}$ , from 1 to 6:

$$\{R_{A \Rightarrow A}, R_{A \Rightarrow T}, R_{A \Rightarrow M}, R_{A \Rightarrow O}, R_{A \Rightarrow Inf}, R_{A \Rightarrow Ins}\} = \{1, 2, 3, 4, 5, 6\}.$$

For example, by comparing the expert it is revealed that a particular resource (from the leftmost column) to the greatest influence on one of reclaimed resources (indicated in the top row). Then the rank, and thus influence the corresponding level index will have a rank of 1. The least effect on that resource to any other resource is marked in the appropriate box rank equal to 6. The other cells are put ranks corresponding row having intermediate values from 25. After ranking up all the resources from the leftmost column the matrix will be filled completely.

Note integer ranging results provide only qualitative distribution of the investigated magnitude values. To make the results of the expert ranking quantitative,

	A	M	T	O	Inf	Ins	
A	$A \Rightarrow A$	$A \Rightarrow M$	$A \Rightarrow T$	$A \Rightarrow O$	$A \Rightarrow Inf$	$A \Rightarrow Ins$	$\Sigma(I_{A \Rightarrow i})$
M	$M \Rightarrow A$	$M \Rightarrow M$	$M \Rightarrow T$	$M \Rightarrow O$	$M \Rightarrow Inf$	$M \Rightarrow Ins$	$\Sigma(I_{M \Rightarrow i})$
T	$T \Rightarrow A$	$T \Rightarrow M$	$T \Rightarrow T$	$T \Rightarrow O$	$T \Rightarrow Inf$	$T \Rightarrow Ins$	$\Sigma(I_{T \Rightarrow i})$
O	$O \Rightarrow A$	$O \Rightarrow M$	$O \Rightarrow T$	$O \Rightarrow O$	$O \Rightarrow Inf$	$O \Rightarrow Ins$	$\Sigma(I_{O \Rightarrow i})$
Inf	$Inf \Rightarrow A$	$Inf \Rightarrow M$	$Inf \Rightarrow T$	$Inf \Rightarrow O$	$Inf \Rightarrow Inf$	$Inf \Rightarrow Ins$	$\Sigma(I_{Inf \Rightarrow i})$
Ins	$Ins \Rightarrow A$	$Ins \Rightarrow M$	$Ins \Rightarrow T$	$Ins \Rightarrow O$	$Ins \Rightarrow Inf$	$Ins \Rightarrow Ins$	$\Sigma(I_{Ins \Rightarrow i})$
	$\Sigma(I_i \Rightarrow A)$	$\Sigma(I_i \Rightarrow M)$	$\Sigma(I_i \Rightarrow T)$	$\Sigma(I_i \Rightarrow O)$	$\Sigma(I_i \Rightarrow Inf)$	$\Sigma(I_i \Rightarrow Ins)$	

Fig. 3 The matrix of qualitative expert ranking mutual enterprise resource system

should be made in the procedure of converting the ranks of the weight, which should be interpreted as indicators of the impact of a single resource for the development of each from all resources. For example, for the resource A— $I_{A \Rightarrow A}$ ,  $I_{A \Rightarrow T}$ ,  $I_{A \Rightarrow M}$ ,  $I_{A \Rightarrow O}$ ,  $I_{A \Rightarrow Inf}$ ,  $I_{A \Rightarrow Ins}$ .

To convert the values of ranks in the corresponding weighting values impact indicators can be used a variety of methods of normalizing, in varying degrees, increase the quality of the interpretation of the real processes.

We propose a method for weight valuation indicators of the impact of resources used in the engineering problems of forecasting.

$$f(i) = \frac{i}{2^{i-1}} \quad (1)$$

where  $i$  is the rank of the corresponding resource impact of (1, 2, . . . 6).

Characteristic properties of the normalizing functions are as follows:

- for the first and second rank values influence resource levels corresponding weights are equal to 1, which gives it true the first two values are equally high importance;
- with an infinite increase in the number of resources (in this case they only 6) of the last level of the indicator weight influence will rightly seek to 0;
- is a function of the form (1) allows the operation of summation weight estimates.

For integer sequence of ranks from 1 to 6 weight values are indicators of the level of influence of resources on the development of each from all resources are equal to, respectively: 1.00; 1.00; 0.75; 0.50; 0.31; 0.19.

So for the resource A in the corresponding row of the matrix (Fig. 3) shows the values for the indicators of the level of influence of one resource A on the development of all resources:

$$\{I_{A \Rightarrow A}, I_{A \Rightarrow T}, I_{A \Rightarrow M}, I_{A \Rightarrow O}, I_{A \Rightarrow Inf}, I_{A \Rightarrow Ins}\} = \{1.00; 1.00; 0.75; 0.50; 0.31; 0.19\}.$$

Each cell of the bottom row is offered to show the result of the summation of the values of indicators of the impact of all the reclaimed resources indicated in the leftmost column, for each specific resource, indicated in the top row of the matrix. For example, for the resource A will be:

$$\Sigma(I_{i \Rightarrow A}) = I_{A \Rightarrow A} + I_{T \Rightarrow A} + I_{M \Rightarrow A} + I_{O \Rightarrow A} + I_{Inf \Rightarrow A} + I_{Ins \Rightarrow A}.$$

As you can see, the amount of  $\Sigma(I_{i \Rightarrow A})$  can be interpreted as an integral indicator of the impact of all the reclaimed resources to human resource A.

Thus, the first stage are the values of the integral indicators of the impact of all the resources for each resource separately, the indicators listed in the bottom row of the matrix— $\Sigma(I_{i \Rightarrow A})$ ,  $\Sigma(I_{i \Rightarrow M})$ ,  $\Sigma(I_{i \Rightarrow T})$ ,  $\Sigma(I_{i \Rightarrow O})$ ,  $\Sigma(I_{i \Rightarrow Inf})$ ,  $\Sigma(I_{i \Rightarrow Ins})$ .

At the second stage the expert rankings conducted in a different order, namely, ordered by grade level the influence of all the resources used for each separately.

For example, human resource A in the diagram (Fig. 3) arrows darkened the respective matrix column shows the order of the ranking process. The cells in this column specifies the values of ranks— $R_{A \Rightarrow A}$ ,  $R_{T \Rightarrow A}$ ,  $R_{M \Rightarrow A}$ ,  $R_{O \Rightarrow A}$ ,  $R_{Inf \Rightarrow A}$ ,  $R_{Ins \Rightarrow A}$ , from 1 to 6:

$$\{R_{A \Rightarrow A}, R_{T \Rightarrow A}, R_{M \Rightarrow A}, R_{O \Rightarrow A}, R_{Inf \Rightarrow A}, R_{Ins \Rightarrow A}\} = \{1, 2, 3, 4, 5, 6\}.$$

If the peer comparison turns out that one of the resources (from the leftmost column) are most affected by a particular resource (the top line), then the rank will



be set to 1. The least impact of any other resource (from the leftmost column) for the same particular resource will be marked in the appropriate box as the 6. The remaining cells of the corresponding column are put grades from 2 to 5. When ranking for all resources from the top row of the matrix will be filled completely.

In the second stage should also be taken to make the results of the expert ranking quantitative procedure for converting rank in weight, which should be interpreted as indicators of the impact of all resources for the development of a particular resource. For example, the resource A— $I_{A \Rightarrow A}$ ,  $I_{T \Rightarrow A}$ ,  $I_{M \Rightarrow A}$ ,  $I_{O \Rightarrow A}$ ,  $I_{Inf \Rightarrow A}$ ,  $I_{Ins \Rightarrow A}$ .

For this purpose, as in the first stage are invited to apply formative function (1), that will give the results of the second phase of the weight character. Then, for example, for the resource A of the uppermost row of the matrix (Fig. 3) in the corresponding column will indicate the values for indicators of the impact of all resources for the development of the resource A:

$$\{I_{A \Rightarrow A}, I_{T \Rightarrow A}, I_{M \Rightarrow A}, I_{O \Rightarrow A}, I_{Inf \Rightarrow A}, I_{Ins \Rightarrow A}\} = \{1.00; 1.00; 0.75; 0.50; 0.31; 0.19\}.$$

In each cell of the rightmost column is invited to show the result of the summation of the values of indicators of the level of influence of each specific resource indicated in the leftmost column, all the reclaimed resources, indicated in the top row of the matrix. For example, for the resource A will be:

$$\Sigma(I_{A \Rightarrow i}) = I_{A \Rightarrow A} + I_{A \Rightarrow T} + I_{A \Rightarrow M} + I_{A \Rightarrow O} + I_{A \Rightarrow Inf} + I_{A \Rightarrow Ins}.$$

As you can see, the amount of  $\Sigma(I_{A \Rightarrow i})$  can be interpreted as an integral indicator of the impact of human resource And all the reclaimed resources.

Thus, the outcome of the second phase are the values of the integral indicators of the level of influence of each resource separately for all resources under development, the indicators listed in the rightmost column of the matrix in Fig. 3.— $\Sigma(I_{A \Rightarrow i})$ ,  $\Sigma(I_{M \Rightarrow i})$ ,  $\Sigma(I_{T \Rightarrow i})$ ,  $\Sigma(I_{O \Rightarrow i})$ ,  $\Sigma(I_{Inf \Rightarrow i})$ ,  $\Sigma(I_{Ins \Rightarrow i})$ .

The resulting comparative analysis results allow to receive for each absorbed in the process of production of the resource value of the two parameters. In accordance with the previously given methodological grounds, one of these indicators we will be seen as a of functional performance indicator (FPI), interpreting the impact of each specific resource to all other resources, and the other—as an economic resource consumption indicator (ERCI), interpreting the effect of reclaimed resources each specific resource separately (Table 1).

It was noted earlier that the content of rational management decisions is determined by the order of development resources in the production process, and the formation of this order should be based on the analysis of the interference of nature resources on each other during their development in the production process.

In general, in determining sustainable resource development order when used in the production process should be guided by maximum functional effectiveness ( $FPI \Rightarrow \max$ ) and the minimum economic resource consumption ( $ERCI \Rightarrow \min$ ), i.e. maximum economic efficiency. In other words, the rational management

**Table 1** Resources effectiveness indicators in the production process

Resource	Functional performance indicator (FPI)	Economic resource consumption indicator (ERCI)
	Interprets impact of the specific resource on other resources	Interprets all resources' impact on a specific resource
A	$\Sigma(I_{A \Rightarrow i})$	$\Sigma(I_i \Rightarrow A)$
T	$\Sigma(I_{M \Rightarrow i})$	$\Sigma(I_i \Rightarrow M)$
M	$\Sigma(I_{T \Rightarrow i})$	$\Sigma(I_i \Rightarrow T)$
O	$\Sigma(I_{O \Rightarrow i})$	$\Sigma(I_i \Rightarrow O)$
Inf	$\Sigma(I_{Inf \Rightarrow i})$	$\Sigma(I_i \Rightarrow Inf)$
Ins	$\Sigma(I_{Ins \Rightarrow i})$	$\Sigma(I_i \Rightarrow Ins)$

decisions should be determined in order of priority the development of resources in the production process, this priority should be determined on the basis of the highest functional performance and lower economic resource consumption. In expanded form, this criterion can be represented as follows:

$$\begin{cases} \text{FPI} \Rightarrow \max(\Sigma(I_{A \Rightarrow i}), \Sigma(I_{M \Rightarrow i}), \Sigma(I_{T \Rightarrow i}), \Sigma(I_{O \Rightarrow i}), \Sigma(I_{Inf \Rightarrow i}), \Sigma(I_{Ins \Rightarrow i})); \\ \text{ERCI} \Rightarrow \min(\Sigma(I_i \Rightarrow A), \Sigma(I_i \Rightarrow M), \Sigma(I_i \Rightarrow T), \Sigma(I_i \Rightarrow O), \Sigma(I_i \Rightarrow Inf), \Sigma(I_i \Rightarrow Ins)). \end{cases}$$

Here we use the sign “ $\Rightarrow$ ” instead of strict equality since, in the formation of the administrative decision is difficult enough for a particular resource, develop within the framework of the administrative decision, “to meet” at the same time the maximum FPI.

It is only to say, the desire to develop within the framework of the administrative decision, first of all (at first), the resources that are increasingly satisfy this criterion.

On the basis of the application of resource-factor approach and cognitive modeling elements for business it will solve the problem of formation of the maintenance of rational management solutions as the order or sequence of the development of resources in the production of goods, works or services.

Thus, entrepreneurship as an economic category in the evolutionary development can be interpreted as a single economic (economic) system with a target to achieve vector positivity of its activities, as expressed in the dualism of transformational and transactional processes of transformation of the business environment in the economic process with further exploration and implementation of combinations factors and resources. Under entrepreneurship is also understood the economic category, reflecting the most significant properties, features and connection free market entities, as well as their financial, economic and social relations, to meet the company-specific goods, works and services. The social, reproductive, stimulating, enterprise resource functions reflect its function in the economic system of the state and its role in the economic process. Specific features business is the economic freedom of the decisions and the commercial management of the risk free and attracted resources, strategic and tactical management, innovation.

At the present stage of historical development of the most fulfilling and multi-variate model representation of the entrepreneurial system is 6-factor model (information, institutional, organizational, human, material, technical and technological resources), which allows you to fully simulate the endogenous entrepreneurial environment in its integration development.

Based on the postulate of the invariability of the positivity of transformational and transactional costs of doing business at all levels of the economic system, may be offered a rational model of decision-making entrepreneur, based on the principles of a strict definition of the order of resource development in the sequence of their maximum functional efficiency and minimum economic resource consumption.

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# Integration of Social and Innovative Activities into Industrial Organization

Valentina N. Parakhina, Olga A. Boris, and Pavel N. Timoshenko

**Abstract** The article studies the typology of models of socially oriented innovative companies (SOIC), reflecting their integrated diversity, based on the use of criterion for the classification of “the level of integration between the programs of social, innovative, and business activities of an industrial organization”.

Socio-oriented enterprises were classified by the level of integration between the programs of social, innovative, and business activities, affecting the selection of a specific business model of doing business innovation. Three basic models of socially oriented innovative enterprises were determined: (1) built-in; (2) integrated; (3) external SOIC model.

Economic and mathematical modeling of socially oriented innovative companies using standardized innovative and social matrices allows selecting SOIC that is the most productive model from the point of view of sustainable development of industrial enterprises under the conditions of integration of social and innovative activities.

## 1 Introduction

The essence of the modern transformation of the phenomena occurring in the Russian and world economy is the “correlated diffusion” of interrelated social and innovative factors in the sustainable development of production that determines the change in market relationships and the dynamics of the national innovation system.

The growing pace of globalization dictate new demands for innovations in relation to corporate social responsibility; in order to be competitive, every company needs to keep track of information, management, and technical innovations in their field of operation, effectively and systematically implement them, and to give special attention to personnel, charity, and environment.

Accordingly, the increasing urgency of the issues of modeling of socially-oriented innovative enterprises (SOIC) is developed and implemented in the

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production of high-end technologies and products that have a long-term positive impact on the living standards and welfare.

The socially-oriented industrial organizations have been only recently formed in the Russian economy, while the majority of innovative enterprises abroad have social orientation, and on the contrary, the socially meaningful industrial organizations try to apply the advanced technologies and developments in their activities.

The theory of socially-oriented innovative company, except for innovative technologies and methods of works, described above, is rooted in the concept of socially responsible business. According to the theory of reasonable egoism, the social responsibility of business is interpreted as simply “good business”, because it reduces the long-term losses and profits (Batalina et al. 2015).

In other words, the social nature becomes the new competitive advantage of the modern business (Manakhova 2011).

In this regard, the adequacy of modeling of socially oriented innovative enterprise is relevant and interesting for scientific research. However, this problem is poorly studied in such a setting. This paper fills this gap.

## 2 Methods

The main research method is the dialectical method which will integrate various scientific achievements in this area in order to form a methodological approach, to identify specific problems, and to suggest socially-oriented innovative company management methods of leveling using graphical methods and economic-mathematical modeling.

Theoretical and methodological basis of the study includes the fundamental tenets of the theory of socio-economic systems and the results of the analysis of issues of social practice-oriented innovation industrial organizations. A key role in the validation of the model of socially-oriented innovative enterprise belongs to the holistic approach implemented in the course of the study (Miller 2015).

Theoretical and methodological understanding of the features of a holistic management of SOIE is reached with the usage of an integrated, process, historical, and other scientific approaches of system management methodology. The following scientific methods were used: analysis and synthesis, induction and deduction, analogy and opposition, abstraction and specification. In the process of study of theoretical propositions, conclusions, and recommendations on the use of models of SOIC, the authors used the economic and mathematical tools, comparative, statistical, and sociological research methods, techniques of multidimensional groups, expert assessments, sample surveys, and others.

The empirical and factual basis for writing this article served as the results of the authors' own sociological research conducted in 2010–2013 on socially oriented innovative Russian companies of the North Caucasian Federal District that allowed for development of basic SOIE models and, based on this, for the selection of the

direction of improving the management of innovative activities using a holistic approach.

### 3 Literature Review

To generate SOIE models, a combination of factors were studied that characterize the features of socially oriented innovative companies, which is reflected in the works of various authors:

1. taking on the mission of creating and maintaining social value (benefits) (Felin and Foss 2005; Kaplan and Norton 2005; Levinthal 2011; Powell et al. 2011; Turner et al. 2013);
2. identifying and exploiting new opportunities for the implementation of the selected mission (Popper and Wagner 2002; Boris and Parakhina 2012, 2014; Piazza and Castellucci 2014);
3. implementation of a continuous process of innovation, adaptation and learning (Kotter 2002; Fugate et al. 2012; Chadwick and Raver 2015);
4. determination of action is not limited to the available resources (Mousavi and Kheirandish 2014; Wangrow et al. 2015; Engelen et al. 2015);
5. high social responsibility for the results of their activities (Konovalova et al. 2003; Manakhova (2011); Parakhina and Boris 2014; Muñoz et al. 2015).

Activities of a socially-oriented innovative company include a continuous process of innovation, covering a combination of resources to enable the acceleration of social change and/or meeting social needs.

Relying on the provisions of other authors (Horn et al. 2011), it found that innovation in SOIE manifested in the creation of social innovations, products, previously unknown technologies and innovative approaches to solving the problems of personnel management and corporate social responsibility through the use of traditional factors of the economy through a new combination thereof.

Socially-oriented innovative enterprises combine their activities in entrepreneurial, innovative, and market-based approaches for the creation of socially useful goods and social transformation. The specialists note the following characteristics of such companies (Konovalova et al. 2003):

1. social results—provides social impact or change by solving specific social problems or elimination of the “flaws” of the market and/or “failures” of the state;
2. entrepreneurial approach—actively uses in its work mechanisms inherent in business: strategic management, marketing, financial and crisis management, etc.;
3. innovative orientation—propensity to use in their work advanced technologies and methods of solving problems;

4. public ownership—can be expressed in the public nature of the manufactured product (service) or public administration, but may not have a legal status.

Socially oriented innovative enterprises or socially-oriented innovative company may vary according to the type of property that is to be based on public, private or corporate. A variety of views on the holistic approach in the field of economics, management and marketing requires generalization of points of view of scientists (Kotler 2008; Baker 2002; Miller 2015). By integrating them, it may be noted that the holistic (from the Greek word “*χόλος*”, “*holos*”—integrity, integrity, unity) management involves the use of intuitive methods, holistic view of the state of the company, this acquisition based on the ideas of development.

In a broader sense, holism is understood as “philosophy of integrity”, developed by the South African philosopher J. Smuts, who in 1926 coined the term “holism” (Smuts 1926).

To study the issues of holistic development of innovative activity of socially oriented enterprise characterized by the absence of unambiguous interpretation of the essence of SOIC as well as a variety of theoretical and applied scientific research of foreign and domestic scientists and economists in the field of Holistic requiring methodological generalization and systematization (Miller 2015).

The solution to these problems can be defined as an innovative region, integrating achievements of such sciences as innovative management, system organization theory, human resource management and corporate social responsibility, all of which contributes to the disclosure of research issues (Parakhina 2013).

## 4 Results

The aim of the study is to provide a holistic, consistent holistic modeling concept of socially-oriented businesses and justification of scientific and practical measures to create effective management.

Achieving the goal of the work led to the formulation and solution of the following tasks:

- investigating the current state of theoretical and methodological approaches to the construction of a model of socially oriented innovative enterprise;
- analyzing scientific approaches to the holistic development of the theory of management and determine the possibility of its use in the practice of management of innovative industrial organizations;
- determining the types of socially oriented innovative enterprises through the development of economic and mathematical model using holistic criteria;
- developing a mechanism of administrative actions to increase the efficiency of the socially-oriented innovative enterprises, depending on the model followed.

Scientific novelty of the results of the study is methodologically SOIC model validation and verification of its practical application in the management of socially oriented enterprise to innovate.

Elements of scientific contributions are the following research results (Boris 2013):

- putting into scientific circulation the concept of “socially oriented innovative company”, the author’s vision which helped to identify the most important characteristics of the place and role of industrial organizations in the aggregate, to show the similarities and differences between them, and to provide the balance of the core values of sustainability of socially-oriented innovative company;
- substantiated typology of models of socially oriented innovative companies, reflecting their diversity integrated, based on the use as a criterion for the classification of “the level of integration between the programs of social, innovation and business activity of the industrial organization”, which is of key importance for understanding the methodological specificity SOIC control;
- achieved economic and mathematical modeling type of socially oriented innovative companies using standardized innovation and social matrices, action which gives rise to a choice of SOIC model most accurately describes a variety of industrial organizations analyzed by assessing the degree of achievement of the company and its structurally separate divisions.

We separated the aggregate factors, characterizing the peculiarities of socially-oriented innovative enterprises:

1. acceptance of mission of creation and support for social value (good);
2. detection and usage of new possibilities for implementation of selected mission;
3. implementation of the uninterrupted process of innovations, adaptations and education;
4. decisiveness of actions, not limited by the available resources;
5. high social responsibility for the results of their activity.

The activity of socially-oriented industrial organization includes the uninterrupted innovation process, covering the combination of resources for creation of possibilities for intensification of social changes and/or satisfaction of public demands.

The socially-oriented innovative enterprises unite in their activity the entrepreneurial, innovative and market approaches for creation of publicly useful goods and social transformations. At that the specialists mark the following characteristics of such companies (Konovalova et al. 2003):

1. social result provides social effect or change by means of solution of concrete social problem or elimination of “defects” of market and/or “failures” of the state;
2. the entrepreneurial approach actively uses the mechanisms peculiar for their activities: strategic management, marketing, financial, anti-crisis management, etc.;



3. the innovative orientation is inclination to apply the advanced technologies and method of problem solution in its work;
4. public property can be expressed in the public character of industrial product (service), public management, but can have no legal status.

Socially-oriented enterprises can differ according to the type of property, i.e. be based on the public, private, or corporate one.

Based on the study of SOIC peculiarities, the basic models of socially-oriented innovative enterprises were formed in the work, which are represented on Fig. 1.

It should be noted that at formation of models, the notion “social programs” include also charitable activity and ecological constituent of innovative activity of industrial organization.

Analyzing Fig. 1, let’s mark that purpose of socially-oriented innovative enterprise can completely coincide with social mission of industrial organization, and be indirectly inclusive or neutral that is reflected on the level of integration of social, innovative and economic programs of the enterprise (Manakhova 2011).

Socially-oriented innovative enterprises, created on the principles of private property, have the range of advantages: independent financing, transparency of property on the assets, purchase and sales freedom. However, the possibility of conflict between motivation of profit obtainment and social mission is possible. Moreover, the profitable innovative industrial organizations have less advantages and strict tax liabilities that limit the social character and purpose of the enterprise, and require the bigger productivity, than satisfaction of the social needs (Filatov 2000).

Socially-oriented innovative companies are also distinguished according to the level of integration between programs of social, innovative and business activity, effecting on the choice of certain business model. We separated three basic models of socially-oriented innovative company (SOIC):

1. built-up model of SOIC is the activity of the enterprise, directed completely on implementation of both functions—innovative and social;

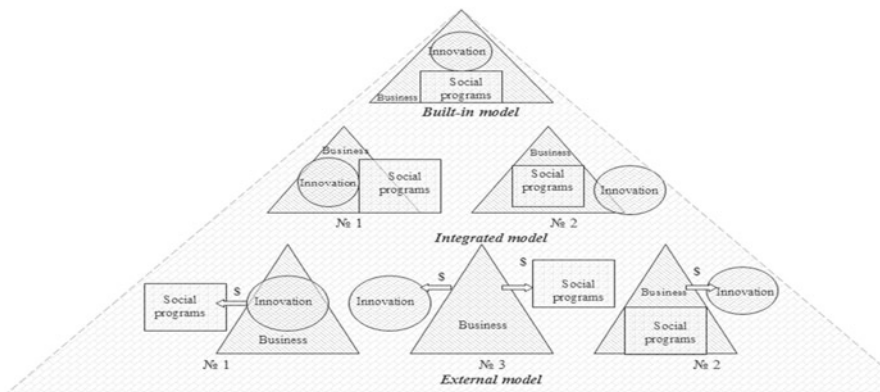


Fig. 1 Model of socially-oriented innovative enterprise

2. integrated model of socially-oriented innovative enterprise—innovative activity combines implementation of the social mission and expanding of business or coverage of operating expenditures (integrated model No.1 of Fig. 1) or emphasis is made on execution of social task at parallel execution of certain innovation at execution of economic tasks (integrated model No. 2 of Fig. 1);
3. external model of SOIC is entrepreneurial activity directed for profit obtainment that serves the source of financing of social programs and innovations (external model No. 2 of Fig. 1), or entrepreneurial innovative activity finances of social programs (external model No.1 of Fig. 1), or socially active entrepreneurship invests money in innovations (external model of No. 3 of Fig. 1).

The result of activity of socially-oriented innovative enterprises can lie in provision of the additional mechanism of financing (social programs of industrial organization or coverage of operating expenditures through creation and implementation of innovations), and can serve the stable system mechanism of provision of social mission.

The built-in model is widespread in the countries of North and South America, where the entrepreneurial activity of non-profitable organization, the profit from which is directed on implementation of statutory aims of organizations, is called social entrepreneurship. It is provided that mission and aims are directed accordingly on solution of social problems by means of innovative methods of business conduction. The subjects of built-in socially-oriented innovation organizations are non-profitable organizations. In the USA, the traditions of self-organization of the population are very strong, so the biggest part of social problems successfully are successfully solved by the socially-oriented innovation enterprises of the built-in type, receiving financing from the target group of population, state, and donors.

The integrated model of socially-oriented innovative enterprises dominates in the European countries, where the social entrepreneurship is determined as innovative business with social mission, or social business with innovative approaches.

Thus, either innovations or social programs take the first place in dependence on the direction of industrial organization activity, and only them the financial effectiveness.

The external model of socially-oriented innovative enterprise is used in the majority of private and public funds, created for development and support of this direction of social-economic activity (external model No. 1, Fig. 1), and also the companies on the STP development and innovations (external model No. 3, Fig. 1) and both these directions (external model No. 2 of socially-oriented innovative enterprise, represented on Fig. 1). Such famous funds as Schwab Foundation for Social Entrepreneurship (Switzerland), Scall Foundation (USA), and Ashoka Foundation (India) determine the social entrepreneurship as innovative entrepreneurial activity for social transformations in the society and community.

Thus, it is possible to determine notions “social enterprise” and “socially-oriented innovative enterprise” as close to its meaning, with the main difference that SOIC includes innovative constituent.

The study of tasks of SOIC management supposes availability of special model, mathematical and computer instruments. At development of the model one or other theories or hypothesis owing to formalization and quantification become visible and accurate and this promotes to better understanding of the studied problems. Modelling makes the reverse effect on the researchers, requiring the preciseness of formulation of research task, strict logicity, and development of hypothesis and conceptions (Vorontsova 2008).

The process of economic and mathematic modeling goes through the following stages: identification of object, specification of model, identification and evaluation of parameters of model, establishment of dependencies between them, and verification. At that, this process is usually repeated many times, and with each cycle the model is defined more accurately, especially when it is related to the model, intended for practical calculations. In the last case, the additional requirements are made to the model on the part of technology of algorithmization and programming (Parakhina et al. 2014).

At mathematical description of economic processes or objects of management, it is appropriate to use the matrix apparatus. The matrix represents the table—such form of data record and results is, firstly, very visible; secondly, is convenient for introduction into PC; thirdly, operations over matrices work well for obtaining the economic results (Khudyakova 2002).

Rectangular table of numbers of type 1 is called matrix.

$$D = \begin{pmatrix} dep_{11} & dep_{12} & \dots & dep_{1n} \\ dep_{21} & dep_{22} & \dots & dep_{2n} \\ \dots & \dots & \dots & \dots \\ dep_{m1} & dep_{m2} & \dots & dep_{mn} \end{pmatrix}, \quad (1)$$

where  $dep_{ij}$ —real numbers ( $i = 1, 2, \dots, m, j = 1, 2, \dots, n$ ), called as elements of matrix, which reflect the contribution of subdivision in achievement of the set goal (solution of the planned task);

$i$  and  $j$ —according to indices of line (aims, tasks) and column (subdivisions).

At that, production of  $m \times n$  number of line for the number of columns is called the size of matrix  $D$ . The matrix (1) is often recorded in the shortened type:

$$D = \|\|dep_{ij}\|\|, \quad i = 1, 2, \dots, m, \quad j = 1, 2, \dots, n \quad (2)$$

In our case we use the matrix method in order to define the type of socially-oriented innovative industrial organization.

For determination of SOIC type it is necessary to build the standard social and innovative matrix. In each of them along the vertical line, aims of company are represented, and along the horizontal line—its subdivisions. The standard departments of average firm, in our opinion, are the following ones: staff department; sales department; information technologies (analytical) department; marketing

department; logistics (provision) department. It is also appropriate to single out separately the production, accounting and manager of the enterprise.

Taking into account that the management of innovative activity concerns the different areas of industrial organizations, it is possible to build several such matrices (D, C, etc.) and the apparatus of matrix adding was used for description of integrated system:

$$D_{mn} + C_{mn} = H_{mn} = \begin{pmatrix} d_{11} + c_{11}d_{12} + c_{12} \cdots d_{1n} + c_{1n} \\ \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \\ d_{m1} + c_{m1}d_{m2} + c_{m2} \cdots d_{mn} + c_{mn} \end{pmatrix}. \tag{3}$$

For comparison of contribution of each subdivision or ranking, establishment of priorities, extraction of the most meaningful aims and tasks, the transposition and multiplication of matrix is applied.

The matrix is built according to principle—the aims are located along the horizontal line (i element), subdivisions of industrial organization along the vertical line (j elements), and that can be transposed into matrix in which the subdivisions of industrial organization (j element) will be located along the horizontal line, and aim and/or tasks (i elements)—along the vertical line.

Transposition of matrix is designated as  $D^T$  or  $D'$ :

$$\text{If } D = \begin{pmatrix} dep_{11} & dep_{12} & \cdots & dep_{1n} \\ dep_{21} & dep_{22} & \cdots & dep_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ dep_{m1} & dep_{m2} & \cdots & dep_{mn} \end{pmatrix}, \text{ then} \tag{4}$$

$$D^T = D' = \begin{pmatrix} dep_{11} & dep_{21} & \cdots & dep_{m1} \\ dep_{12} & dep_{22} & \cdots & dep_{m2} \\ \cdots & \cdots & \cdots & \cdots \\ dep_{1n} & dep_{2n} & \cdots & dep_{mn} \end{pmatrix}.$$

Multiplication of the source matrix on transposition allows obtainment of new square matrix, reflecting the lines (i elements of matrix—aims and tasks) both along the vertical and horizontal line:

$$D_{mn} \times C_{nm} = H_{mn}, \tag{5}$$

in which  $C_{nm} = D_{mn}^T$   
i.e.

$$D_{mn} \times D_{mn}^T = H_{mn}. \tag{6}$$

Such matrix reflects the meaning of one or another aims and tasks of innovative activity of enterprises, and allows establishment of their priority, and level of social orientation of industrial organization, innovation of different areas of its activity.

Else as the lines and columns of matrix take part in the work of  $DC$  unequally and  $DC \neq CD$ , then at multiplication of transposed matrix into the source one, we'll receive:

$$D_{mn}^T \times D_{mn} = H_{mn}. \quad (7)$$

Thus, the new square matrix reflecting subdivisions of the company, which execute the innovative activity, was obtained both along the vertical and horizontal line. Such matrix reflects the contribution of each subdivision activity in holistic development of industrial organization.

For “narrowing of space” and concentration of “the leading innovation aims or separation of “basic” structural subdivisions, it is appropriate to use the method of analysis of conformities as a peculiar type of multi-dimensional of scaling, where for calculation of the closeness between objects the chi-square of space is applied, and each object is weighed in proportion to its mass. At that, it is necessary to use Kaiser Criterion explaining the inertia rate as a guide that allows separation of main components—the most important aims and tasks, as well as the basic structural subdivisions of the enterprise.

The standard innovative (matrix A) and social (matrix B) matrices of industrial organizations are shown in Figs. 2 and 3. They illustrate the content of each department in obtainment of aims of the enterprise. In order to avoid the overloading with unnecessary data, we excluded the other aims of industrial organization, except for social and innovative ones.

Analyzing the Fig. 1, it becomes obvious that the innovative criteria of estimation include the following aims of socially-oriented innovative industrial organization: creation of innovative products/service; usage of innovative approaches in its economic activity; development of innovation product/service by the consumers; commercialization of innovative product; investments of funds into external innovative products/services.

The pattern of matrix B (social) for determination of SOIC model is shown in Fig. 3.

We relate satisfaction of the staff with its work, labor safety/social package (guarantees), ecologically pure production/cost-effective resource usage; development of local community; social programs inside industrial organization to the social aims of the enterprise activity.

For each model of socially-oriented innovative industrial organization its own set of aims and levels of their implementation in the departments is typical. At that “0” means that the analyzed subdivision doesn't implement this aim of socially-oriented innovative enterprise; “1”—aim is achieved indirectly/partially; “2”—this aim is fundamental for the studied department. The points to each department are appropriated by the enterprise leader, in order that to enhance the effectiveness of SOIC activity in future.

	Staff department	Sales department	IT department	Marketing department	Logistics department	Production	Book-keeping	Manager
Creation of innovative products / service								
Usage of innovative approaches in its economic activity								
Acquisition by the consumers of innovative product / service								
Commercialization of innovative product								
Investment of funds into external innovative products / services								

**Fig. 2** The matrix pattern A (innovative) for determination of socially-oriented innovative enterprise type

Determining the significance of each for the analyzed type of socially-oriented innovative industrial organization, we'll do adding of points by vectors of matrices A and B (8):

$$A_1 = \begin{pmatrix} 0 & 0 & 2 & 0 & 0 & 2 & 1 & 1 \\ 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 \\ 0 & 2 & 1 & 2 & 1 & 0 & 0 & 1 \\ 0 & 2 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \quad (8)$$

It is determined that the most meaningful innovative aim for the built-in model of SOIC—is the usage of innovative approaches in the economic activity (16 points from 16).

	Staff department	Sales department	IT department	Marketing department	Logistics department	Production	Book-keeping	Manager
Satisfaction of the staff with its work								
Labor safety / social package (guarantees)								
Ecologically pure production / cost-effective resource usage								
Development of local community								
Social programs inside industrial organization								

**Fig. 3** The matrix pattern B (social) for determination of socially-oriented innovative enterprise type

Evaluating the content of each subdivision in achievement of aims for matrix A of built-in type of socially-oriented innovative industrial organizations, we'll add the values of vertical vectors (9).

$$A_1 = \begin{pmatrix} 0 & 1 & 2 & 0 & 0 & 2 & 1 & 1 \\ 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 \\ 0 & 2 & 1 & 2 & 2 & 1 & 0 & 0 & 1 \\ 0 & 2 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \tag{9}$$

Thus, the most important role in achievement of innovational aims is played by the sales department—it realizes the innovations and the department of information technologies (for 6 points) because it provides the uninterrupted work over consciousness and commercialization of innovations.

We study the matrix B of built-in model of socially-oriented innovative industrial organization in the similar way (10).

$$B_1 = \begin{pmatrix} 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 \\ 2 & 1 & 1 & 1 & 1 & 1 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 & 2 & 0 & 2 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 & 1 \\ 2 & 1 & 1 & 1 & 1 & 1 & 1 & 2 \end{pmatrix} \tag{10}$$

Obviously, the built-in model according to its essence is characterized by high complex innovative and social orientation, so has the biggest total quantity of points on both directions.

The general innovative and social effectiveness of departments of all types of SOIC is shown in Table 1.

The total values on all analyzed aims of socially-oriented innovative industrial organization, are shown in Table 1, analyzing which it is possible to conclude that the most effective model of SOIC from social and innovative aspect is integrated model of No. 2 (80 points) and built-in model (77 points). The most effective chain is manager (64 points), marketing department (51 point) and information technologies, and also production service (per 45 points respectively).

## 5 Discussion

Thus, modelling is based on the principle of analogy, i.e. possibility of studying of the object not indirectly, but through consideration of the other one, similar and more accessible object of its model (Boris and Parakhina 2012). At the mathematical description of economic processes or objects, it is very convenient to use the matrix apparatus. We use the matrix method of determination of SOIC type. For this purpose the standard social and innovative matrix was represented, along vertical line of each the aims of the company were represented, and subdivisions—along the horizontal line. The own set of aims and levels of implementations



**Table 1** General social and innovative effectiveness of basic types of socially-oriented innovation enterprises

		Subdivisions									
SOIC models	Totally along the whole SOIC model	Staff department	Sales department	IT department	Marketing department	Logistics department	Production	Book-keeping	Manager		
Built-in model	77	8	10	10	10	8	10	8	13		
Integrated model No. 1	57	7	7	7	7	7	7	7	8		
Integrated model No. 2	80	8	11	9	13	9	8	8	14		
External model No. 1	59	5	7	9	8	7	8	6	9		
External model No. 2	59	7	5	6	8	6	7	8	12		
External model No. 3	39	4	4	4	5	4	5	5	8		
Totally on all models of subdivisions		39	44	45	51	41	45	42	64		

in the departments are typical for each model of socially-oriented innovative industrial organization.

However, we consider that the offered matrix method of modelling of SOIC on the basis of statistical and research data should be added by the methods of measurement of latent variable. It is connected with that “among a number of possible methods, which implement the set aim of statistical processing of data, in combination with some other (more specified) basic ideas, this approach gives possibility to built sufficiently general model, within which it is possible to “establish order” in a number of existing algorithms” (Osipov 2003).

At that the factors above-mentioned and specified in matrices, which determine the SOIC type can be among statistically researched characteristics, and can be latent, i.e. directly statistically unobserved, but restored according to the source data.

Thus, in perspective for the development of technologies of study of holistic management of innovative activity it is appropriate to use the methodologies of measurement of latent variables, as the factors, determining SOIC are complex, indirectly observe, but “restored” according to the statistic data.

## 6 Conclusions

So, SOIC represented as the integration of traditional commercial firms, innovation and social enterprise, as the latter takes the social orientation of the innovative company and an innovative component of the commercial industrial organizations.

Socially oriented innovative company can call any (commercial and non-commercial) organization, whose activities are related to the implementation of socially important projects in the function of innovation, or on the contrary—the creation of innovations of a social orientation.

Socially oriented enterprises engaged in innovative activities, classified by the level of integration between the programs of social, innovation and business activity, affecting the selection of a specific business model of doing business innovation.

We separated the aggregate factors, characterizing the peculiarities of socially-oriented innovative enterprises:

1. acceptance of mission of creation and support for social value (good);
2. detection and usage of new possibilities for implementation of selected mission;
3. implementation of the uninterrupted process of innovations, adaptations and education;
4. decisiveness of actions, not limited by the available resources;
5. high social responsibility for the results of their activity.

We identified three main models of socially oriented innovative companies:

1. built-up model of SOIC is the activity of the enterprise, directed completely on implementation of both functions—innovative and social;
2. integrated model of socially-oriented innovative enterprise—innovative activity combines implementation of the social mission and expanding of business or coverage of operating expenditures (integrated model No.1) or emphasis is made on execution of social task at parallel execution of certain innovation at execution of economic tasks (integrated model No. 2);
3. external model (SOIC) is entrepreneurial activity directed for profit obtainment that serves the source of financing of social programs and innovations (external model No. 2), or entrepreneurial innovative activity finances of social programs (external model No.1), or socially active entrepreneurship invests money in innovations (external model of No. 3).

The result of activity of socially-oriented innovative enterprises can lie in provision of the additional mechanism of financing (social programs of industrial organization or coverage of operating expenditures through creation and implementation of innovations), and can serve the stable system mechanism of provision of social mission.

We used the matrix method to determine the type of socially oriented innovative company, that appear as result integration of social and innovation processes in industrial organization. For this purpose built standard and innovative social matrix. Every socially oriented innovative industrial organization has its own set of objectives and the extent of their implementation by departments.

Determining the value of each target analytic type of socially oriented innovative industrial organization adds the points on the vector of the matrix. Evaluation of the contribution of each division in achieving SOIC performed by summing the values of vertical vectors. Total innovation and social efficiency of departments of all types SOIC reflected in the totals for all the analyzed targets socially oriented innovative company (Pepper and Gore 2015).

In the future, for development of technologies for the study of holistic innovation management, it is advisable to use the methodology of measuring the latent variables as factors that determine the development of SOIC (they are complex and not directly observed, but they could be restored on the statistical data).

The research has shown that an integrated model SOIC is the most productive model, both in terms of achieving social and innovative goals, and from the point of view of sustainable development of industrial enterprises under the conditions of integration of social and innovative activities.

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# Using Economic and Mathematical Methods During Formation of Construction Cluster

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**Abstract** The article deals with the notion “economic cluster” and views the necessity for creation of clusters in construction industry. The author offers a hypothesis that cluster enables effective information exchange between its members, formation of integrated legal and financial environment, and development and promotion of single commercial strategy. As a result of the research, the author distinguished peculiarities, goals, and principles of formation of construction clusters which operate in the subjects of the RF. Special attention is paid to expediency of application of economic and mathematical methods during formation of a construction cluster. As a result of the research, the author shows that formation of a construction cluster is a possibility to increase the level of manageability of construction complex and effectiveness of interaction of economic subjects with the perspective of transition to innovational path of development, and strengthening of financial and economic situation in the region on the basis of application of economic and mathematical methods.

## 1 Introduction

At present, cluster approach becomes more popular in economic research. Probably, the term “cluster” was first used during formulation of the apparatus of cluster analysis of multivariable data in mathematics. That was in the late 1930s.

The founder of cluster approach in economics is M. Porter. He defined economic cluster as “a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and

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complementarities” (Porter 1998). M. Porter came to the notion of economic cluster from analysis of specific spheres of economy of one or another country in the global market.

Other scientists gave their interpretation of the term “cluster”:

1. Rosenfeld (1997, p. 4), Van den Berg et al. (2001, p. 187), and Enright (1996, p. 191) distinguish geographical aspect as the main one during formation of cluster;
2. Crouch and Farrell provide a general definition of “cluster”, supposing that this is a tendency of companies of one sphere for unification without any important reason of presence in this very sphere (Crouch and Farrell 2001, p. 163);
3. Roelandt and den Hertog characterize “clusters” as association of manufacturers and companies which are interconnected by production chain (Roelandt and den Hertog 1999, p. 9);
4. Feser considers that enterprises united into “economic clusters” are not just connected by production chain; clustering would allow them become more competitive (Feser 1998, p. 26);
5. Simmie and Sennett distinguished “innovational cluster”, defining it as “a large number of interconnected industrial and/or service companies having a high degree of collaboration, typically through a supply chain, and operating under the same market conditions” (Simmie and Sennett 1999, p. 51).

Definitions of “economic cluster” of foreign scientists could be united by the following principles: radius of transport influence, economic profits, and characteristics of workforce and agglomeration. By the middle of the nineteenth century, Russia had theoretical and methodological foundations, factors, and principles of economic zoning, within which specialization of region’s development is pre-determined by its resource-raw materials potential.

Cluster approach to analysis of economic phenomena develops and expands its limits. New and more precise definitions of economic cluster appear. However, the literature uses verbal models of economic clusters which are the studied by classic methods and do not allow building vivid dynamic economic & mathematical models of clusters.

## 2 Formation of Construction Cluster

A material basis of real estate market is a construction sphere, which consists of several cooperating spheres of material production and R&D works which ensure the construction. Construction sphere includes:

1. capital construction (construction production);
2. material and technical basis of construction (spheres which manufacture products and provide market services);

3. construction design (providing a possibility of professional functioning of construction production) (Kamenitskiy 2008).

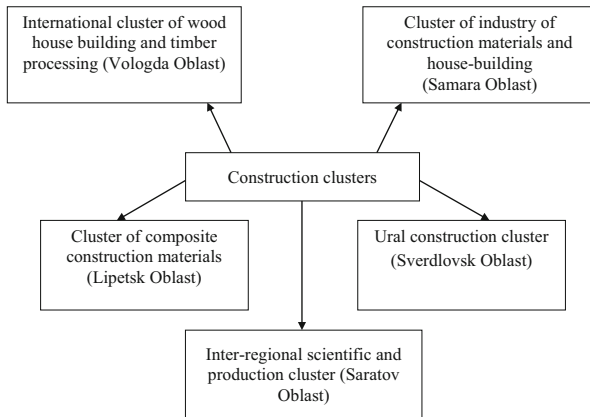
Viewing the necessity for creation of clusters in construction sphere, it should be mentioned that clustering stimulates improvement of quality of living standards, influences demography and processes of migration, and provides potential for the formation of region’s positive image.

Creation of clusters in construction sphere allows:

1. receiving additional financing of construction sphere;
2. reducing the cost of products and services for cluster members;
3. receiving more effective protection of legal rights and interests of cluster members at various levels;
4. reducing transaction costs of companies which appear due to opportunistic behavior of suppliers and rivals.

At present, five active construction clusters has been formed in Russia: Ural construction cluster, Inter-regional scientific and production cluster, International cluster of timber house-building and timber processing, Cluster of industry of construction materials and house-building, and Cluster of composite construction materials, Fig. 1.

Each cluster was created for different purposes—depending on the needs of the sphere and of the region. Territorial clusters of Sverdlovsk and Samara Oblasts aim for increase of competitiveness of construction complex and provision of the whole range of necessary materials. At that, the peculiar feature of the Ural cluster consists in aiming not only for preservation but for expansion of sales markets of products



**Fig. 1** Construction clusters in the RF (The Ural construction cluster. URL: stroycluster.ru; Program of development of innovative cluster of composite construction materials in Lipetsk region. URL: lipetskprom.ru; Program of development of International cluster of wooden house-building and woodworking in Vologda region for the period of years 2014–2020. URL: economy.gov35.ru; Development conception of construction materials and industrial house-building cluster on the territory of Samara region till 2020. URL: [www.minstroy.samregion.ru](http://www.minstroy.samregion.ru))



by means of Northern territories (Lavrikova et al. 2013). The Saratov and Lipetsk construction clusters have innovational character and aim for implementation of new innovational products in the sphere of construction, increase of products' competitiveness, and entering new sales markets. The goal of Vologda cluster is attraction of foreign technologies for the purpose of development of a new sphere of wood house-building and entering new sales markets.

Depending on the goals of formation of a cluster, there are different principles of organization of cluster interaction. For territorial clusters (Sverdlovsk and Samara), these are primarily territorial and sectorial concentration of economic entities for realization of large investment projects and combination of cooperation and competition; for innovational clusters—deep technological cooperation of cluster members, as well as innovativeness and technological nature.

Construction clusters are concentrated in the European part of the country and are located in the regions that are peculiar for a high level of development of construction complex. From the point of view of territorial structure, it is possible to distinguish cluster entities dispersed on the whole territory of the region (Sverdlovsk, Samara, and Lipetsk Oblasts) and examples of association of enterprises and scientific and educational organizations within several countries (Saratov and Vologda Oblasts). Thus, the members of Saratov cluster include enterprises from Kazakhstan and Belarus, and house-construction cluster of Vologda Oblast—construction enterprises from Finland.

Each cluster has its peculiarities which are shown in Table 1.

Viewing the systems of transfer and use of knowledge and innovations within functioning construction clusters, it should be noted that most of them suppose the purchase of progressive foreign technologies. Only in two clusters (Ural construction cluster and International cluster of wooden house-building and timber processing), the strategies of acquisition of new products for construction market and conduct of own R&D and design works are planned (Loshchenko et al. 2013).

The process of formation of construction cluster is related to a range of problems but it allows acquiring certain competitive advantages (Table 2).

**Table 1** Characteristics of construction clusters in the RF

Cluster title	Initiative sources of creation	Innovation component
Ural construction cluster	Business society initiative	Purchase of progressive foreign technologies
Inter-regional scientific and production cluster	Business society initiative	Conduct of own R&D and design works
International cluster of wooden house-building and timber processing	Government initiative	Purchase of progressive foreign technologies
Cluster of industry and construction materials and house-building	Government initiative	Purchase of progressive foreign technologies
Cluster of composite and construction materials	Center for cluster development of the region	Conduct of own R&D and design works

**Table 2** Problems and perspectives of construction clusters in the RF

Cluster title	Problems	Competitive advantages
Ural construction cluster	Lack of projects for technological development in a cluster and termination in development	<p>“Mega” cluster that allows realizing large investment projects. A “pioneer” in cluster development of construction complex. Presence of the largest inter-regional sales markets for cluster products. High resource provision of construction complex of the region. Initiative team of cluster development. Formed image of the cluster</p> <p>Presence of specialized cluster’s web-site. Lobbyism within sectorial and professional associations. Active interaction with sectorial and professional associations</p>
Inter-regional scientific and production cluster	Lack of competition between members	<p>Foundation of cluster—full technological chain of creation of innovational house-construction systems and technologies (all links of added value are present)</p> <p>Close cooperation of enterprises of machine building and construction complexes. Federal and inter-governmental level of cluster, inclusion into global chains of creation of added value in construction technologies. Initiative leader and trust between cluster members</p> <p>Active cooperation between sectorial and professional associations</p>
International cluster of wooden house-building and timber processing	Low level of personnel qualification, ineffective management of enterprise’s resources, low depth and effectiveness of raw materials processing	Vologda Oblast is among the leaders of the subjects of the RF for availability of timber raw materials. Availability of formed and sustainable sales market
Cluster of industry of construction materials and house-building	Information non-readiness of specific initiatives of a cluster and cluster leaders from business	<p>Accessible raw materials</p> <p>Effective demand for products</p> <p>Necessary infrastructure</p> <p>Support for public authorities</p> <p>Formation of fair competitive environment in the region</p>

(continued)

**Table 2** (continued)

Cluster title	Problems	Competitive advantages
Cluster of composite construction materials	Lack of potential large consumers and experience of use of cluster's innovational products, lack of personnel and specialized equipment	Availability of formed and sustainable sales market and sales channels, scientific and production base, cluster leaders, and cluster projects Variability and competitiveness of new product Possibility for quick and successive implementation of scientific developments

At present, marketing policy for promotion of construction clusters is not conducted properly. This complicated solution of a range of tasks before the cluster members: (1) positioning the cluster as one of the key points of growth of construction in the country; (2) creation and support for positive image of cluster in the investment society of the RF.

Besides, cluster enables effective information exchange between its members, formation of single legal and financial space, and development and promotion of single commercial strategy.

### 3 Methods of Construction Clusters Formation

Formation of construction clusters might stimulate growth of internal market and increase of international competitiveness. Like was said above, formation of construction clusters could be caused by various factors. Due to that, there appears a task of multi-criteria optimization which is solved by the methods of mathematical programming.

During formation of construction cluster, it is expedient to use the methods of successive concessions, as private factors (criteria) are ordered according to reduction of their importance. Thus, for example, the most important criterion is receipt of larger profit than before formation of the cluster. Then goes reduction of cost of products and services for cluster members, etc. Future members of the cluster can rank all the factors (criteria).

Let's assume that all private criteria are maximized and enumerated in the order of reduction of their importance. Let us find the maximal value  $Z_1^*$  of the most important criterion in the sphere of allowable solutions by solving a single-objective task:

$$\begin{aligned} Z_1(\bar{X}) &\rightarrow \max \\ (\bar{X}) &\in Q \end{aligned} \quad (1)$$

The, based on practical ideas and the set precision, the value of allowable deviations is set  $\delta_1 > 0$  (economically justified concession) of criterion  $Z_1$  and maximal value of the second criterion  $Z_2^*$  is found under the condition that the value of the first criterion should not deviate from its maximal value by more than the value of allowable concession, i.e., the following task is solved:

$$Z_2(\bar{X}) \rightarrow \max \quad (2)$$

$$Z_1(\bar{X}) \geq Z_1^* - \delta_1 \quad (3)$$

$$(\bar{X}) \in Q$$

The value of concession  $\delta_2 > 0$  is set by the second criterion, which—together with the first concession—is used for finding a relative maximum of the third private criterion:

$$Z_3(\bar{X}) \rightarrow \max \quad (4)$$

$$Z_1(\bar{X}) \geq Z_1^* - \delta_1 \quad (5)$$

$$Z_2(\bar{X}) \geq Z_2^* - \delta_2 \quad (6)$$

$$(\bar{X}) \in Q$$

The same procedures are repeated until the maximum value of the least important criterion for formation of construction cluster  $Z_m$  is determined—under the condition that the value of each of the initial  $m-1$  private criteria is different from the corresponding relative maximum by not more than the value of allowable concession for this criterion. The solution received at the last stage is considered to be optimal.

## 4 Conclusion

As a result of the research, it is possible to say that there appear new and more precise definitions of economic cluster. Formation of construction cluster stimulates improvement of living standards of the population, improves demography and migration processes, and provides potential for formation of region's positive image.

At present, there are five active construction clusters in Russia. Each cluster was created for different aims—depending on needs of the sphere and the region. Principles of organization of cluster interaction are also different—depending on the goals of cluster formation. Construction clusters are concentrated in the European part of the country and are located in regions peculiar for high level of development of construction complex. During formation of construction cluster, it is necessary to use methods of mathematical programming. Thus, formation of

construction cluster is a possibility to increase the level of manageability of construction complex, increase the effectiveness of interaction of economic subjects with a perspective of transition for innovational path of development, and strengthen financial and economic situation in the region on the basis of application of economic and mathematical methods.

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# Support for Cluster Initiatives in View of Development of Innovational Economy: Regarding the Issue of Legal Regulation at the Level of Subjects of the Russian Federation

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**Abstract** Detailed study of the global tendencies of state economy's transition to innovational type of development allows making a conclusion about active popularization of the phenomenon of economic clustering over the recent 15 years. Unification into clusters of small and medium enterprises has to become a decisive direction of realization of the strategies of perfection of particular spheres, which pre-determines priority of development of foundations of cluster theory as applied to territorial organization of production. Experience of the developed countries points at active application of cluster approach which has been used within study of the problems of competitiveness, in the process of development and realization of strategies and programs of development, and for the purposes of optimization of interaction of various subjects of large and small business. The same path was chosen by the Russian Federation. The Russian Government has taken a serious task of transformation of the structure of small business through increase of the share of small enterprises involved in the sphere of processing industry on the basis of sub-contracts with large

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enterprises. It is a serious reason for activation of cluster policy and scientific study of the issues of state and other actors' conducting the cluster development of territories. It is also a significant foundation for realization of attempts for determination of existing gaps in its regulation in normative and legal vector.

## 1 Introduction

Under the modern economic conditions, the business-structure of the society faces again a phenomenon of unstable markets. Their recessive state, which was often discussed in various types of scientific works, explains the behavior of financial and economic factors in the business vector of the global economy.

A nature of the crisis of capital efficiency decrease and the influence of its stagnation consequences on the development of enterprises under the conditions of absence of financial and economic environment were viewed in the works of M.L. Khazin and May B.A., Palley T., Pierewan, A.C., Tampubolon, G., Quiggin, J., which are based on the qualitative research of the structure and peculiarities of crisis developments of the modern day (Khazin 2008; Mau 2009; Palley 2012; Pierewan and Tampubolon 2014; Quiggin 2013).

Historically, optimization of crisis phenomena is connected to the phenomenon of clustering. Thus, the idea of cluster, which appeared more than a hundred years ago, belongs to Alfred Marshall (1890s), who considered that success of overcoming the instability of national economy depends on development of localized concentration of enterprises of similar specialization. The sources of specialization of commercial organizations in the author's works are resources, proximity of markets, or simply "historical incident". Marshall also introduced the notion "cluster atmosphere"—formal and informal customs, traditions, and practical interconnections between enterprises. All of them comprise the localized economic system that reduces the level of negative influence of crises.

One of the prominent founders of the cluster concept is Michael Porter. He offers four-factor "diamond" model, the systemic nature of which conforms to the process of clustering and creates geographical concentration of leading rivals in industrial spheres and intensifies cooperation between factors. Cluster approach is a new managerial technology which allows increasing competitiveness of a separate region and sphere or a state on the whole. M. Porter introduced the notion "cluster" into economic literature; he defined it as geographically concentrated groups of interconnected companies, specialized suppliers, service providers, and companies in corresponding spheres, as well as related organizations (for example, universities, agencies for standardization, and trade associations) in certain spheres which compete but conduct joint work (Lazareva 2010). Despite the impulse of popularization of the cluster concept, set by M. Porter, not all scientists accept it in his interpretation.

Cluster structures are interesting from the point of view of legal regulation of their formation and development at the state level. Thus, existing contradictions between the objective need for Russia's transition to innovational and socially-oriented type of

economic development, which is reflected in the program documents of public authorities until 2020 and existing legal regulation of innovational activities at the level of the Federation determined the authors' interest to study of this problem.

The main goal of this research is to solve the actual problems of legal regulation of innovational activities and cluster policy on the basis of analysis of the laws of the subjects of the RF and to develop offers for solving them.

## 2 Methods and Materials

The theoretical basis of the research includes studying and using scientific works of Russian and foreign authors in the field of economic clusterization. In this research the methods of logical and statistical analysis are used. Information-based materials are derived from the World Statistics Service and the Regional State Statistics Service, periodicals, scientific publications, conferences, and the Internet.

The subject area of this article is study of the development of clustering in Russia. It is related to the quantity of clustered companies, opportunities, and obstacles for this kind of business-activity in Russia.

In this research, a method of systematic approach was used. It helps to make a detailed review and constructive assessment of the general structure of the subject matter. The use of the descriptive aspect of the chosen method realization is motivated by structure of the modern economic environment, by dependence of its general condition on external and internal impact and crisis development and on the transformation of its content as the result of emergence of new accelerators of its new elements' development.

## 3 Results and Discussion

The concept of long-term socio-economic development of the Russian Federation until 2020, set by the Decree of the Government of the RF dated November 17, 2008, No. 1662-r, sets one of the direction of such transition as creation of a network of territorial-production clusters which realize territories' competitive potential.

Within this work, clusters are treated as complexes of enterprises (industrial companies, research centers, scientific establishments, public authorities bodies of different levels, etc.), formed on the basis of territorial concentration of networks connected by production and technological and other relations, and cluster policy is treated as a system of state measures and mechanisms of support for clusters which ensure increase of competitiveness of regions and enterprises of the clusters, as well as implementation of innovations (Popkova et al. 2015).

In the process of inter-country comparison, interconnection between the level of centralization of cluster policy and geographical size of the state was found: in small countries it is usually conducted at the national level, and in the large countries—at



the regional. At the federal level, the following peculiarities and problems of organization of management of scientific & technical and innovative activities are determined:

- plurality of subjects of managerial activities;
- managerial functions are realized—together with executive power bodies—by state scientific establishments and organizations, primarily, academies of sciences;
- there is no clear limitation of authorities between the subjects of management at the legal level—both vertically and horizontally;
- management of scientific and technical and innovational activities in a wide sense of this word is performed by all bodies of executive power which create its system, as, for example, functions of state customer of scientific and research work in its sphere could be performed by any body of executive power.

The following problems were determined as a result of analysis:

1. Problem of inter-departmental coordination of stimulation of innovational activities in the subjects of the RF.

Issues of state management of innovational development at the level of subjects of the RF could be assigned to the competence of executive power bodies in the spheres of science, industry, communications, etc. This makes the provision of inter-departmental coordination very actual, including for the formation of clusters.

In modern economic science, formation of a new function of state regulation of socio-economic processes in the region is substantiated—coordination of members of production process in the region, aimed at provision of integrity and sustainability of regional economic system.

At present, 17 subjects of the RF have the following bodies (coordination and expert councils, work groups, etc.). However, sectorial division is observed—in Kamchatka Krai, the Kabardino-Balkar Republic, the Republic of North Ossetia-Alania, Khanty-Mansiysk Autonomous Okrug, Murmansk Oblast, and Saratov Oblast, these bodies provide coordination of innovational activities and science, and in the Jewish Autonomous Oblast and the Chechen Republic—innovational activities and industrial policy and entrepreneurship.

It would be expedient to create integrated coordination and advisory bodies for industrial, scientific & technical, and innovational policy, as it is determined in the Chuvash Republic.

2. The problem of insufficient setting of cluster policy in the innovational laws of the subjects of the RF.

The analysis showed that formation of clusters is envisaged in the laws which regulate general issues of socio-economic development:

- laws which set the strategies of socio-economic development;
- in 11 subjects of the RF (Republic of Altai, Republic of Mordovia, Republic North Ossetia-Alania, the Chuvash Republic, Krasnodar Krai, Primorski Krai, Volgograd Oblast, Voronezh Oblast, Kemerovo Oblast, Lipetsk Oblast, and Penza Oblast);

- in laws which set the programs of socio-economic development in 23 subjects of the RF (Republic of Buryatia, Kabardino-Balkar Republic, Republic of Tatarstan, Udmurt Republic, Krasnodar Krai; Amur, Arkhangelsk, Bryansk, Volgograd, Voronezh, Irkutsk, Kaliningrad, Kemerovo, Lipetsk, Penza, Rostov, Sakhalin, Sverdlovsk, Tambov, Tomsk, Tula, and Chelyabinsk Oblasts, and Khanty-Mansiysk Autonomous Okrug);
- laws which set the concepts of socio-economic development of subjects (Novgorod Oblast).

This tendency is caused by the fact that the Requirements to the strategy of socio-economic development of the subject of the Russian Federation, set by the Decree of the Ministry of Regional Development of Russia, dated February 27, 2007, No. 14, suppose “development of production clusters”.

Studies of Russian economists prove that the technology of preparation of programs, the key element of which is correspondence to typical forms and requirements, presupposes appearance of rather formal documents.

Formation of clusters is envisaged by laws which regulate:

- development of small and medium entrepreneurship (Murmansk, Nizhny Novgorod, Orenburg, and Tula Oblasts);
- industrial policy and formation of industrial areas (Orenburg and Ulyanovsk Oblasts);
- increase of investment attractiveness and realization of top-priority investment projects (Kirov Oblast and Khanty-Mansiysk Autonomous Okrug);
- support for specific spheres: textile industry (Ivanovo Oblast), agriculture (Saratov Oblast), forestry complex (Tomsk Oblast), tourism (Ulyanovsk Oblast), external relations (Khanty-Mansiysk Autonomous Okrug).

In the laws that regulate innovational activities, application of cluster policy is not that widespread—out of 52 laws passes in 47 subjects of the RF, clusters are mentioned only in 2 (Altai Krai and Novosibirsk Oblast), which constitutes only 5.7 %.

The situation is better with programs, concepts, and strategies of innovational development (innovative activities) of the subjects of the RF (as of now, 29 programs, 9 concepts, and 2 strategies are realized) which are set by the laws and normative & legal acts of executive power bodies of the subjects of the RF.

Formation of clusters is envisaged in 11 of them, which constitutes 26.8 %.

Thus, an actual direction of improvement of legal regulation of innovative activities at the level of the subjects of the RF is legislative consolidation of the mechanisms of cluster policy.

### 3. Problem of information provision of innovative activities.

Under the conditions of modern financial crisis, the measures of financial and tax support of innovative activities cannot be used in full; due to budget deficit, many subjects of the RF reduce financing of corresponding targeted programs. That's why the measures of organization support, including information provision, are more necessary and applicable.

This problem is peculiar for investment and innovational development. The authors include into the reasons for insufficient development of investment process in the regions the weak information support during promotion of investment projects (while having projects, economic subjects are not able to independently find the potential investors). In our opinion, existing practice of information provision of depressive regions doesn't provide adequate idea on the quality of socio-economic processes that take place in these regions.

Out of 52 laws, passed in 47 subjects of the RF, only 11 (Altai Krai, Republic of Komi, Republic North Ossetia-Alania, Chechen Republic, Perm Krai, Voronezh Oblast, Irkutsk Oblast, Ryazan Oblast, Samara Oblast, Tula Oblast, and Tyumen Oblast) point at the necessity for information support for innovative activities, which constitutes only 23 %.

Very often, it is just declarative norms, unsupported by the mechanism of realization. For example, according to Article 13 of the Law of Voronezh Oblast dated December 11, 2003, No. 68-OZ "On innovational policy on the territory of Voronezh Oblast", development of the system of information provision of innovative activities is assigned to forms of state (oblast) support for innovative activities, but the law does not provide a mechanism of realization of this form. The situation with programs, concepts, and strategies of innovational development (innovative activities) of the subjects of the RF is better—information provision is envisaged by 18 of them, which constitutes 41 %.

Solving this problem would require distribution of positive experience of legal regulation of information provision of innovative activities of specific subjects (for example, implementation of forms of annual regional statistical observation over innovational organizations (Republic of Bashkortostan, Tomsk Oblast) and creation of lists of innovation active organizations (Tomsk Oblast)).

Legislative consolidation and implementation of new forms of information provision that allow determining and forming innovational clusters are also important. Thus, it is necessary to form innovational process in the country by the principle "based on technological demands". It is not perspective to finance the development of technologies and then solve the problems of their practical realization. The technologies themselves should appear as a respond to the practical demands. If anything could be changed here, the results might be really impressive. The minimum program for the state in solving this problem is formation of corresponding information resources of generally accessible character.

A rather interesting experience could be universities' conducting monitoring of needs of organizations for specialists of economic profile and scientific & consultation services.

Thus, bodies of executive power of the subjects of the RF can form information resources by the principle "demand for innovations" of commercial organizations which work on the territory of corresponding subject and determination of subjects of innovative activities (universities, scientific organizations, etc.) which can satisfy these needs. This would ensure formation of innovational clusters.

This mechanism of information provision should be set in the laws of the subjects of the RF which regulate innovative activities.

#### 4. Problem of protection of competition during realization of cluster policy.

During the process of realization of cluster policy, public authorities of the subjects of the RF and local administration can pass normative legal acts which contain recommendations for enterprises, establishments, and organizations of the subject of the RF (municipal entity) of all ownership forms and for individuals during conduct of certain types of activities—regarding application of equipment manufactured by enterprises of the corresponding cluster. Such actions could be qualified as discrimination conditions (conditions of access to commodity market, conditions of production, exchange, consumption, purchase, sales, and other transfer of products), at which an economic subject or several economic subjects are put in unequal position as compared to another economic subject or other economic subjects—Clause 8 Article 8 of the Federal Law “On protection of competition” dated July 26, 2006, No. 135-FZ.

It should be noted that according to Clause 1 Article 13 of the above law, such actions could be deemed admissible if their result is or might be improvement of production or realization of products or stimulation of technical and economic progress or increase of competitiveness of Russian goods in the global commodity market.

For the purpose of prevention of possible collisions in the above situations, it is necessary to define in the federal laws (anti-monopoly and the ones that regulate innovative activities and realization of cluster policy) the balance of corresponding interests.

Thus, on the basis of analysis of laws of the subjects of the RF and the recent studies on economic and legal science, the actual problems of legal regulation of realization of cluster policy in the subjects of the RF were determined, and the ways of their solution were offered.

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# Methodology of Complex Evaluation of Eco-Economic Effectiveness of Agricultural Clusters

Yuri A. Kozenko, Konstantin Y. Kozenko, Yulia S. Rogoleva,  
and Svetlana V. Zemlyanitsina

**Abstract** Aggravation of ecological problems in agriculture leads to necessity for formation of a new scientific approach to evaluation of eco-economic effectiveness of the use of agricultural lands and formation of irrigated agriculture clusters. Insufficiently systemic approach to consideration of a large number of ecological risk factors during formation and development of agricultural clusters leads to economic problems—primarily, due to reduction of soil fertility.

Solving the issue of systematization of the above characteristics allows describing any complex eco-economic system, including the complex of ameliorative measures. Therefore, the paper offers the methodology of unified evaluation complex for assessment of investment projects related to amelioration.

Possibility of integration into a unified model of key indicators of the project, reflected in the form of quantitative evaluations that characterize the project at a certain moment allows realizing the task of building a systemic interconnection of quantity and quality of conducted ameliorative measures and evaluation of expenses for them. The developed graphical model of a unified evaluation complex allows for qualitative assessment of economic effectiveness of the project and the volume of expense for creation of the project on the whole and of its specific elements.

## 1 Introduction

Necessity for intensification of agricultural production and aggravation of ecological problems in agriculture require development of a new scientific approach to evaluation of economic effectiveness of the use of irrigated lands. As a result of

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ameliorative measures, the main components of agricultural landscape suffer significant changes, and the structure, integrity, and functioning of biotic and abiotic components change too. In its turn, violation of main attributes of natural landscapes is accompanied by violation of ecological balance of natural systems which, under insufficient accounting of a large number of risks, would lead to economic problems—primarily, through reduction of soil fertility.

This situation could be solved by expanding and supplementing standard forecast instrumentarium of investment projects in agriculture (2003).

## 2 Materials and Methods

Methodological basis of the research of eco-economic problems of development of agricultural clusters is synthesis of methodological approaches and theoretical provisions, developed in the works of Russian and foreign economists who studied economic laws and made efforts to balance organizational and economic elements of the system for the purpose of prevention of crisis situation or weakening their consequences.

During development of theoretical aspects of this work, the authors used systemic approach to study historical experience of economic organization of agricultural enterprises, ecological evaluation of their influence on environment, and creation and maintenance of ameliorative systems. Methods of comparative, structural, and functional analysis were applied, as well as methods of expert evaluation and matrix & analytical research.

## 3 Results

During development of theoretical aspects of this work, the authors used systemic approach to study historical experience of economic organization of agricultural enterprises, ecological evaluation of their influence on environment, and creation and maintenance of ameliorative systems. Methods of comparative, structural, and functional analysis were applied, as well as methods of expert evaluation and matrix & analytical research.

During formation of agricultural cluster and development of investment projects of its enterprises or of cluster's production infrastructure, a range of optimization tasks is solved: reduction of production costs, maximization of profit, and rational use of resource potential. Various evaluations are used during solving these tasks: products, production factors (labor, land, capital) which characterize contribution of production factors into its final economic results.

Solving the issue of systematization of the above characteristics allows describing any complex eco-economic system, including the complex of ameliorative measures. One of perspective directions of this is formation of the methodology

of unified estimate complex, for its application to tasks that emerge during development of investment projects related to amelioration (Kozenko and Kovalev 2015).

Solution of this problem is related to necessity for development of a special indicator, which, having its own scale and measure, could become a tool of systemic integration of main parameters of the project.

The categories which are operated by the economy are very blurred and are far from numerical certainty. For example, cost is an abstract category: costs of abstract labor. Price is also a conventional value: a measure of labor expressed in money. Money are subject to inflation and depreciation—so to calculating money the same was as values are calculated in mathematics, i.e., in a certain numerical value, is possible only in very narrow tasks, limited in time.

Economic theory has such a notion as utility, but this indicator also has an estimate character close to cost as to the level of abstraction. These notions could be the basis of a certain economic theory, but they cannot reflect fluctuations of demand and offer in the form of numerical values. That's why, from the practical point of view, indicators without strict scale and clear dimension cannot be deemed substantiated.

The value “consumer cost” depends on quality of good or service, but quality is not subject to clear and categorical evaluations and also has an estimate character. At that, quality, as a totality of significant attributes of an item, could be lost in the process of its use. The process of measurement of consumer costs depends on the process of consumption, intensity of consumption, and observation of rules and terms of consumption. Quality and consumer cost are multi-factorial indicators that change in time and make evaluation of their value monitoring, not a one-time measure.

In this situation, building a model of single estimate complex is based on the fact that the main characteristics of investment project of amelioration of agricultural lands as a system of eco-economic indicator are the following groups of parameters:

- quantitative characteristics;
- qualitative characteristics;
- characteristics of expenses;
- characteristics of externalities of ameliorative project.

The proprietary approach consists in the attempt to include into one graphical model all substantial characteristics of the product expressed in the form of specific scores that characterize specific product in a certain moment of time. At that, if any of these characteristics is changed with time, there's a possibility to visually track this process, observing the general state of the model in dynamics.

The approach to creation of a unified estimate complex has several equal characteristics united into a single model which moves with the change of at least one parameter of this model.

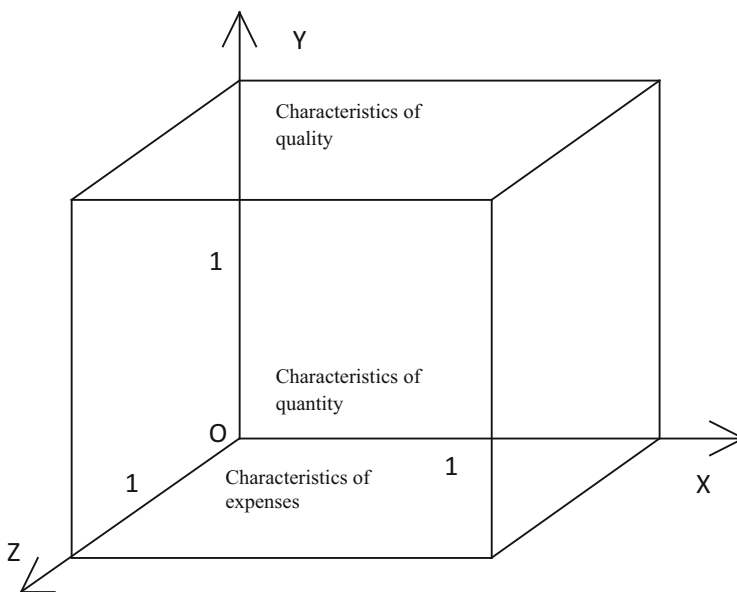
As a result, we have a model in which it is possible to track graphically the change of price depending on the change of any components of the general model of the unified estimate complex.



Thus, there's a possibility for integration into one graphical model of all substantial characteristics of the project expressed in the form of specific quantitative evaluations that characterize the specific project in a certain moment of time. If any of these characteristics changes with time, there's a possibility to track this process visually, observing the general state of the model in dynamics. Thus, integrated evaluation of main parameters of the project is realized, which systematically connects evaluation of the quantity and quality of performed ameliorative measures and evaluation of costs for their conduct. Graphical model of the unified estimate complex allows evaluating economic effectiveness of the project and volume of expense for creation of the project on the whole and its separate elements.

For clarity, let us present a three-dimensional cubic model with three edges that come out of one point in the form of three-dimensional axes (Fig. 1). Sides of this cube reflect qualitative aspects of the project. One of them opens purely economic effect of the project, the second one—perspective ecological consequences, and the third one—capital investments. Quantitative indicators are reflected in three-dimensional system of coordinates, visualized in the image of internal volume of represented cubic model. Thus, there's a possibility to unite in one system of coordinates various characteristics which are heterogeneous by their sense but which belong to the same project.

Quantitative estimate characteristics could be presented in the form of units, units fractions, or a certain number. Quantitative evaluation corresponds to one of the axes—e.g., X. In this case, indicators of quality are shown in Y axis Y. An



**Fig. 1** General model of three-dimensional expression of indicator system

important aspect is difference between dimension of X and Y axis. While indicator on the X-axis is a quantitative evaluation, expressed in physical units, measurement of quality cannot be so unambiguous. For convenience of operation of quality evaluations of heterogeneous indicators, let us assume that the model value of quality is one. Thus, 1 (unit of quality evaluation) is a model of quality of the product of such type, or quality evaluation equal to 0.5 (half of quality evaluation that is equal to 1) shows that the value of quality of the realized quality has the value of quality that is equal to half of the model estimate value. Z-axis is thus an integral indicator that reflects influence of quantitative and qualitative indicator on general costs of investment project.

Now we approached the key moment and reproduce the provision which is not traditional. It says that product of all estimate characteristics, set on axes, gives a certain integrated cost characteristics (Kozenko 2002a, b), expressed by money value.

So, one cubic model combines in a certain order certain characteristics of the product on the basis of the fact that all these characteristics belong to one product and one graphical construction that could be presented as a single system that evaluates all main characteristics of the product in a certain moment of time.

Broadly speaking, it is possible to view a specific project, creation of which required socially necessary labor, acknowledged by the market in totality of buy and sell acts. A graphical representation of the product in a public form (as a triangle) was done by V.N. Ovchinnikov and G.A. Serikov in their joint work (Ovchinnikov and Serikov 1986).

Let us view the edge created by quantitative axis and the axis on which evaluation of cost components is set (costs related to quantity, regardless of indicator quality).

Thus, we have a model in which is it possible to visually track the change of price depending on changes of any component of the general model. At that, this model is integrated evaluation and a certain value that has a certain numerical value. With observation of the rule of equivalence, it is possible to use other variants of cost values that could be used for measuring a certain cost basis.

## 4 Discussion

In respect to agricultural clusters and evaluation of eco-economic effectiveness of investment projects of a unified estimate complex, it will have the following form: setting a unit on X-axis that denotes quantitative evaluation of project indicators; setting a unit on Y-axis that denotes evaluation of expenses for project realization; setting a unit on Z-axis that denotes evaluation of project quality in which ecological parameters are integrated—for example, negative externalities which could lead to economic damage for the economic subject in the form of compensation payments, expenses for land recultivation, etc.

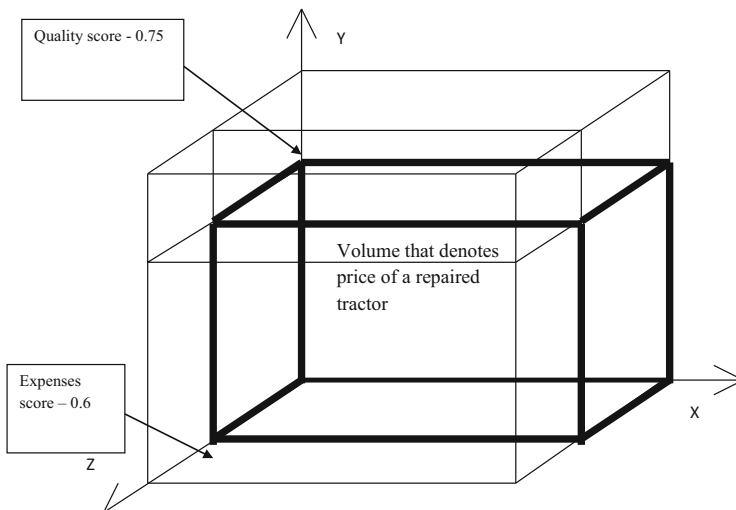
Assuming that in the process of realization of the project, quality of the used technologies of amelioration and agriculture were not taken to the planned project indicator of 1.0, and final value of indicator quality on the basis of expert evaluations integration constitutes 0.75. Due to unpredicted financial difficulties, expenses were below the project indicators and reduced their integrated evaluation of expenses to 0.6. Quantitative indicator of 1.0 remained unchanged.

Applying the methodology of calculation of the price with the use of the model of unified estimate complex, let us determine the cost of investment project for development of agricultural cluster.

This example is given graphically in Fig. 2.

Let us assume that inflation led to change of money price for the product which already had money price before the inflation changes. According to the model's logic, if the product preserves its quantitative, qualitative, and expense characteristics unchanged, its volume component cannot be changed by its cost expression. That's why the final number, expressed in money changed by inflation, should be corrected by the corresponding coefficient, or it should be expressed in another monetary unit that remained unchanged. This is the only way to preserve totality of indicators, reflected by the unified estimate complex, unchanged and only under such conditions will it be able to perform its functions of a certain firm and sustainable economic characteristic.

With listing of all possible actions during deviation of certain parameters up to automatic clarity, with observation of special rules of introducing the correction, numerical expression of a unified estimate complex will be a tough landmark on the basis of which it is possible to build relatively long-term economic and anti-crisis strategies.



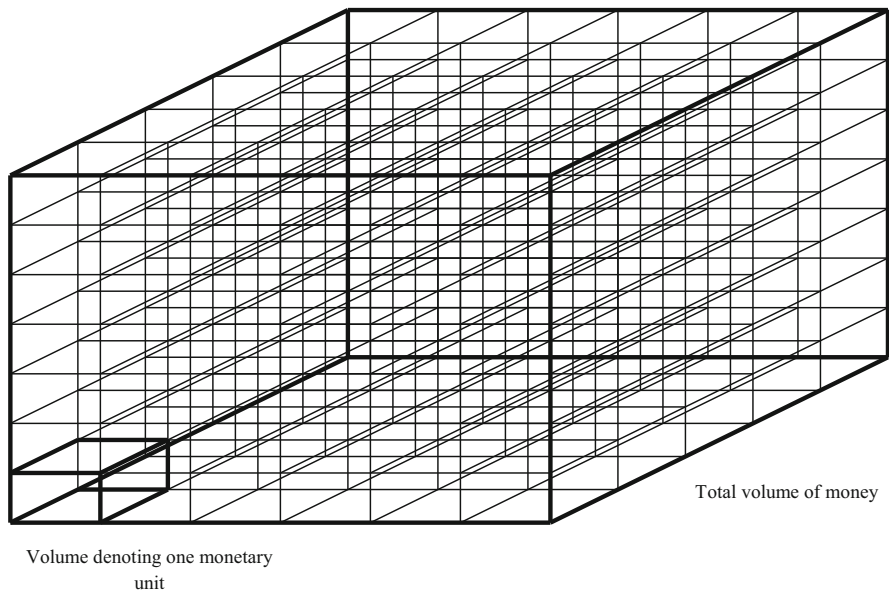
**Fig. 2** Example of the use of three-dimensional model of project's indicator systematization

This example shows an essential possibility for using the reassessment of cost components into more proportional cost basis, which does not exist in reality but is very stable. The model of the unified estimate complex opens wide possibilities for using such approaches, including in crisis situations of the most serious level. The thing is that destruction of a correct construction could be caused only by conscious incorrect actions. For example, with a certain change of quality as a result of improperly conducted ameliorative measures, it is possible to incorrectly evaluation the remaining level of quality. However, fixing all actions for change of a certain characteristic of a unified estimate complex, it is possible to find incorrect actions, as general change in the model is divided into fragmentary changes which are fixed and tracked by special characteristics that are responsible for these changes.

Unchanged quantitative and qualitative characteristics of the viewed products ensure equality of their cost foundations regardless of the time and state of the market. Any deviations from this equality should be considered conjunctural, temporary, and the ones that characterize price disparity.

Let us imagine a strictly ordered location of other cubes, added together in single order into a bigger cube or parallelepiped, constructed of smaller cubes. Let us expand the model to several thousands of cubes, strictly ordered, and let us denote the volume of this construction with a certain money value.

Let us express a certain sum of money through a certain volume in physical meaning of this word. An essential possibility of this expression, even without specific characteristics of the products, is represented in Fig. 3. It is necessary to



**Fig. 3** System of accounting of resources through totality of money and physical volumes

note that it is the simplest one of the whole complex of possibilities that are opened due to using the model of the unified estimate complex as a certain interconnected system.

The described model of the product is one of the possible spheres of potential application of the unified estimate complex. Another aspect of application of the unified estimate complex is a possibility to measure significant parameters of relations: public, production, economic, and interpersonal—which are related to evaluation of performed or expected expenses and efficiency of these expenses in interconnection with their quantitative evaluation.

Thus, totality of volumes creates a construction that unites into one complex a certain cost basis, expressed in money; we receive a certain model that could be assessed in other indicators as well. Based on this, depending on labor costs and accessible data, it is possible to build a system of accounting of all types of resources of agricultural cluster, a separate agricultural enterprise, production sphere, or state on the whole.

Let us view the potential of the unified estimate complex as a possibility of accounting of existing or changing production relations.

Thus, evaluation of acceptable volume of expenses, after the quantity unit and quality unit, is denoted by a unit as well, but these units are totally different. The first unit reflects quantitative component of the model, or quantitative characteristics. The second unit reflects the indicator of acceptable level of quality, or totality of qualitative characteristics. The third unit reflects cost component or totality of cost components accounted for these relations. By multiplying these units, we'll receive the value of a certain volume.

We multiply not quality by expenses and quantity by quality but evaluation of these parameters. By making their dimension so it is possible to multiply them, we receive a dimension expressed in money. It is not money is the usual understanding of this word but money evaluation of a certain cost basis—competitive price, determined in accepted money in a certain period of time.

Summing and interconnecting these characteristics, plus price characteristics that expresses volume created by edges, are a unified estimate complex of the viewed service. We have a cube in which maximum of significant characteristics is reflected which describe first economic relations in the history of the created enterprise when it receives quantitative evaluation for the first time. Furthermore, these relations, connected to this specific enterprise, will grow and take slightly changed forms.

## 5 Conclusions

Thus, the most important feature of the offered model is its fractality which allows for quantitative and qualitative evaluation of the planned ameliorative measures in scale of specific husbandry and at the level of a region. Visually, the complex of conducted measures could be presented as a totality of cubic models that reflect

separate blocks of expenses for territorial or technological division. Let us imagine a certain volume of money assets as a certain sum that will be used for ameliorative measures in the scale of a certain territory during a certain period. Formation of private models inside this general model will show the ratio of the volume of necessary and received assets, and, during building the mathematical model, will allow testing it and modeling various scenarios of development in dynamics, including the ecology-related negative externalities and economic consequences of their cupping. Apart from other advantages, this provides such important applied results as a possibility for building more diversified and deep financial project model than the one envisaged by traditional financial modeling according to the UNIDO standard.

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# Political Existence of the System of Social Space-Time

Elvira R. Gatiatullina, Elena I. Polyakova, and Alina N. Khasanova

**Abstract** Politics is interpreted as an activity that regulates social time and space (STS), and the peculiarities of the mechanisms and processes of STS are considered in the general context of society's civilizational and political history.

In this aspect, every epoch is characterized not only by its own “design” of STS and the range of political chronotopes, but also by the peculiarities of their forming and the peculiarities of social identity. It should be mentioned that in pre-industrial societies the structure of STS, the range of political chronotopes and their geopolitical hierarchy are determined primarily by natural-geographical factor (population and territory size, resource potential). In industrial society, it is determined by the level of technological development. In modern world, the specificity of social time and space is determined primarily by the variety of person's identities of political and cultural self-identification and by the scale and level of involvement of “the virtual” in society's social and political objective reality. In this context, projective and virtual transformative individual and social minorities' activity become the dominant process of forming STS and regulating political objective reality.

## 1 Introduction

The thought about the politics in the modern complicated world escapes from basic macro-cognitive optics, based on categories: Society, Country, Capitalism, Democracy, Liberality, Alienation, Modernization, Archaization, Globalization, and that this methodological challenge demands answer becomes keynote of discourses in relation to the political being and horizon of political science development (2012). Characteristically that political science in searching for ways for defeating its categorical methodology insufficiency mostly turns to sociology, its ideas and

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explanation potential. Ideas of being flowness (Bauman), symbolic capital (Burdie), informational society (Castels), society of communications (Luman), globalization of world and risks (Beck), creative society (Florida), express different sides of social reality and forms of social process become (became) dominants of interpretation models of political sciences.

But with the entire popularity of these conceptual ideas they are not without reductionism and must be supplemented by holistic reality measures. For instance in “Social time and space” (STS) category should express all sides of social being.

Appealing to united forms of social being is updated by one more obstacle—absence of modern scientific portrait of society which could be accepted by social-humanitarian sciences. Before it was doctrine of Marks. However if you understand politics as a “complex of social practices and discourses, directed to form, develop and investigate legal and moral norms; forms of governments; relations and authority institutions”, it is evidently nothing more than a method and a way of social being regulation. In this point of view political obviously cannot be considered without Social Time-Space and problematic of STS is equally addressed to philosophy and to political science. Growing activization of researchers’ attention to problems of Political Time-Space methodology tells about it (Prokhorenko 2012).

## **2 STS Theory Genesis as an Aspect of Political Philosophy and Epistemology**

Intentions, methods and actual problematic of Laws of cognition are determined by the social and cultural in the widest meaning, i.e. dominating on this historical stage trends of cultural and civilizational progress, social practice forms (including political), which in unity and integrity are expressed STS categories. In the meantime the semantic contents operability of this category are determined by the highest modern level of cognition, existing paradigm set of ideas and explanation of scientific machinery. As a result we get vicious circle of methodology, breaking which (if it happens) means not only new step/stage in social cognition (and in semantic content of STS category), and in evolution of social regulation wheels, forms of social being. In retrospection, it can be tracked easily.

In the Age of Enlightenment—in the time of epic social transformations and rising of science appears the problem of social time and social space. Before in the cognitive practice there wasn’t distinguishing of casualty mechanisms in the world of the nature processes and the society. Ancient philosophy as known used “macrocosm-microcosm” models spreading natural principles and laws on the society and in the middle Ages casualty reduced to the God. Viko, in whose ideas refracted his time ideas and processes, persuasively demonstrates, that wheels of social phenomenon determination are evidently different than in the nature and



such wise gives for the arena of cognition and philosophical reflection problem of the social space and the social time (Thagapsoev and Gatiatullina 2011).

Subsequently in the context of complex and contradictory processes of industrial capitalism establishing problematic of STS gains actuality goes out in the field of attention of sociological science. For instance G. Zimmel introduces idea about heart and forms of STS, which in the future gets different development in works of Rickel, Parsons and Brodele. But if Zimmel's social time and space are "Pure forms" (in the way of Kants a priories), on the base of which possible (and must be) comprehension and describing of reality (social and politician), then in the works of Rikkert it tells about cultural space, "which raises Man above nature and his biological roots". And to Parsons, he interprets STS as a system of stratifications and measure of their evolution, i.e. as forms and measures of social evolution, emphasizing their interdependence of social space and social time.

In turn Brodel invents in science terms "Time of big longitivity" and "Structures of routine" i.e. expanding methodological horizons of STS categories usage and demonstrating high operationality of STS category not only in sociology, and in historical science.

However Marks works in original form relies on idea of STS. Here STS are classical structures and sum of public relations which gain integrity, typological forms and dynamics in socio-economic systems and their periodic change. In this context everything in political being of society is caused by socio-economic systems and laws of its evolution.

Stated conceptions with all formulated differences are same and unified in one thing—they fit principles and logic of classical science i.e. interpret STS as ontological constant of society which can be described as a set of structures and their linear evolution in time, "On the way of progress". Thereby Man in this conception is shown just indirectly in super individual structures (over structures and institutions as reference of structures), pressurize Man and "making limits" for his activity. Within frames of such interpretation of STS the political wheels cannot be anything else than forms of coercion.

New stage in STS comprehension (one more breaking of "methodological circle") give ideas of A. Bergson which accordant with principles of existential philosophy and generate by "the Phantom of disappointment" in rational mind in conditions of social disasters social chaos in the first half of twentieth century by First World War and following wave of crises, revolutions and civil wars with all problems for political being for Man.

Bergson assumes STS are the life functions, condition and form of "the vital impulse" (Polyakova 2015). With such understanding STS close up and submissions of P. Burdie, tractating social space as part of a human "currency field", created by habitus—normative system of social activities determined by culture and broadcasting social experience from Man to Man. From previous generations to the next. Thus Bergsons and Burdies social space is not only the outer condition, but the function of society being (of the man) and existential form—field of interaction and society members' cultural mental exchange. In the developing of these ideas

P. Shtompka underlines four levels of this characteristic existential field which “encircle” man and his interior space, firstly:

- field of ideas, beliefs and definitions;
- field of norms, regulations, prohibitions and restrictions;
- field of communications and interactions;
- field of resources (opportunities) (Shtompka 2005).

Conceptions of STS by Bergson, Burdie and Shtompke are the new level in comprehension of STS and in the meaning that they suit the logic of the neoclassical science in which frames nature and society are seen (and interpreted) as a complex system subject to numerous emergent processes dependent of personal factors. Such comprehension of STS requires multiple forms of social and political being, thus multiple forms and methods of social management: from economical motivation and justice regulation to the social self-organizing and the social autonomy.

In 90-s in context of social transformations of social being and making of the Russian political science problematic of STS in our homeland expectedly gain actuality what can be seen in the works of Andreev, Vengherov etc. Again has been proved the regularity: when during the cognition processes is seen that changed socio cultural context (social and political being) doesn't fit theoretic methodological frames—in this case frames of historical materialism—opens new way to the new level of social cognition, opening new views of structures, processes and mechanisms of social being (and genesis of STS) make doubtful forms and wheels of political being.

Without details let's note that during polemics in 90s was underlined: political time-space is a part and an aspect of STS. In the meantime was stated that political time-space executes functions of ordering and organization of political life, designing and institutionalization of political deeds and processes; express multilayers of political life and discontinuity of political being time. By this logic the STS as before kept being outcast in relation to the man as “territory of political spreading” term and background of political being and its processes, i.e. polemics is not a “new milestone” in genesis of the STS theory. Anyway and Russian political practice in 90s is not a standard in political being genesis. But since that time has changed a lot in socio political being and political sciences.

The modern civilizational situation since end of the 80s—beginning of the 90s changes quite intensively and dictates necessity for new views on the STS. In the conditions of globalization and nonstop transforming of all aspects of human life, STS analysis methodology on the base of regular structure-ontological categories (geographical space, type of the civilization and the culture, political system, social class structure of the society, judicial, authority, and management institutions) as it was underlined loses efficiency. Nowadays condition of civilization is anything but “threshold” as a herald of the change of all human being forms from economic and technological to socio cultural, existential and anthropological. Respectively the major measures are scales, rates and diversity of the changes (processes) by which are covered all aspects of man life: culture, technology, semantic practice, social

organizing, political processes, and communicative relations. In the meantime the dynamics and radicalism make problematic to express their heart, on this claim lots of definitions: postindustrial, informational, society of creativity, post economics era, “society of knowledge” and even “post human era”. And this “escaping from cognition” process of qualitative changes in being is up to break before everything else over “social space” and “social time” categories, their meaning which try to solve ideas and approaches of U. Beck, M. Castels, and R. Florida etc.

Castels assumes that if subject is the modern society which he determines as informational, STS cannot be considered as an outer form of society existence because now “STS is the society”. Castels form of social space is physic geometrical metrics, not the social institutional structure but the streams and the structure of the cargo, money, streams, raw materials, labor, and information streams. Actually Castels fixes the new architectonics and dynamics, new trends of STS. By the way special place in his theories keel social nets. Only here (in the nets) space loses its physical and geometrical dimensions and time becomes the absolute unit of the space. But this space can be compared only with ideal, with mind products. Indeed assurance that the social net is firstly a mechanism of production of meanings and the space of exchange. That means a mechanism of generation and legitimation of forms of sociality and social relations which determines the STS now is widespread.

### 3 Identity as a Measure of STS and Political Being

To the contained should be added one more obstacle: in the contest of the modern globalization social being gains permanently changing character, and all the measures of society and STS like economics (market, private property, stock exchange, shares, e-money), consumption (consumerism) and also mechanisms of socio cultural communication and the ways of interaction (the Internet) become widespread “trans dimensional”. In these conditions features of architectonic of STS are expressed not only with sets of the legitimated by time ontological structures (social, institutional, artifact) and their temporality but the changing and divers flow of meanings, information, cultural and political situations, innovational technologies, behavior strategies and lifestyles which require identification, verification and legitimation.

In this context operability of STS is under a question without supplement of “Identity” category. On this obstacle indicate other authors. Just specific and interpretational arsenal of identity allows reflecting specifics and nuances of the “flowing” social time and “transformational” social space of our era and the most important compare STS and its aspects (economics, culture, communication, religion, social psychology and the political space) with the man and the forms of his activity. There is political being in these relations, its forms and mechanisms (Polyakova 2014).

Let’s explain it on the examples. Features the social being of the era as known find reflection in the personal identity of people, social actors because human

identity is variant of aggregation constellation by individuality (in the individual) being meanings, cultural forms and sociality, motivations to actions, valuable positions, and behavior patterns “here—now” in this historical period. But the personal cultural forms of cultural being became possible just with early forms of European capitalism and on the previous stages of history the man keeps being (and he has to continue) in the frames of socio cultural identity, given with birth—with class identity, religion, ethnicity. Thus supporting and reproduction—sacral social identity make the meaning of the social and the political being in preindustrial societies. In this situation socio spatial society specifics determine mainly geographically (in the wide meaning) and the markers of the local culture to which it belong. And the political being of the society its forms and mechanisms have “canonical character”—serve to save their “sacral” identity and its STS and spreading of its geography.

But with evolution of capitalism, differentiation of forms of activity and structures of the society develops new paradigm type of social identity,—“transformative”-reflective appearance of choice, social escalators, and variations of the motivations of professional and cultural of the individual self-determination. And progress is the major goal of the industrial society is comprehended as a growth of the material artifacts diversity and evolution of social identities spectrum and the ways of their regulations. As a result development of social being and STS structuration are made not because of only geographical factor (it’s value is graded and removing by the way of industrial infrastructure development, diversity and efficiency of transportation and communications) or local culture specifics and by the industrial technologies and the artifacts they produce and the growth of the social identity diversity which now is shown in a lot of works.

It’s clear that in this context political being (space) thickens and the identity of its forms and mechanisms gain great variety of characters: unions, parliament, elections, political parties, and labor movements, etc.

As was mentioned civilizational situation changed radically during the second half of the twentieth century. In the context of the new types of communication development forms new modus of social identity which can be determined as “communicative-spectral” because expresses universal (mental, value orientated, professional, behavioristic, cultural, and spatial) man’s mobility and the major role of the informational streams and the communicative pressure in his life (Tkhagapsoev & Gatiatullina 2012). The matter is right now against the stable existence of personal identity work almost all the forms and wheels of informational man’s being: market, the Internet, mass culture, political and commercial aggressive pressure because they offer ready solutions that are given in the beautiful combination of the forms of meanings, values, life goals, i.e. projects of personal identity, the life strategy and the lifestyle. As a result the social identity gets not only plural (variative) but the flickering and quite unstable character, inspired by circumstantial factors (small social groups, fashion, media, political and cultural technologies). Actually appears “living situation” of the man social identity in “flowing time” and changing social space which cannot be described but in

categorical system “identity” and on the base of the identification methods which is related to the political being and its forms (Gatiatullina 2011).

Let’s use examples again. It’s clear that social (political) space-time is the totality of the actors, their relations, behavior strategies, and the ways to act. The state of the modern situation is so that the traditional dichotomical forms of action of the political subject (admission—not admission of acting authority, acceptance—not acceptance of supported norms and values, support—refusing the course) more frequently are substituted by demonstration of identity and performance on its visual semantic base. But because the modern society is differentiated in numerous social groups, demonstration of self-identity by small groups becomes the only form of political activity. Their typology is a question of a discrete analysis we just mention that it is almost inexhaustible: from senseless loony identity of “flashmobbers” and “identity of irony” to “identity of aggression” of radical nationalists and “identity of permanent dread” of different society members.

Identity as a measure of STS and the political being gains especial meaning when the matter is in the virtual sphere which importance unstopably grows for all aspects of social being (economics, culture, education). The reason is the virtual without substantial structural forms can be described, comprehended and represented only on the base of “identity” category, for instance: on the base of identity types/forms of actors of virtual space (blogger, poster, moderator, medium, provider. etc.) or of used virtual technologies (chat, forum, flash mob, PayPal, stock exchange, e-library, social nets, trainings, etc.).

The written demonstrates that genesis of STS includes its formation growing mechanism. As a result the historical epochs match not only their “own design” of STS but the dominant mechanisms of its formation and “epochal” features of social casualty. In preindustrial society STS structure determines as was mentioned mostly by the natural geographical habitual factors of the society and local cultures specifics. In the industrial society moves the entire row of mechanisms evolution of STS (consequently the new forms of the social casualty) among them the proliferation of industrial technologies and produced material artifacts, social identity spectrum dynamics and mechanisms of its regulation (political, legal, cultural, economic). Today in the terms of globalization (free moving of producing potential “looking for cheap labor”, projecting and producing “identity of everything”) activity becomes the major mechanism of social being structuring. As a result types of identity (goods, relations, processes, forms of consumption, lifestyles and horizons of perspective society development) produced by the creative man (individual, small groups) now regulate everything what happens with the society (politics, economics, culture) e.g. STS, forms and the wheels of the society political being. In other words STS is made mostly by subjective personal factor.

This is time to turn to the social practice, to the specific examples (Gatiatullina et al. 2015).

Anybody who is familiar with Council of Europe decision (1996) “The key competences for Europe” effortlessly can see that these competences are just “description” of the type of the social identity “Of the modern European” of the informational era. It (personality) as it turns has to know, comprehend, and be able to do a lot, consequently accumulate inside many competitors, among them:

- Be able to live in the modern society of democracy, improve its institutions.
- Be able to accept the cultural differences, live with persons with different cultures, languages, and religions (Khasanova 2014).
- Have wide communication abilities, ability to know more than one language.
- Be able to build own life and activity in the modern informational space, comprehend and take into account with its pros and contras, usage of informational and media technologies.
- Ability to study during the entire life. It is the base of your social being and its success.

“Picture (identity) of era personality type” appears more detailed if we use the ideas of J. Raven who matches competences with such types of sociality and with motivations of social of the person counting about 40 different types of competences (Thagapsoev & Gatiatullina 2011).

Characteristically that the accent is on the abilities/competences that form personal qualities “readiness”, “ability”, “responsibility”, and “confidence” in actions and the social behavior, and also adherence to innovations and believe in their effectiveness which is mostly claimed in the modern complicated, dynamically changing very competitive world.

It is clear that in formation of the man competences education is crucial. In these circumstances the reorientation of the modern educational system (from high school to the university) to the principles of competences approach contains some regularity. But obvious and another for establishing the man the best subject for the modern social system (with democracy of participation, innovational economics, culturalism, moral ethics pluralism, etc.) frames and methods of the education is not enough, there should be another factors of human socialization and determination of his behavior (efficient legal system, legality, market, institutions of the civil society). In this context the widespread idea of Russians in the frames of education that they can and even must form the actual competences is erroneous—“abilities for the 21st century” (Shtompka 2005). Of course this is not without suitable structuration and political being of the country.

In this case (for the goals of our article) is very important something else: categorical ideas “competences” and “competence” in the European discourses subordinated to the representations of “modern man” identities, and to the forms and mechanisms of its correlation to the structures and processes of the modern STS, which unfortunately is not the subject of the homeland historical science. However it is related to the whole raw of aspects of methodological potential of “identity” category. Thus against the logic and the structure of the general typology which includes the next kit of “form families” of identity (each one unites the entire spectrum of specific identity forms):

- Social (societal, political, cultural, subcultural, professional, religious, network, club, corporative, identity of the small social groups);
- Socionatural (geopolitical, civilizational, gender-related, age-related, kwir-identity);

- Natural (identity of specie, genus, ecosystem, population, physical, chemical, and cosmological object);
- Mental (logical mathematician constructions and models, fashion, paradigm of science and art creation, paradigm of genre, brand, etc.);
- Artifactual (identity of technics, cultural stuff, objects of the social infrastructure), the entire raw of identity forms in our discourses is represented and tractated incorrectly. For instance civilizational, geopolitical, ethnical, and gender related identity forms are usually related to the “social” class. As a matter of fact they are just forms of socio natural identities, principally different structure and the causal determination from social identity. But the “societal identity” which could shed light on the character and mechanisms of “economical” and “political” relations which often and actively discussed in the political science till it became the subject of the scientific discourses (Pushkareva 2012).

The circle of “underestimate” examples of the methodology potential of identity or unsuccessful appellation is not over. For instance, in the contest of the Russian national identity problems often mentioned the multilevel identity (even the strategy to reach it) like something existing, empirical. But from position of methodology the situation looks differently. Because the identity being is a form and a measure of existence regularity, and the whole knowledge about this regularity appears like a system formation—the unity of evidences, abilities, connections-relations, behavior strategies and patterns which (as any system) can be hierarchical or referential (depends of the connections between inner parts). Thus the social identity of “mass person” being a complex system of mental, behavior, ethnic, cultural, subcultural, professional, and another patterns rather has referential character. But it can get (and gets, as show the forms) hierarchy with evidence of a dominant element, which can be religious or ideology political implement of the social identity carrier (Thagapsoev & Gatiatullina 2010).

Another example as a matter of fact shows that identity of the most youth subcultures has hierarchy structure because determinates by the “factor of idol” or informal leader. In the meantime it hard to imagine the reasons that can give the hierarchy structure to the social identity of the fashion man, opened to the world of cultural meanings and values and standing out of the politics. Such identity is referential which is called “by the definition”. Among referential can be such forms of social identity like “professional” and “societal”.

And further, in the political sciences appealing to the opposition “micro social” and “macro social” when for political chronotops, sphere politics and the actual political relations and processes more suitable mesa scale measure which somehow “forgotten” in methodology. Would be good to notice that representation of the forms and mechanisms of co-organizing of large scale measures (micro, mesa, macro) of social and political being demands support of labeling and identification cognitive source of “identity” category (for instance, on the base of identification and ranking the magnitude of subjects, actors, mediums of social relations and processes).

#### 4 Reality of the Socio-Political Being of Man in the World of Virtuality

In the processes of the modern STS and its causal mechanisms as was mentioned already, subjective in such forms like “projectivity” and “virtuality” more and more dominate the physical and geometrical, natural and geographical, and socio-institutional. However the STS is not only a kit of structures and social subjects, their relations and connections, but includes the mechanisms of “self-motion” e.g. transformation, evolution of social being. If social transformation can be understood like social transformations of man’s being and form of his adaptation to these changes through “activation of subjective factor”, then virtualization of being in the forms and scales that today take place, no doubt is the social transformation (its type and form). Because right now the successful work for a company or studying in the university do not demand physical contact with these structures. The structures can function (and functioning) in the virtual space. As to “political” (political connections and relations, projects, technologies, etc.) it moves more to the virtual space. On the background of decreasing influence of traditional forms of authority we see increasing importance of self-organizing. But principally important self-organizing of people and their deeds (e.g. mechanism of structuring of social and political time and space) are oriented to the ideas, meanings, and projects given by the net. As a result we have: formal hierarchy of social and political status that is being in the society in the net is substituted by the theater and carnival of randomly elected and changed actors of status identities. In this context in formal influence identities’ constructor (horizons of future, fashion, odd forms of consumption and public behavior), idols of mass culture (show, sport) in the nets and in everyday life is higher than influence of political authority and formal structures/institutions of social regulation.

These specifics of the modern STS evidently determine the specifics of political area. Judging by the facts the understanding of democracy as a form of authority which directs submission of minority to majority, and the authority as a legitimate source of violence “in the sake of justice and safety” now more frequently doesn’t fit in the political philosophy of the modern “virtual society” which as a rule followed by the principles of “participation democracy”, and “rational misbelieve” to the authority. In the meantime the mechanism of “virtual society” influence on the authority becomes habitual and effective. Here some of them: “informational tsunami on the subject of. . .” (corruption, freedom of speech, occurrence of the Crimea in Russia, attitude to the sexual minorities) created in the social networks; “virtual unions and struggle front” with anybody; constructing and organizing of “smart mob” which can be transformed in the “angry society” in the type of manageable chaos (euromaidan) or regular mob (Condopoga, Birulevo, Manejnaya square, Bolotnaya square). Altogether there is a trend to the growing role and importance of “political actors of virtual space” on the realities of the social life. It is worth to be mentioned that “Time” magazine included the famous virtual activists “Anonymous” in the list of “a hundred of the most influential persons” of



2012. This growth of virtual “political power” of the individual and small groups which could work not only for democracy development but for cultivation of “reverted forms” of political being (pseudo democracy, “e-totalitarian”, e.g. different forms of attacks on the human freedoms) gives new actuality and new dimensions to the almost forgotten political anthropology.

The modern trends of technics development, which are out of the eyesight of social philosophy and political science, work for growing importance of subjective factor and “single subject”. In particular concentration of information, energy and technological operations in a single workplace (just in one pair of hands), also are the convergence of different technologies (robots, analytical centers, multifunctional machines, supercomputers). In addition came out technologies of integration/synthesis of classical engineering technologies with Nano-, Bio-, and cognitive technologies building new horizons not only for technological but for socio anthropological future which demands fixed political and theoretical attention because “man’s power” becomes unlimited in creational as in destroying meaning. In this context activation of discourses on the subject of human political dimension (Pushkareva 2012) probably could be comprehended as a reflection of the growing role of the individual subject and its projective constructional potential in the modern world and its processes.

In conclusion, the mentioned specifics of the historical evolution of STS are reflected in the epoch’s political chronots. Thus in the preindustrial society political chronotops and their status geopolitical hierarchy mostly are specified by “geographical power” of the country (territory scale, population, the available resources) and in the industrial society by the technological feasibility in the wide spectrum of meanings. The examples are widely known: geopolitical face of the world in preindustrial era was determined by Middle East countries of the “fertile soils” (Babylon, Egypt) and countries of the “great steppes” of grain cultures (China, Persia). But in this era of the industrial technologies geopolitical leadership moved to countries which were poor for resources, didn’t have big territories and population, to Netherlands and the Great Britain, e.g. to the “technological leaders”. And the modern world, its political chronotops and their geopolitical range their driving factor not only natural, production and technical factor, but:

- Diversity and design of creative identity of political and cultural man’s self-determination;
- Spectrum of forms of consumption and horizons of the social future in the frames of political chronotop;
- Intellectual level of political practice in the space of chronotop and its informational supplement (informational power)
- Scale and level of involvement “virtuality” in socio-political and cultural man’s being in the space of this or another political chronotop.

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# Wind Rose as One of the Main Factors of Apartment Buying Decision

Mikhail K. Starovoytov, Elena G. Popkova, and Elena A. Gladkaya

**Abstract** The article analyzes the data on wind directions in the city of Volgograd for 1998–2014. As a result of statistical analysis, we found the disparity between empirical data and the data obtained from the set of rules of building climatology. According to the set of rules, the predominant wind direction in Volgograd is west wind, and according to our data—east wind. As the study showed, many citizens of Volgograd consider the issue of wind direction not to be the one that should be taken into account when buying an apartment. However, it should be known that lack of data on predominant wind direction might lead to the purchase of apartment which would have less comfort than apartment which is less influenced by wind, especially winter wind. Based on longstanding meteorological data, we have built a general wind rose for Volgograd which can be used by anyone who plans to buy the real estate property. This is necessary, as many developers neglect the influence of the wind rose on residential houses and focus on location of the house on the property.

## 1 Introduction

Purchase of real estate is an important stage in lives of many people. Purchase of apartments requires a lot of funds and is a serious step for most Russians which determined their life style for many following years. That's why the purchase should be reasoned and well-thought-out.

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While analyzing the offers in the market, most of buyers of residential real estate focus on the range of factors:

- apartment price;
- infrastructure: transport accessibility (this factor is very important in Volgograd due to its strip typology and lack of alternative roads); parking lots; proximity of state establishments and network stores; leisure centers, etc.;
- ecology;
- view, etc.

At that, few buyers pay attention to the direction of wind as to the windows of their future apartment.

Necessity for full analysis of all variety of factors which influence the state and perspectives of the development of the market of residential property of the region, as well as importance and scale of the problem of emergence of regional markets of residential property cause the actuality of the chosen topic of the thesis research.

## 2 Research Methods

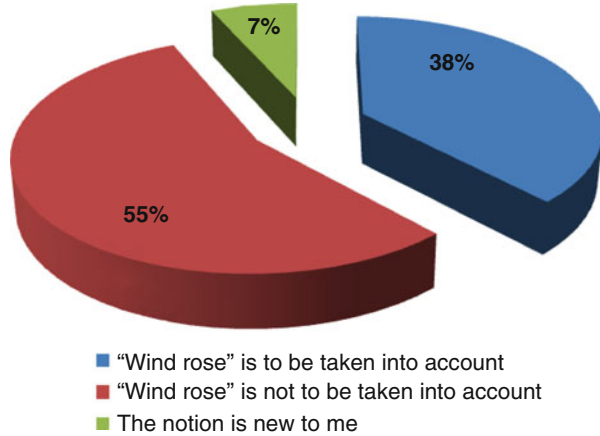
The theoretical & methodological basis of the research is comprised of the fundamental and applied scientific works of domestic and foreign scientists in the sphere of study of influence of climatic phenomena on the real estate market and of processes which take place within it. The methodology of the research is based on the systemic approach and methods of statistical analysis which allowed ensuring faithfulness and reasonableness of conclusions and suggestions.

## 3 Results

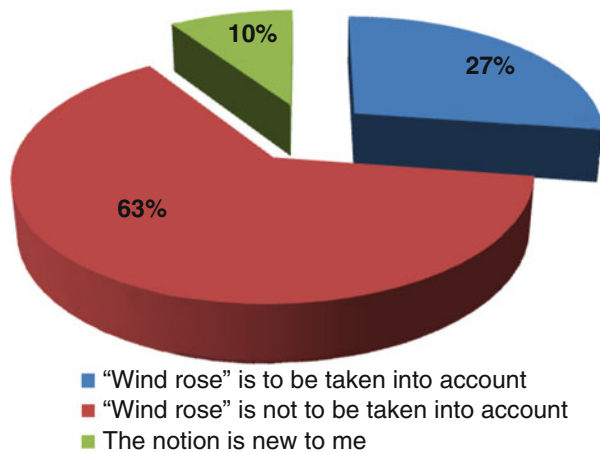
A significant factor, which, together with infrastructure, should be taken into account when choosing the real estate object, is wind direction—as it is an important nature phenomenon that influences directly the comfort of the person (Wind rose 2014). Wind direction may put pressure on a building construction (Mironov 2011), cause soil erosion, and aggravate the ecological situation (in case when wind brings noxious emissions from near industrial enterprises or exhaust air from a highway). The wind can reduce the level of comfort in the apartments due to noise. If the predominant wind blows into apartment's windows, the noise will be frequent, and in winter it may lead to cooling of an apartment and, consequently, to consumption of electricity for additional heating and increase of expenses of the residents.

However, many people consider the issue of wind direction not to be the one that should be taken into account when buying an apartment. This is proved by survey among residents of Volgograd which was held for respondents aged 21–60.

**Fig. 1** Survey as to necessity of account of “wind rose” when choosing the real estate object



**Fig. 2** Survey of respondents aged 21–34 as to necessity for account of “wind rose” when choosing the real estate object



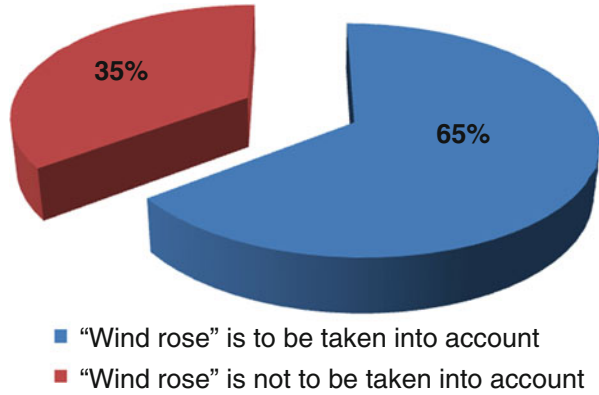
Most respondents (55 %) do not consider the “wind rose” an important factor, saying that “This is not the most important factor”, “Problems with wind can be solved with a window glass unit of high quality”, etc.

The notion of “wind rose” was new for 7 % of respondents, and 38 % think that “wind rose” should be taken into account when buying apartment, Fig. 1.

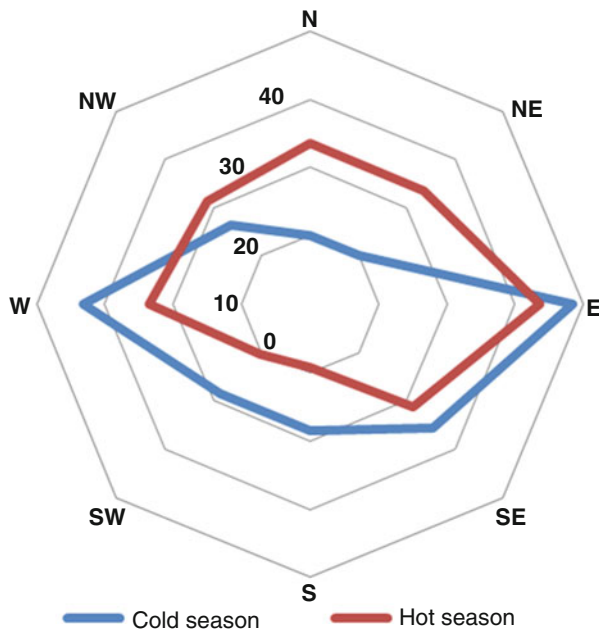
In order to view the opinions of age categories in detail, let us study Figs. 2 and 3.

Within the age category of 21–34, 63 % of respondents do not think that “wind rose” should be taken into account, 27 % think that “wind rose” should be taken into account, and 10 % heard this notion for the first time. For the age category 35+, the situation is different: 65 % of the respondents acknowledge the significance of “wind rose” and only 35 % of the respondents do not think that it should be taken

**Fig. 3** Survey of respondents aged 35+ as to necessity for account of “wind rose” when choosing the real estate object



**Fig. 4** “Wind rose” of Volgograd



into account. At that, within older age category, all respondents are familiar to the notion of “wind rose”, unlike the younger respondents. According to Figs. 2 and 3, it is possible to conclude that age brings the understanding that the choice of apartment supposes multiple-factor analysis, and climatic conditions are also rather important.

“Wind rose” is a diagram which reflects the predominant directions and strength of wind according to long-term observations (Wind Rose Data 2014) in cold season (December–February) and hot season (June–August). In the Soviet period, this phenomenon was paid a lot more attention while planning the direction of buildings

and streets and construction of residential blocks. Nowadays, some developers place the “wind rose” in general plans, but it is rather an exception than a norm.

The data on predominant wind directions in cold and hot seasons can be obtained from the set of rules on building climatology (Set of rules. Building climatology 2012). However, having analyzed daily data as to direction of wind in Volgograd over 1998–2014, it is possible to conclude that the predominant wind direction in cold and hot seasons is east wind, which contradicts the set of rules, where it is said that the predominant direction is west (Volgograd weather diary 2014), Fig. 4.

Fig. 4 shows that in winter, east wind is 1.2 times more frequent than west wind, and in summer, west wind is 1.4 times less frequent than east wind.

## 4 Conclusion

As a result of conducted analysis, it was found that many buyers of real estate do not take the wind rose into account, which may lead to aggravation of the conditions of their living in future. Statistical analysis of the data as to wind direction in Volgograd showed the disparity of experimental data and data of the set of rules for building climatology. On the basis of that, the authors have built the wind rose, the use of which will allow buyers of residential real estate to take the true wind directions into account.

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# Conceptual Aspects of Tax System Development in Cyclic Economy

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**Abstract** The objective of the research is study of the transition points of the tax system in order to define its further development. The paper envisages the tax system development regularity as a dynamic system within various forms of economies.

The methods of dialectics were applied in this article such as induction and deduction, analysis and synthesis as well as logic approach to noesis. Theoretic and methodological basis consists of fundamental works in the catastrophic theory, mathematic simulation, and self-organizing system theory represented in the works of Russian and foreign scientists.

Different variants of phase transition from one economic system to another are defined within the present research. The features of each system phase transition within the acknowledged chronology are considered. The key impelling factors for each period are found. The probable development vector of the tax system after the finance crisis in 2018–2020 is determined.

The altered economic conditions will require the formation of completely new tax system where the main taxable items will include labor, financial capital and land. The phase transition will presumably last for several decades and will induce high levels of social, politic, and economic instability in the world. The formation transition takes place under the influence of external factors and only at the precise moment when the previous formation has created the necessary conditions for that transition to the next formation.

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## 1 Introduction

Taxation history lasts for thousands of years. Taxes were necessary element of regulation of the economic affairs since the origin of State and stratification of classes and estates within the society, when the creation of social and state structures within primitive society first required constant financing. Tax is essential element for a state existence while the state is a hallmark of any advanced society. Formation of the tax systems in various states took place during their periods of prosperity. For each state that period was marked with unprecedented economic, cultural, trade growth and development of social institutions. At the same time, the prosperity periods interspersed with depressions and almost complete lack of economic and politic sovereignty. Many countries were destroyed during those periods, were absorbed by other states or survived considerable transformations in every part of their existence. Each such cycle in a particular state was accompanied by alteration of the tax system. Similar process had led to the fact that in many countries tax system had analogous structure and hierarchy due to their constant economic interaction. This led to the situation in ancient times when several tax systems were formed in the world which remained in some approximation till the present day, in some cases having suffered but insignificant changes. Taxation formation is affected by government's adherence to some type of economic system as well as both internal and external politic situation. The matters of correct understanding of the tax essence always remained the ones of utmost importance. The term 'tax' includes not just economic but also social implication. That is why comprehension of human daily activities facts formed long before the beginning of scientific interpretation of those ongoing processes in the sixteenth to seventeenth centuries.

Contemporary economic model has faced yet another threat of global financial crisis which is becoming more and more obvious with every passing day. But crisis tendencies are observed not only in financial or industrial sectors of economy but are clearly visible in the tax collection organization system (Bezrukova 2015). And it is not just the circumstance that decline of industrial growth rate or economic results of the financial sector operation leads to the tax revenues depletion, but the system itself cannot function in the same regime under the changing conditions. In this case the necessity for development of new methods and ways of tax system operation arises in order to make them capable of meeting the new economic fundamentals. New tax system shall in the first place meet the collective interests of the community. Despite that fact that tax systems were typical for all types of economy regardless their specific aspects, they were responsible for formation of the baseline minimum of the revenues. However, under no circumstances excessive growth of the budget dependence on the indirect taxation system shall be accepted as in this case the government loses control over the economic processes in the country. The typical feature of state degeneration and destruction is the unbalanced tax system. Namely, maladjustment of the tax system to the changing economic situation had led to manifestation of social and economic shocks in many European countries.

For proper understanding of the essence of the matter, we need to turn to the initial period of the taxation system formation as the taxes are the central element of

the whole economic system. Qualitative composition of the tax system defines the intensity of its influence upon the economy. Accordingly, we require theoretical grounding and identification of the measures aimed at the formation of efficient tax system and the methodology for its creation which shall enable achievement of restoration of financial stability, mitigation of unfavorable effects upon various economic branches and formation of advantageous conditions for long-term economic growth.

## 2 Background

The scientific status of the problem: the matters of state tax system formation are discussed in the economic literature widely enough. But at the same time tax system does not remain unchanging but is permanently under the effect of macroeconomic conditions stimulating its alterations due to various circumstances. Many ancient written sources supplied us with the information about the economy and social life of peoples in Europe, North Africa and Middle East in the 2nd and 1st millennia B.C. These sources, among the rest, contain the data concerning taxes paid by citizens at that time.

The works of Xenophon (1935), Plato (2007), as well as Aristotle (1911) the first attempts of theoretical interpretation and grounding of the economic organization of Greek Polis were undertaken. For Aristotle the ideal was slave owning economy with subsistence production. The first ideas of labor differentiation and allocation of some economic branches such as agriculture, crafts, trade, we see in Xenophon's works. Aristotle meditated about a general counter value for commodity values. He could not find it then but correctly defined the vector for the future scientific thought. His ideas were picked up by other economists in the past in the sixteenth to eighteenth centuries, and gold was selected as the universal value measure. It was used not only as the measure for value or wealth accumulation but as the universal form of payments between the state and the society. Aristotle considered the value of goods to be subjective and depending on their benefit. But at the same time he stressed upon social necessity for cost recovery (both for polis and for aristocracy). However, he did not give the details of the cost composition.

In the age of feudal system rise (after the downfall of the Roman empire), especially in the beginning of the second millennium, economic thought retreated to monasteries and the first ever universities. In the eleventh to fifteenth centuries scholastic scientists paid great attention to the matters of economic organization of the society. The views of Anselm of Canterbury, Johannes Roscelin, Abelard, Albertus Magnus, Thomas Aquinas, and W. Oakham were based in theologian and dogmatic paradigm generally presented in the Holy Bible and sacred texts. That paradigm condemned unnatural (non-biblical) wealth accumulation way based on interest rate, danism and trade. Namely, in feudal age Biblical values formed the base for all economic affairs. Nowadays diversion from the target values of that time has led to rise of banking, stock market, credit and trade, which in some measure placed the world in front of a new global economic catastrophe, as the

current generations (by means of loans) drained all the demand (for goods and services) instead of the three next generations. Such forms of economic affairs have become natural and universal in the capitalist age.

At the decline of the feudal system (in the end of the sixteenth century) one of the brightest people of the age Jean Bodin did not consider the taxes to be one of the sources of state incomes formation but, conversely, affirmed that they lead to popular outbreaks. In his opinion, taxes are also exceptional case which shall be used under emergency circumstances when the state has no other income source left to it. Monchrestien in 1615 suggested to introduce high customs duties for foreign goods in order to protect national manufacturers and thus form the conditions for craft growth which he considered the creator of national wealth for a country. But at the dawn of capitalism political economics consisted of a number of abstract-logical and mathematical schemes (Anikin 1975), mostly based in subjective psychological approach to the economic processes. This fact was demonstrated in the works of economists of both the New and Old Worlds. The writings of Menger and Wieser (Austria), Walras (Switzerland), W.S. Jevons (England), and J.B. Clark (the USA) greatly changed the understanding of the economic processes of their time.

David Hume in his works denotes so called ‘price revolution’. This term had appeared after gold and silver were brought to Europe from America in the sixteenth to eighteenth centuries. Goods prices in Europe grew 3–4 times. In the nineteenth century, after many European countries switched from the bimetallic monetary system (gold and silver) to monometallic system (only gold) in 1873, and it led to growth of national debts of the countries in gold to their creditors, and the key creditors were British banks, ‘horrible agricultural crises’ (Nechvolodov 2013) were observed.

In the end of the seventeenth century British economist W. Petty undertakes scientific research in discovery of statistic method for interpretation of particular economic problems and matters of economic policy including taxation and customs duties. Throughout the history of civilization various taxation theories were applied depending on the sectoral structure of the economy. Tax division into direct and indirect was introduced by J. Locke (Alekseev et al. 2004). He considered direct taxes ‘non-shifting’ which indirect—‘shifting’. This statement is arguable as the degree of shirting for various taxes is different depending on the form of tax appliance.

The works of F. Kene (2008), A. Smith, D. Ricardo, J. Keynes formed the basis for the classic taxation theory announcing the fundamental principles, through realization of which tax systems would equally take into consideration the demands of all the parties and the state would seize the opportunity to regulate the sectoral economy growth. Turgot comes to understanding that farmer’s labor creates added value allocated to the owner of the capital goods. At the same time he actively supports reduction of tax burden for industry and trade, correctly believing that these fields would become the economic powerhouse in the eighteenth and nineteenth centuries.

Grounding for the taxes as one of reproduction factors can be found in the writings of foreign and Russian economists of the beginning of the eighteenth

century such as E. Sax, J.B. Say, etc. Later this idea in Russia was developed further by well-known economists N.I. Turgenev, I.H. Ozerov, I.I. Yanzhul, etc. French philosopher Paul Heinrich von Holbach thus spoke of taxation: 'It is fair only when the public have expressed their consent to obey it; its appliance is legal only if it is used stringently to its intended purpose which is for preservation of the state. Its unchanging measure shall be social benefit: the size of the possessed estates and wealth used by each member of the society defines the degree to which he should provide for the common good. Tax collection becomes common theft if it is executed for the purposes other than preservation of the state and enlargement of its felicity' (Bartenev 2005).

The researches of the marginalists H. Gossen, W. Jevons, L. Walras on the matters of the tax burden effect upon economic growth were associated with the appliance of analytic geometry method and led to the conclusion that inability to shift the tax burden to another subject causes stimulus to increase labor productivity (Pushkareva 2001). Later researches of this area were continued by A. Laffer who plotted a curve demonstrating that growth of the tax burden exceeding 50 % leads to reduction of the budget income.

As Keynes affirmed, capitalism cannot exist based on self-regulation (Keynes 2008). State needs to control of economic regulation by means of effective demand expansion. This means reduction of tax burden for the consumer and credit cheapening. Industry, on the other hand, needs various stimuli, including tax stimuli, for growth of investment into the fixed capital.

### 3 Scope Definition

About 7000 years ago, in the age of subsistence economy, the matter of production forces and proprietary forms for capital goods. At that time the key source of justice was the will and decisions made by the head of the state, while the members of the royal household (nobility and dignitary) were executors of his will and beneficiaries from exclusive rights for capital goods. Trade and exchange, product and profit appeared and called for reconsideration of economic affairs and reformation of the system of interaction between state and society. Such idea as payment to the monarch's treasury for using the capital goods was first introduced at this stage and later was named 'tax'. Slave-owning economy defined the character of economic affairs in the ancient world countries for many millennia to come. Whole system of values and orientations was formed in association with slave-ownership as well as whole course of life of people on Ancient Egypt, Ancient Greece and Ancient Rome. At the same time this form of economy was marked by very low labor productivity, the production basis was formed by large estates and lands where thousands of slaves worked. In fact, the subsistence economy of that age has become the prototype for modern corporations. Actually it produced virtually everything it needed for its operation. Poor market efficiency of this production form did not allow the state to guarantee sufficient level of tax revenues to cover the

ever growing expenditures as any state's development required huge resources. Many various forms of state treasury generation were already in use: domains, regalia, import and export duties. But all of them were insufficient to cover the current needs of states, so another important source of income was tribute from conquered folks, contributions and reparations, and state trade in various goods.

These facts largely determined that tax system was developing in the direction of tax revenue growth. This extensive model reached its culmination in Roman Empire, when total number of paid taxes rose up to 2000. It is very obvious for those studying the history of ancient empires attentively. In large towns the labor productivity is higher and one craftsman concentrates on manufacturing one product which improves its quality and increases the craftsman's profit, which, in its turn, increases the polis's incomes due to greater tax revenues received. While the boundaries and influence of the empire were growing in the direction of the neighboring states, within Roman, Greek, or Egyptian society itself everything was quite stable, but once the expansion stopped, irreconcilable differences instantly surfaced which sooner or later led to downfall. We observe the similar situation at the present days, when impossibility for further expansion placed capitalist system to the edge of a catastrophe. This means that the time is ripe for replacing the model of the further economic development.

Aristotle once said: '...there is no limit in goal-attaining in the art of accumulating wealth as it affects trading, because the goal itself is the unlimited wealth and possession of money... Everyone who is involved in money turnover strives to increase his wealth to eternity' (Aristotle 1911). Exactly at that time the formed capital made the basis for appearance of a new taxation item. Labor and turnover taxation, actively used in Ancient and Middle Ages, was replaced by capital taxation as the production forces were developing. Even Platon and Aristotle in their ancient times introduced the concepts for universe structure and organization of economic and politic society life based on the forms of rule. Little has changed since that time in conceptual aspect.

Economic and tax policy of the feudal period bore no differences from that on Ancient Rome or Ancient Egypt. Former colonies of the strongest empires of the past more or less adopted economic, politic, social, legal, and tax traditions of their formed suzerains. At first tax systems of the future France, Germany, Great Britain, Italy or Spain were very similar. Byzantium remained a considerable part of Ancient Rome and its traditions. The basis of the system consisted of indirect taxes on goods flows and consumption, customs duties, excise taxes, various non-monetary servitudes (when peasants executed some works for the needs of the feudal lord or the king). Aristoi were mostly exempted from taxes and payments to the king. The main non-monetary servitude for the aristoi at that time was military service, for which the nobility received various titles and lands. Such obviously unfair division of the tax burden among the different society strata sometimes led to popular outbreaks and rebellions. Politic situation in general also did not facilitate harmonious coexistence of scores of ethnic groups within the area of contemporary Europe. During that period the foundation for political economy was first laid, which would later become the basis of capitalist mode of

production. Origin of this economic branch in science started at the decline of feudal system, when irreconcilable problems for its further development became obvious. At the same time the key elements of capitalist production and bourgeois relations were being formed, which was mirrored in the writings of thinkers and economists of the period.

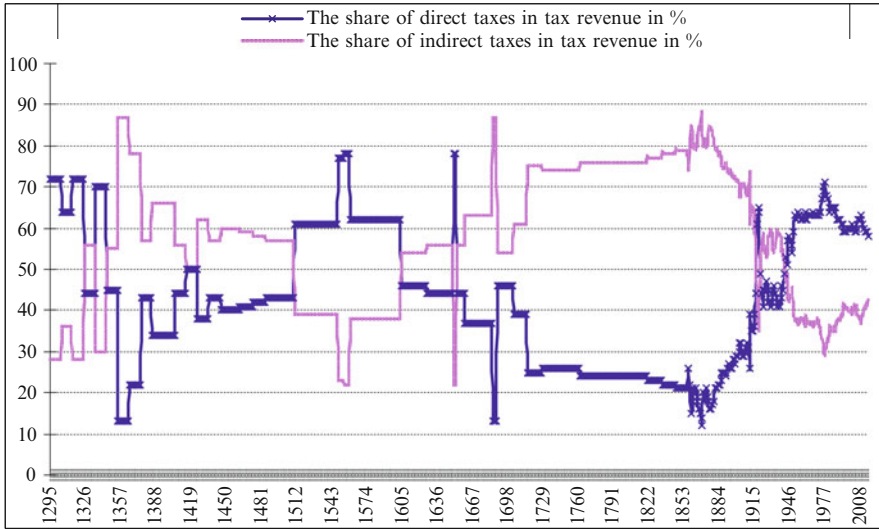
Trade capital growth required permanent extension of territories where it could be realized. Industrial capital demanded constant acquisition of new markets to sell the manufactured goods and increase of their capacity, banking capital needs permanent emission and speeding up the capital turnover. Termination or considerable decline of these processes leads to trade, production and financial crises and forces the governments of countries make sufficient alterations in their tax and budget, and financial policies.

In 1620-es, in England mercantilism policy reached its climax. At that period import of raw materials was prohibited and export of ready products was stimulated (sometimes governmental subsidies were involved in it). During that period England invaded huge territories of other countries making them its colonies and the key source of cheap raw materials. At the same time protectionism policy was implemented in England. English market was protected against foreign commodity goods by high import duties which stimulated growth of manufacturing system inside Britain. Trade became the main source of gold and silver till the end of the seventeenth century, and as a result the national debt was negligible. Production and trade growth under balanced tax and budget policy allowed Great Britain to become the biggest empire of that time in short interval of time and implement monopoly power to sell considerable range of goods exported from Asia, America and India.

The history of European empires demonstrated, that metropolitan countries tended to seize total control over trade processes with their colonies (British East India Company, Holland West-Indische Compagnie). Various raw materials were imported from the colonies and commodity goods for industry and domestic use were exported there. That is why the tax system was aimed at collecting indirect taxes, consumption taxes in the first place. It is especially clear from the British taxation statistics for more than 700 years (Fig. 1).

As we can see from the figure, during the period from 1600 to 1945, which is actual period of existence of British empire, indirect taxation was prevailing. In some years the share of indirect taxes reached 85–90%. In those years the metropole considerably restricted trading affairs of its colonies with other countries. But after the start of globalization period in the middle of the twentieth century the metropolitan countries' influence upon their formed colonies has weakened which affected the structure of tax system where direct taxes began to dominate.

In the eighteenth century French economist Kene affirmed that peasants would have to give away all their income for the taxes and obligatory payments to their liege, king and Church. Particularly, 4/7 of the income was due to the liege lord, 2/7—to the king, 1/7—to the Church. The payments were both monetary and non-monetary. In fact, the tax system was clearly fiscal focus which finally led to impoverishment of peasantry and, as a result, brought about reduction of



**Fig. 1** Proportion of direct and indirect taxes in revenues in Britain, period from 1295 to 2015. drawn up by the authors based on the public statistic data available at <http://www.ukpublicrevenue.co.uk> and <http://www.esfdb.org>

governmental income under continuous growth of expenditures. Unfortunately, actions with the similar results took place repeatedly, in many countries and in different periods. The result of all these actions was the same treasury depletion, popular discontents and rebellions, change of government and political and economic policies.

In the contemporary economics the opinion concerning negative effect of tax burden growth upon economic processes is not so univocal. Even J. McCulloch in the nineteenth century wrote that wealth growth in England during the period from 1688 to 1817 was associated with increase of tax payments: ‘... tax growth has just as powerful influence upon a nation, as increase of a family and associated necessary expenses affects an individual person. England enforced its industrial activities under the influence of the war started in 1799, demonstrated spirit of enterprising and inventiveness, ... if the taxes were too burdensome they would not bring about such result’ (Anikin 1975).

In 1825 the first general crisis of overproduction blew up in England. The reason for that crisis was the fact that capitalism leads to wage restraint and virtually keeps it at the level of physical survivability. Accordingly, more and more of the manufactured material values can be consumed by the less and less number of people. From the middle of the nineteenth century the following was identified as the key items and sources of state incomes in the world economy:

- labor-wages;
- capital-profit;
- land-rent.

Previous to the capitalist epoch those items almost never were taxable except for labor. During many millennia labor remained one of the most important taxation items. As the practice demonstrates, excessive taxation of labor leads to formation fundamental conditions for burst of an overproduction crisis. Capital, on the opposite, is rarely viewed as a taxation item, and if there is a will to increase the tax burden on the capital, reasons and arguments are immediately found grounding its inexpedience. Rent is levied even less often during the capitalism age. Actually, rent as a source of governmental incomes is missing from the tax systems of most of the countries.

The triad labor–capital–land is the source of wealth for the key productive groups in any state. Land is the source of wealth for the owner of this resource. In many countries the state is the land owner while the economic subjects just administer this resource temporarily. Capital is the source of wealth for industrialist who owns capital goods. Labor is the basic source of sustenance for the most of population. With its help and its direct involvement materials values are created which in the course of circuit are consumed by various society strata.

The distribution of the tax burden among these items is uneven. About 60–70 % of the tax burden fall on the labor, sometimes this share is considerably bigger. Industrial capital carries tax burden of 20–35 % of the total. Financial capital is almost free from taxes. Land as the key resource bears 1–5 % of the total tax burden. Tax burden distribution proportions among different social strata are about the same.

After rise of new economic activity types, the tax systems of the developed countries introduced income tax; along with capital accumulation, especially during the second half of the twentieth century, inheritance and donation taxes gain more and more power. The rest of the taxes, which used to be of the topmost importance or at least played considerable role in the state incomes before, are shifted aside or are totally removed from tax system. In particular, this process is typical for excise taxes, various state duties, land tax, etc. The exception is the consumption taxes still holding their positions in terms of collected revenues, but even they may considerably shrink their share in case of change of economic circumstances in the world, especially during the period of transition of economic cycles.

## 4 Methods and Procedures

Economy, just like any other dynamic system, is unstable. At bifurcation point it may loose equilibrium and collapse under the influence of one of the attractors. In our opinion, in contemporary economic model such attractor is tax system which is at the same time a subsystem of the economy. After the effect of this factor economic system may gain equilibrium (virtually return to the zero point), or transgress to a new ordered condition (new evolutionary economic model will appear). Accordingly, the development may follow either regress or progress line,



which, in its turn, is manifested in evolution or revolution. The choice of one or the other direction depends on numerous factors, all of them do their bit in the model formation.

At the various stages of society development typical approaches to tax system formation existed. Type, structure and shape of a tax system largely depended on the operant forces of the period. Transition from one tax system model to another usually took place abruptly, in shape of phase transformation or catastrophe. In slave-ownership period such operant force was slave labor and presence of sources of precious metals. So, the tax system of that period was an extensive model aimed at extension of taxation items and the number of them.

Retrospection demonstrates, that crisis goes first and only after it (normally) follows industrial revolution which at the same time brings about economic revolution. It happened in the twelfth century b.c., when after bifurcation the iron revolution took place, after which the rise of Ancient Rome began with formation of one of the most powerful economies of that period, including its tax system. In a slightly modified shape it reached the present time in various European countries. But introduction of various machines (many of which were designed during that period) could destroy the ancient slave-ownership system.

The next bifurcation point appeared in the fifth century. At that moment a crisis situation in the classic system had formed which brought about the change of the development vector of the whole society. In economy that change appeared as the alteration of the production model, transition from slave-ownership to feudal system. That transition moment was caused by a catastrophe of lifestyle of whole ethnic groups which led to branching of the system development variants. Economic, political, social processes cause periodic fluctuations affecting the tax system depending on their intensity, forming directed graphs with various results. Three variants of scenarios are defined:

1. If the structural reforms are not strong enough, this will lead to arising of tendencies to fall back into the original state, thus forming fiasco of any reformation. In fact, direct graph is formed.
2. In case of excessive fluctuation the destruction of the system takes place (Arnold 2004). In terms of mathematics we can present this model as connected indirected graph. Under the lack of equilibrium the system must permanently perform a work to preserve the conditions rendering its existence possible (Nicolis and Prigogine 1979).
3. If in the bifurcation point the applied effort is sufficient to form stable condition in nonequilibrium medium, this generates new system with different parameters, which means that we are dealing with Euler graph. Knowledge of the common features of these graphs allows description of the phenomena taking place at the moment of abrupt transition of the system to equilibrium under gradual change of the parameters (Venttsel 2005).

At the same time self-organizing systems (economy included) under the effect of synergy laws organize themselves so that to create minimum resistance to the factors forming them. Forming flow (key operant factor) generates the structure

that strives to support it (Poddubny 2000). With increase of the key factor operation the system reorganizes and its structure unable to adapt to the new factors decays. This leads to formation of a completely new system with stronger parameters. The transition is of an avalanche-type.

The tax system in the bifurcation point reaches the most unbalance condition due to the avalanche-type changes which usually are stochastic. The performed impulsive actions taking in no account the fundamental factors and strategic interests of the state's economy, stimulate destruction of the system created earlier, but at the same time under the influence of growing event flow they form the conditions for creation of a new system development point higher than the previous in terms of its key parameters. In fact, we observe hysteresis phenomenon here.

Later, in the tenth to twelfth centuries, utility revolution had taken place at first and only after it the industrial revolution associated with the increase of the number of mills has happened, which formed powerful impulse for the further development. European civilization faced a qualitative abrupt change of the environment where even the weakest attractor (Kuznetsov 2013) displays susceptibility to the external effects which leads to considerable and often unexpected results. In this case the synergy effect of small external inputs coordinated with the system itself is more efficient than the impact of considerable but inconsistent factors. During the feudal period that resulted in internecine wars, by means of which the feudal lords considerably reduced the existing surplus and slowed the rate of commodity-money relations development, which allowed them control over the flow level and prevention the system unbalancing.

During the feudal period the tax system starts to deviate from the extensive development; its composition includes more and more qualitative components. The system acquires the taxation intensification features. But they are sporadic and irregular as there is serious struggle between different views concerning the economic processes. The majority of the population represented by the feudal lords resists the introduction of the qualitative components in the tax system by all possible means. Increasing flow of material values starts destruction of the ruling hierarchy structure. Product surplus reaching the ordinary manufacturer made him less dependent on the hierarch while forced and deficit ruling methods became inefficient (Marshall and Bansal 1998).

The catastrophe theory affirms that any complex system is capable of both intensifying one or another factor and to generate new factors. Appearance of new determinants leads to unavoidable destruction of the system that produced them. After that equilibrium is achieved and the process starts its development. We observe this in the whole course of the human history, but it is most convincingly demonstrated at the moments of transition from one economic system to another. Naturally, in this situation the change of tax system and its key orientations takes place as well.

During the slave-ownership period the extensive economic model prevailed which allowed accumulation of considerable human resources. Such system structure, on one hand, solved the problem of control over power and resources which provided for stabilization of economy, and on the other hand, did not allow

distribution of these resources among the population, which made efficient income taxation existence virtually impossible. Despite the fact, that the attempts to introduce income tax were undertaken repeatedly, they always ended in failure, as this element came in conflict with the conceptual basis of the economic model existing at that time.

Understanding of this aspect came in the very end of the slave-ownership period. During the feudal epoch considerable efforts were undertaken to change the model and, as a result, appearance of new elements of tax system. But, as the existing contradictions were not fully solved, the effort brought no success, though considerable progress was achieved in adaptation of the new tax elements to the economic basis. As the slave-ownership and feudal systems were in fact hierarchic systems, this promoted material value accumulation in individual hands. But at the same time, their growth destroyed the existed ways of ruling which eventually led to revolutions, rebellions and riots, which became the typical features of the centuries when the critical condition of the dynamic system was reached. Appearance of considerable number of negative factors called for sufficient effort for their containment and system stabilization. This circumstance is mostly overcome during the capitalism epoch. At that time impossibility of further extensive tax system development becomes clear. During that period new and new taxation theories are designed and the basic conceptual approaches to taxation are formulated.

During the next system transformation from feudal system to capitalism the essence of the epoch remained practically unchanged (it is not for nothing that capitalism at its dawn within new territories copies the previous formations). Alterations happened in the management principles (Fernando de Melo 2015). The stress was placed not upon the primary need satisfaction but upon introduction of new needs which required speedy technological development. A. Maslow has written about it when first described his hierarchy of human needs.

During the capitalism period the generating flow is the financial capital. It defines the vector of the whole system development as the capital flows to the places where it can find the most efficient appliance with the highest returns. Financial capital attraction to the branches with low returns (where the profitability of production is lower than bank credit interest) in the end leads to the companies' bankruptcy. On a whole country's scale this might lead to a situation when the banks accumulate in their hands all material values that were used securing of pledge (railways and roads, mines, standing wood, plants and factories, all types of real estate and even taxes and duties). As we talk of a closed economic system the financial capital place the role of destabilizing factor. In fact, transition through bifurcation points represents the system development where the transition moment is the moment of choice of one or another development way. In accordance with the synergy laws, new formation cannot appear inside the yet unformed previous one. In this case the system performs the phase intermittent transition when it has no other choice.

So, the chaos that we observe in the transitional period entails not only disruption of the system structure but also unbalance and desynchronizing of vast variety of processes in both national and global economic system. This means that

principally new economic system is required. As material factors were subtracted under the previous formation, information (intellectual) factors should be subtracted within the new model. Essentially, it is a matter of a new paradigm formulation grounding acquisition of information factors of production. This will require creation of the global distributional economy, implying rigid control over resources (due to their scarcity), food supplies, and other material values. This will inevitably cause exacerbation of the struggle among various concepts which ends the demolition of capitalism system and marks crossing the bifurcation point. However, end of the previous and beginning of the new cycle will be marked by considerable drop of living standards of the greater part of population.

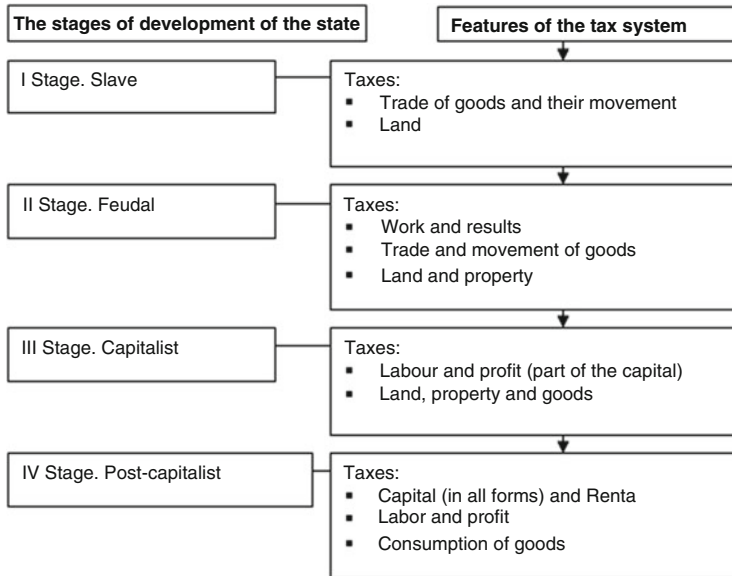
## 5 Results

Transition from feudal to capitalism system took most of the seventeenth century. During the feudal period the main resource was land. The key tax is rent in its various forms. Whereas transition from slave-ownership to feudal system took several centuries. The main resource of the system during the slave-ownership epoch was workforce. So, the key taxation item was the result of labor (goods and products). Transition from capitalism to the new economic formation should take several decades. During the capitalism period the main resource is ownership for capital goods and the key taxation item is profit (in its various forms). The transition of formations itself takes place under the influence of external factors and only at the moment when the previous system has created the conditions required for this transition to the next system. The main resource in the post-capitalism formation (Fig. 2) will be ideology (idea), and, accordingly, the taxation item will be the result of individual creativeness. Consequently, the necessity for economic model replacement and management mechanisms arises. By all accounts, the key source of the society progress after this transition stage will be non-compulsion for the work (unlike during the early formations), non-stimulation of consumption (unlike it is at present), but appliance of human capability for self-realization.

Firstly, release of human resources. As appearance free workforce has required replacement of state economic policy (including tax policy), which would otherwise cause the state destruction. The countries which succeeded in finding the area for appliance of the released human resources managed to avoid revolutions. In the seventeenth century Europe had suffered a wave of revolutions.

Secondly, capital and capital goods consolidation. Under the feudal system each town, estate or plantation produced everything they needed for population sustenance. Capital goods and capital consolidation brought about the new problem of production forces proportion, expressed in the necessity of markets for the goods manufactured by the plants and factories as well as sufficient number of consumers of these goods. In fact, competition for the world markets bursts out.

Thirdly, economic base contraction from the previous system. First of all, the contraction is caused by the influence of the two factors described above. As release



**Fig. 2** Typical characteristics of the tax systems of a state depending on the stage of its development

of considerable workforce is caused by reduction of labor appliance points, production intensification due to scientific and technology progress and resource price rise caused by growth of demand, this forces the greater part of the free workforce to search for new income sources and areas for labor appliance providing for the increased consumption standards. Replacement of the economic system necessitates creation of a new tax system meeting the modern requirements and stimulating destruction of the old formations, on one hand, and speedy shaping of the new economic age.

As a result of studying dynamic developing systems certain directions of their prevailing progress were identified:

1. Rapacious. This means disintegration of the previous system to create a new, better organized one on its base. The example is transition from feudal taxation system to capitalistic system. In terms of typology this is extensive-intensive progress.
2. Parasitic. This means system disintegration by means of destruction of better organized system and transition to less organized level. As the negative factors are accumulated in a number of countries (France, Germany), new and immature taxation system was replaced (in some historic period) by the old (feudal) system. It is always an extensive way.
3. Disintegration. This is the situation when the existing system at the moment of transition breaks down into a number of independent elements not united by any system. It took place in the very beginning of capitalism system shaping when

decaying feudal system split into a number of independent elements not forming any aggregate at the same time (Spain, Portugal, France in the seventeenth century).

4. Cooperation. Formation of a super-system with delegation of its features and functions creating the potential for the further progress. The development can be either positive or negative. This development type is described with singular intensity.

All these models are the directions of the dynamic system progression under some or other conditions. During the capitalism epoch we could observe the first three transitions in separate countries and at different moments. This is true both for tax system and the economy in general. The fourth type of system will be forming in the twenty-first century on the basis of what is left of the tax system existing now.

So, in the world's economic thought tax has become one of the necessary elements of a national economic system. The main role performed by taxes is financing of a number of functions without executing which a contemporary state cannot exist. This was determined by history, that state authority is to provide its citizens with the following: protection against external and internal enemies, law enforcement and effectuation of justice, formation and development of the country's infrastructure (roads and railways, utility networks, public healthcare and education systems). Lack of any governmental regulation of the economy leads to even worse problems, particularly drop of population living standards and incomes, unemployment growth resulting in reduction of consumption, taxable base and collected tax revenues, outburst of social strain, rebellions and finally state destruction.

## 6 Conclusion

Tax systems in different countries despite many varieties have considerable features in common. Particularly, the type of the tax system varies depending on the stage of economic development of a state (there are four of them: rise, golden age, fall and decay). At the rise of any state direct taxes are preferred by the tax system and they are normally collected from the conquered folks, on whose account the future state is growing and consolidating.

Later in the consolidated state entrepreneurship flourishes, various branches of economy grow, government usually invests in infrastructure projects. The tax system of this stage is quite balanced and moderate. The taxes are universe, their size is moderate, but due to constantly growing taxation base state budget incomes increase. The management is effective and competent, considerable resources are invested in the construction of roads, channels, irrigation systems, various buildings, corruption level is low, trade and foreign affairs are advanced, the borders are relatively quiet, and as the result the expenditures and low and the incomes are high.

At the third stage of its development the state economy is neglected, ruling is weak, torpid and inefficient in the opinion of the majority of population. The expenditures for infrastructural objects support gradually increase as they dilapidate, the desires of the governmental staff grow along with corruption, the expenses for the army also grow because of the tension at the state borders and borderline conflicts, trade and international affairs levels drop, taxes gradually grow along with simultaneous taxation base reduction. This stage of business stagnation and fall is clearly manifested by the moment of state economy transition to the fourth stage.

At this period state finances are in complete disorder because of unbalanced economic and tax policy. The situation remains the processes of the second stage of the development but with the opposite sign. Expenditure grow caused by dilapidation of considerable part of the infrastructure, army chaos brought about by constant delays of wages and general depression of the public morals, reduction of the number of crafts and entrepreneurs, trade level drop due to shrink of the usual markets for the local goods and the state territory reduction, corruption of administrative expense upturn, disruption of both horizontal and vertical cooperation system between different authorities. In the tax policy complete unbalance takes place between the tax burden level for various economic subjects, particularly, the taxation base reduces while the existing taxes grow and considerable number of new ones is introduced, which makes the crisis tendencies in the state even more prominent.

So, in the whole course of the modern human history tax systems of various countries go through the same development stages. As long as the economic influence of the country extends, the taxes are fragmented or remain extremely low. In the period of shrinking of the economic influence or lack of opportunities to find additional income sources the tax system turns to maximum possible coverage of all income sources, thus aggravating the situation which was already tangled. As the result the world came to the verge of new global changes which will lead to replacement of economic paradigm and consequent change of tax system.

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# Economic Aspects of Application of Biotechnologies During Creation of Forest Plantations

S.S. Morkovina, I.V. Sibiryatkina, and A.V. Ivanova

**Abstract** The article views economic possibilities for creation of forest plantations on the territory of forest fund and areas taken from agricultural turnover. With the help of survey among the managers of enterprises that work in the sphere of forestry, evaluation of risk and income during creation and exploitation of forest plantations was performed. It was established that the age of cutting (or turnover) of forest plantations, together with assortment and agricultural technique of growing, influences significantly the entrepreneurial revenues and risks. Forest plantations with minimal turnover of cutting are the most risky and unprofitable. A criterion of entrepreneurial certainty in effectiveness of creation of forest plantations is combination of acceptable level of revenues with acceptable risk. It is proved that significant factors for development of entrepreneurship in this sphere are measures for support and tax subsidies. A large part of entrepreneurs that work in the forestry sphere of the central part of Russia are not sure in effectiveness of plantation forestry, as these activities are related to risk and uncertainty in receipt of the final result, due to long time intervals of growing plantation trees. The economically expedient plantation forestry is based on combination of two conditions—turnover of cutting for the criterion of maximum of receipt of the targeted assortments and price for assortments that is sufficient for compensation of production costs which appear in the process of cutting. A large contribution into reduction of the turnover of cutting and, as a consequence, reduction of production costs could be done by biotechnologies. It is determined that with the use of biotechnologies, the cost of creation of forest plantations grow significantly. That's why entrepreneurial structures are not interested in creation of plantations. This task could be solved in the sphere of development and establishment of the State program of support for development of agricultural forestry and plantation forest breeding. The program should envisage economic mechanisms of stimulation of development of plantation forest breeding.

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## 1 Introduction

Forest complex faces the problem of lack of high-quality and accessible timber raw materials, which is a reason for economic instability of work of processing enterprises (Morkovina 2014a, b).

In this situation, one of the effective measures is growing of timber raw materials plantations.

At that, forest plantations include forest plants created on the territory of the forest fund and lands of other categories that are characterized by totality of indicators, including:

- structure of certain targeted breeds;
- artificial origin;
- potential of obtaining timber with set characteristics.

Experience of creation and exploitation of forest plantations in Canada, USA, China, and Scandinavian countries proved perspective of this type of forest use. In Canada, the term of growing of plantations of fur-tree constitutes 35–70 years with a targeted volume of 215–510 m<sup>3</sup>/ha (Burley 1997). Total useful area of forest plantations constitutes 7% of the general area of forests—as of 2010, it was 264 million hectares (FAO 2010). In the USA, investments into creation of forest plantations over 40 years ensure income at the level of 14% per year (Bitkov 2008). Researchers of this problem note that creation and growing of such plantations—especially on areas taken from agriculture—does not require significant additional expenses and ensures multiple increase of economic effectiveness of timber raw materials reproduction. In Belarus, forest plantations are created for quick growing of balance timber of fur-tree and pine-tree, as well as energetic forest plantations of pine-tree and birch (Shtukin 2004).

Certain progress in the sphere of creation of forest plantations is observed in Russia, as well. Beginning from 1980s, around 36,000 ha of plantation cultures were set in the European part of Russia as a raw materials base for cellulose and paper plants (Korchagov 2010). However, they haven't obtained acknowledgement in society and are still not studied well. Moreover, an obvious interest to raw materials plantations could be formed with agricultural business as an alternative in usage of lands taken from agricultural turnover. According to an academician A.I. Pisarenko, forest plantations possess high efficiency. Thus, average growth of the stock at the plantation of larch-tree in Quebec constitutes 5–8 m<sup>3</sup>/ha at the age of 5–10, and at the age of 20–25 it is possible to have lumber log (Pisarenko and Strakhov 2014).

The Forest Code of the RF (2006) envisages creation of forest plantations and their exploitation as a type of forest use that is entrepreneurial activities. Moreover, development of plantation forest breeding is envisaged by the state program “Development of forestry for 2013–2020”. Let us emphasize the fact that as a result of creation and exploitation of forest plantations, pressure of lumbering on natural forests decreases, which is very important in terms of ecology.

To answer the question of attractiveness of plantation forest breeding with business, it is necessary to view not only legal but economic possibilities for their creation and exploitation.

## 2 Methods

Within the research, analysis of costs of creation and exploitation of plantations is performed. With the help of a survey among managers of forestry sphere enterprises, evaluation of risks and income during creation and exploitation of forest plantations was performed. For processing of the received information, the method of generalization by collection and grouping of the data was used.

The research is based on the hypothesis that forestry business is interested in accelerated growing of balance timber for manufacture of cellulose and timber plates and strives for minimization of production costs, which is possible during application of biotechnologies of growing of tree plants. The authors used the methods of comparison and observation in part of:

- survey of representatives of forest business and scientific society of Central Black Earth region of the RF on the issues of creation of forest plantations and application of biotechnologies;
- calculation of production and full cost of growing of planting stock with the methods of biotechnologies.
- desk study which includes analysis of current demand for products of biotechnologies in forestry sector and the possibility for creation of forest plantations with the application of biotechnologies.

During determination of full cost of planting stock *in vitro*, the authors founded on the idea that it was formed by adding production cost and overhead costs. Calculations envisage two variants of technology of obtaining planting stock (micro bud woods) *in vitro*:

- full cycle—from taking the initial material to receipt of planting stock in cultures in tubes—in *in vitro*.
- obtaining planting stock *in vitro* on the basis of long preservation *in vitro*.

According to the first technology, receipt of planting stock *in vitro* is performed from the parent plant, with direct receipt of the initial material in natural conditions of growing. This technology was considered to be basic.

According to the second technology, view in this work, the initial material for micro-cloning is plants “introduced in culture” and constituting collectible material that has been preserved for a long time.

For each type of work, the structure of laboratory equipment, necessary volume of materials, and labor costs were determined (Mashkina 2016).

### 3 Results

It should be noted that entrepreneurial interest to creation of forest plantations is formed in view of the following factors:

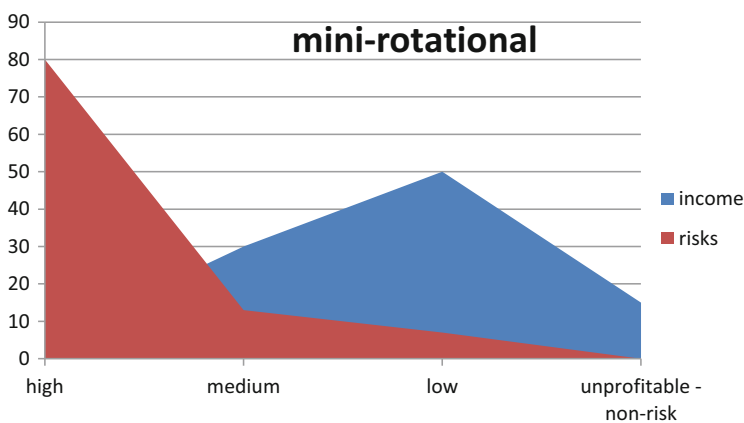
- organizational and legal form of enterprise’s activities, scale of activities, and specialization;
- state of resource base (financial, material, HR, information, etc.);
- demand for products, competition in the market segment;
- organization of production, technique, technologies, logistics, etc.
- natural and climate conditions;
- total costs of activities.

It is known that depending on the age of main cutting, forest plantation could be mini-rotational (from 1 year to 10 years and density of planting exceeding 20,000 plants per 1 ha), medium-rotational (from 11 years to 25 years and density of planting from 5000 to 20,000 plants per 1 ha) and maxi-rotational (more than 26 years and density of planting from 2000 to 5000 plants per 1 ha).

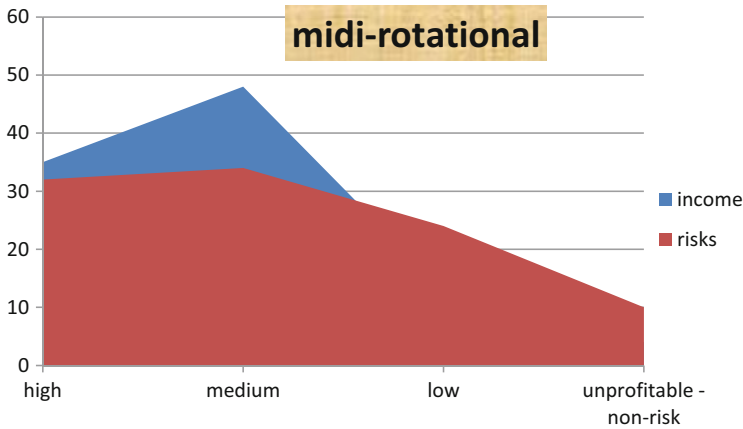
Age of cutting (or turnover) of forest plantations, together with assortment and agricultural technique of growing, influences significantly the entrepreneurial income and risks (Fig. 1).

The result of the survey of representatives of forestry business and scientific society of the Central Black Earth region of the RF allowed determining that the most risky and unprofitable—according to the survey participants—are forest plantations with minimal turnover of cutting.

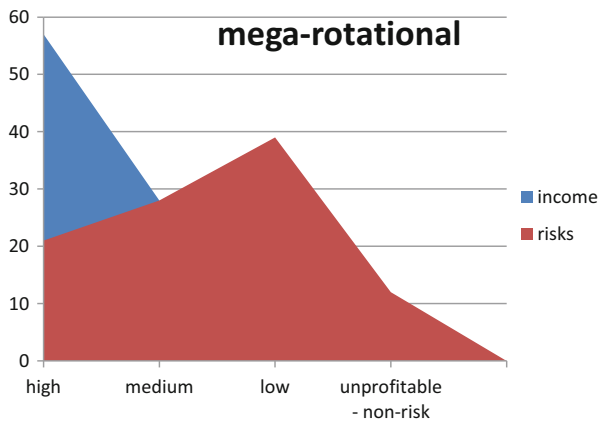
Risks and expenses are maximal for mini-rotational plantations with short turnover of cutting of forest plants for manufacture of biomass and do not bring enough profit from its processing in many regions of the world (Weetman 2000).



**Fig. 1** Ratio of revenues and risks during creation of mini-rotational plantations in expert evaluations



**Fig. 2** Ratio of revenues and risks during creation of medium-rotational plantations in expert evaluations



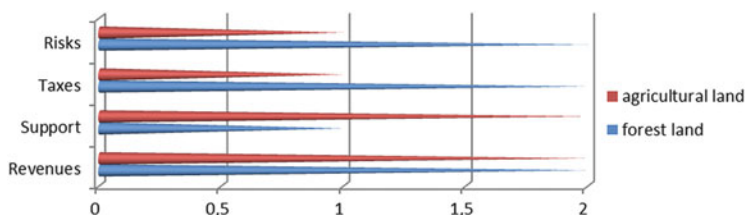
**Fig. 3** Ratio of revenues and risks during creation of maxi-rotational plantations in expert evaluations

With increase of age of cutting, risk of business decreases and revenues grow. The reasons of positive development of business are availability of processing capacities for small-size timber and insignificant, but sustainable, growth (Fig. 2).

The largest entrepreneurial interest is presented by plantations with rotation turnover of more than 26 years (Fig. 3).

Presence of technologies of storage and processing of timber allows providing stable income with acceptable level of risk. At that, most of the experts assigned this type of entrepreneurial activity to profitable and not risky.

Then, a criterion of entrepreneurial certainty in effectiveness of creation of agricultural forestry plantations is combination of acceptable level of income



**Fig. 4** Criteria of entrepreneurial certainty during creation of forestry plantations

with admissible risk. Very important indicators are support measures and tax subsidies. Viewing the entrepreneurship in forestry, it is possible to state that over 2007–2015, not a single targeted program of support was realized for it. In this aspect, development of agricultural forestry seems more attractive.

The conducted survey of entrepreneurs on the issues of attractiveness of creation of forestry plantations on the territory of forest fund and lands of other categories allowed determining that a large part of entrepreneurs that work in the forestry sphere of the central part of Russia are not sure in effectiveness of plantation forest breeding.

Large part of forestry measures (creation of plantations, looking after plants) is related to risk and uncertainty in receipt of final result, due to long time intervals of growing of plantation cultures.

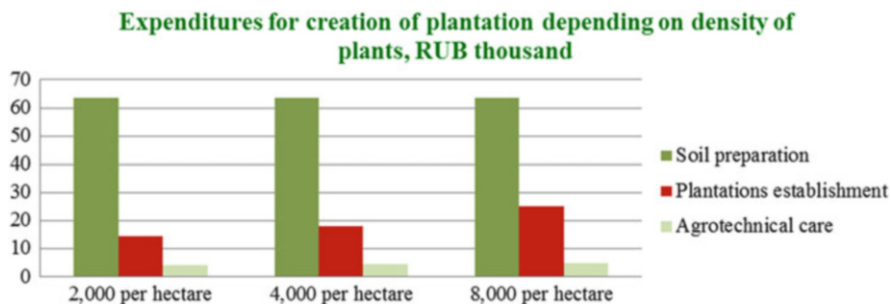
At the same time, subsidies and support in agriculture open new perspectives for agricultural forest breeding, which pre-determines growing interest with entrepreneurial structures (Fig. 4).

Of all categories of lands, the purpose of creation of forest plantations is satisfied by lands of agricultural purpose, without trees or bushes.

In this aspect, we deem it expedient to create agricultural forestry enterprises that specialize on growing of plantation cultures. In its turn, lands with low level of soil fertility, excluded from agricultural use and with tree planting, could be used for this purpose.

Economically expedient plantation forestry is based on combination of two conditions—turnover of cutting for the criterion of maximum of targeted assortments and price for assortments that is sufficient for compensation of production costs that emerge in the process of cutting turnover. In view of that, creation of tree plantations, depending on the initial state of plots and categories of lands, it is necessary to envisage the following:

- organizational measures for development of the project of creation of plantations;
- measures that ensure preparation of soil for establishment of plantations;
- main measures for establishment of plantations;
- measures of agro-technical care for plantation forest cultures.



**Fig. 5** Expenditures for creation of forest plantations depending on density of plants

We have performed calculations for determination of costs for each phase of the works and found out that total expenditures of a business structure for creation of 1 ha of forest plantations are significant and vary depending on the density of plantation from 2000 to 8000 plants per 1 ha (Fig. 5).

At the initial stage of creation of plantations, it is necessary to perform design works, work on selection of the land plot and soil preparation, and technical and economic substantiation of the project. At that, initial expenses could constitute up to 75 % in the structure of total expenses for creation of forest plantations. At that, for each plot of created forest plantations or complex of plots, rented for creation of plantations of one type for the intended use and intended breed, a project for creation and exploitation is developed that includes the whole list of applied measures, terms of their conduct, volume and results of works, and expenses for them. In our opinion, such substantial one-time expenses should be based on significant investments into agricultural forest breeding and plantation forest breeding.

The second stage of creation of forest plantations is related to their establishment—purchase of planting stock and planting it according to the selected technology and technique. The volume of expenditures at this phase determines the type of planting stock and the applied technique of planting on silvicultural area. The share of expenditures for this phase of works in expenditures for creation of forestry plantations does not exceed 30 %.

The last stage of creation of plantations is the longest one and is related to agrotechnical care—it accounts for no more than 5 %.

Thus, by the moment of cutting or by the end of the first rotation, production cost of 1 ha of forest plantations at the level of RUB 82,000–93,000 per 1 ha is formed.

As per 1 plant, these expenses could constitute from RUB 11.6 to RUB 41—depending on density of planting. Due to obvious reasons, the smallest expenses per 1 plant are observed with forest plantations with maximal density of creation—for our variant, it is 8000 per 1 ha.

During transition of forest plantation to cutting, it is only logical to presume the following phases of works and elements of expenses:

- direct expenses for storage according to the selected technology (technique, turnover of cutting);
- expenses for transport and logistics to the processing spot;
- expenses for initial processing (according to the selected technology technique, and turnover of cutting);
- expenses for marketing and sales of final products;
- expenses for payment of mandatory taxes (according to tax rates and regional coefficients);
- expenses for payment of forest tax.

The volume of these expenses is higher and it should be covered by revenues from sales of the final products; at that, reduction of turnover of cutting and increase of the quantity of rotations influence the entrepreneurial revenues positively. In this regard, a large contribution into reduction of turnover of cutting and, as a consequence, reduction of production costs, could be done by biotechnologies. For example, genetically improved plantings of woody species which are capable to increase the growth by 10–15 %, as compared to control samples (DeForest et al. 1991).

During creation of forest raw materials plantations with the use of biotechnologies, it is necessary to understand that the whole process could be represented by the following work phases:

- 1st phase—selection of biological material with the following creation of the collection of long storage;
- 2nd phase—multiplication of regenerates;
- 3rd phase—additional growing of micro-plants;
- 4th phase—establishment of plantations;
- 5th phase—exploitation of plantations.

At that, two variants of creation of forest raw materials plantations on the territory of forest funds and lands taken from the agricultural turnover are possible.

The 4th and 5th phases are related to the technology of creation and expenditures for these phases depend on various factors. For the variant of creation of forest raw materials “from the scratch”, the law-creating factors are type of plantation, age (turnover) of cutting; woody species; method of tollage; location; density; agro-technical care.

For the variant of formation of plantations from existing plantings, the law-creating factors are the state of natural renewal and measures for plants care.

For each phase, normative costs are formed on the basis of study of experience of creation of forest raw materials plantations in the subjects of the RF in view of law-creating factors.

Then, for the purpose of creation of plantations, the cost of planting stock in vitro is very interesting. We have performed calculations and conducted analysis of planting stock in vitro from existing collection of long preservation and receipt of planting material in vitro from parent plant. For *Populus alba*, grown with the help



**Table 1** Economic indicators for receipt of planting material of *Populus alba* in culture in vitro for the full cycle on the basis of long-preserved collection

Indicator	Method of receipt of planting material in culture in vitro	
	For full cycle	Based on the long-preserved collection
Amortization of equipment, expenses for machines, RUB	9771.3	15,013.47
Wages, RUB	28,503.25	29,072.81
Materials, RUB	8901.63	11,792.31
Electric energy, RUB	8638.8	13,655.64
Total production cost, RUB	55,814.69	69,534.23
Overhead expenses, RUB	13,953.67	17,383.56
Full cost, RUB	69,768.36	86,917.79
Micro budwoods	3052	3052
Production cost of regenerator, RUB	18.29	22.78
Overhead expenses of regenerator, RUB	4.57	5.70
Full cost of regenerator, RUB	22.86	28.48

of biotechnologies, it is determined that depending on the method of receipt of planting material, full cost of 1 plant constitutes RUB 22.8–28.4 (Table 1).

In comparative technology, expenses for growing planting material in vitro are higher than the basic variant by 20 %. This is caused by increase of the quantity of rotations for implementation of explants in the culture in vitro and receipt of micro-plants fit for formation of collection and multiplication of regenerators. Expenses for these types of works in production cost constitute RUB 9868.92. Moreover, the cost of growing of planting material in vitro from the collection included expenses for its preservation during six months, which constitutes RUB 10,452.86, or 29 %.

It should be noted that during the use of biotechnologies and establishment of forest plantations, expenses grow significantly (Table 2).

Depending on density of plantings, they vary from RUB 178,400 to RUB 478,000 per hectare, which is by several times higher than during creation of forest plantations with the traditional planting material.

## 4 Discussion

Creation of forest plantations in the world is related to growing of quickly growing and popular forest tree species (as a rule, of seed origin), in which growth of timber as to the stock exceed the growth of usual forest crops.

Over the decades of genetics and selection works in forestry of Russia, a huge potential of new forms, sorts, and hybrids was accumulated. Many of them could be used for creation of forest plantations. Growing of planting material of improved quality with the use of biotechnologies for the purpose of creation of forest

**Table 2** Expenses for creation of forest plantations with the use of biotechnologies

Phase of work and formation of expenses	Expenses, RUB per 1 ha with density of planting		
	2000.0	4000.0	8000.0
Production of micro-clones	45,720	91,440	182,880
Additional growing of micro-clones	50,640	10,1200	202,400
Preparation of soil for forest plantation	63,427	63,427	63,427
Establishment of forest plantation	14,455	17,996	25,096
Agro-care for forest plantation	4214	4214	4214
Total expenses per 1 ha	178,456	278,277	478,017
As per 1 plant	89.2	69.5	59.8

plantations is rather perspective (Brown 1976). Plantation growing, oriented at quick production of balance timber, supposes high level of the use of selection planting material, intensive agro-technique, forest breeding care, and melioration (Marris 2009). The obtained results show that wider application of biotechnologies in practice is restrained by a set of economic, material & technical, and information limitations.

Mass character of plantation forest breeding and agricultural forest breeding is restrained by not only underdevelopment of legal and lack of economically substantiated projects, but also by lack of support measures at all levels of executive power (Morkovina 2015).

Due to that, entrepreneurial structures are not fully interested in creation of plantations (Morkovina 2014a, b). This task could be solved by development and establishment of the State program for support for development of agricultural forest breeding and plantation forest breeding. The program should envisage economic mechanisms of stimulation of development of plantation forest breeding. Development of forest complex under the modern conditions should be accompanied by organization of industrial production of timber at forest plantations of increased efficiency with reduced turnover of cutting.

## 5 Conclusions

Forestry sphere of economy requires high-quality and accessible timber raw materials, which could be received with creation of forest plantations with short turnover of cutting. In the sphere of creation of forest plantations, the works should be conducted at all directions—selection for the biomass, receipt of balance timber, cellulose, etc.

However, long term and large volume of investments into creation of forest plantations on forest lands and former agricultural or degraded lands under the Russian conditions make this process unprofitable. There's a necessity for objective evaluation of availability of forest plantations and quantitative and qualitative evaluation of perspective lands, which will allow making necessary managerial decisions in the sphere of optimization of species structure, system of machines,

and technology and establishment of the program for support for development of forestry business.

Achievement of main goals of plantation growing—increase of targeted timber use in volumes and quality—is done with the help of a complex of special measures of intensification of growing with the help of corresponding agro-technique of creation—establishment of plantation of forest crop and care for them, as well as selection of cultivated types of plants. The most important role in this belongs to biotechnologies.

Within the support for processes in forestry sector, it is necessary to provide subsidies and targeted assets for entrepreneurial structures which conduct activities on plantation forestry and agricultural forest breeding for compensation of a part of suffered expenses caused by purchase of forest plants grown with the help of biotechnologies.

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**Part IV**  
**Methodological Approaches to**  
**Measurement of Sustainable Development**  
**of Industrial Enterprises Under the**  
**Conditions of Integration and Clustering**

# Educational Clusters as a Factor of Development of Educational Services Market in Region

Irina A. Morozova, Mikhail N. Mysin, Sergey A. Gryaznov,  
and Stanislav S. Yatsechko

**Abstract** The purpose of the article is study of educational clusters as a factor of development of educational services market in the region. The methodology of this research is based on the method of economic and mathematical modeling of the state and development of socio-economic systems and method of factor analysis, with the help of which a model of educational services market in the region is built and influence of various factors on it is determined. The authors determine the sense and specifics of educational clusters, compile economic & mathematical model of development of educational services market in the region, determine main factors of development of educational services market in the region, define the role of educational clusters in development of educational services market in the region, determine perspectives of their development, and compile corresponding authors' recommendations. As a result of the research, the authors come to the conclusion that under the conditions of global competition, clustering is an important source of competitive advantages of educational establishments in the region. Ignoring the possibilities and perspectives of creation of educational clusters could be a serious threat to development of educational services market in the regions of Russia, especially under the condition of absence of other factors of development of this market.

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## 1 Introduction

One of the recent tendencies of development of modern Russian educational services market is its regionalization. Initially, educational services market in Russia was organized according to the network principle with placement of so called “main” universities in the capital or another city and creation of multiple branches of these universities in other regions of the country. At present, there is an opposite tendency of creation of a main university in each region. This is done for the purpose of increase of accessibility and quality of educational services in regions of Russia and increase of independence of educational establishments.

These tendencies are manifested in the phenomenon of supporting university. It is a state educational establishment acknowledged as a key player in educational services market in this region and it receives corresponding financing. During establishment of a regional supporting university, it includes the largest state universities of the region. As a result, several academic blocks are joined, which have earlier belonged to various universities, and organizational structure is complicated.

Creation of regional supporting universities provides advantages for the region and the state. Firstly, it is easier to manage large structures. Thus, while performing scheduled checks and issuing licenses, controlling bodies of public authorities have to conduct audit of much lower number of educational establishments. This ensures significant saving of time and money. At that, maintenance of documentation for regional supporting universities is also simplified, as instead of multiple repetition of required volume of work, each separate university performs one-time work with documentation within a common supporting university.

Secondly, it is easier for large structures to protect interests of their region and to receive state preferences. Thus, regional supporting universities receive larger volume of financing than separate universities within their structure. Moreover, supporting universities receive larger state order for educational services. The state allocates more state-funded places in the top-priority directions in such educational establishments, which allows preparing more specialists for the region on a state-funded basis and increases the prestige of regional supporting universities.

Despite the stated advantages, due to creation of regional supporting universities, the problem of functioning of universities which do not belong to them grows in regional markets of educational services. Under the influence of market mechanisms, a lot of private commercial universities appeared in regions of Russia recently. They have smaller areas, educational blocks, and equipment, they are financed by means of their own sources, and provide paid educational services.

Having no state support and state financing, they have to compete in the market independently. They function by the principles of conduct of entrepreneurial activities and provide competitive entrepreneurial environment in the educational services market. Private universities have large flexibility, providing development of educational programs. They are drivers of modernization of educational services market and stimulate its commercialization.

Under the conditions of formation of regional supporting universities, oligopolization of regional markets of educational services takes place, which largely complicates economic conditions for small private universities. This research is aimed at solving the problem of their functioning under the modern economic conditions. The work offers a hypothesis that enlargement of private universities and their joining the educational clusters in the regions of Russia will stimulate development of educational services market in the region. The purpose of the article is verification of the offered hypothesis and study of educational clusters as a factor of development of educational services market in the region.

## 2 Literature Overview

Under the conditions of market economy, market mechanisms form and work in the sphere of education (Murashko and Nazarko 2015). That's why education acquires commercial nature in the whole world, and educational establishments function on the basis of market laws, with entrepreneurial culture formed in their environment (Kisida and Wolf 2015). Educational services market is a totality of educational establishments providing educational services, their consumers, and interested parties (Ivanenko et al. 2014), which include the state, as a controlling body and representative of demand for educational services through the system of state order for training of specialists, and employers which indirectly form demand for educational services, etc. (Croce and Ghignoni 2015).

Sellers in educational services market are educational establishments, which are presented by universities in the segment of higher education (Bol and van de Werfhorst 2013). The product in this market is educational services which are services for increase of the level of knowledge, acquisition of new or improvement of existing skills, and increase of the level of culture, upbringing, etc. (Weßling et al. 2015). There are also investors, students' relatives, and other interested parties in the educational services market (Popkova et al. 2015). The state coordinates activities of members of educational services market (Chashchin et al. 2013).

Educational services market is closely connected to labor market—these markets are complimentary (Wang and Vallance 2015). Educational programs are formed depending on knowledge and skills which are necessary in labor market, and high school graduates show demand for specialties which are most popular in the labor market (Osipov and Matveeva 2015). In regional educational services market, regional peculiarities of demand and offer of educational services are manifested most vividly (Schmidt and Molkentin 2015).

Educational services could be provided on a paid or state-funded basis, being free for students, as their education is covered by the state (Ivanova et al. 2015). Specifics of educational services market consists in the fact that educational services are not a commodity—as an economic good—for features of public good dominate in them (Horta et al. 2015). That's why the role of the state in educational services market is rather high (Harrington and Maysami 2015). The issues of

development educational services market are viewed in detail in the works by Morozova and Popkova (2014), Morozova (2015), and Morozova et al. (2015).

Educational cluster is an integration association of a range of educational establishments (Noor and Crossley 2013), in segment of higher education—of universities, with formation of common brand and preservation of their full economic independence (Larionova et al. 2015). As a rule, initiators of educational clusters are educational establishments (Timiryasova et al. 2015)—though their activities is largely regulated by the state (Safin and Korchagin 2015). Clustering is a relatively new phenomenon for educational services market (Larionova et al. 2014)—so nowadays there aren't many examples of educational clusters (Gavrilov and Yaw 2013).

Literature analysis on the topic of the research showed that the level of elaboration of the topic of the research is rather high, and there is a large number of works by modern authors from various countries devoted to study of issues related to educational services market, its regional peculiarities and educational clusters. However, these works do not pay attention to analysis of the role of educational clusters in development of regional educational services market, which stipulates necessity for further research in this sphere.

### **3 Materials and Methods of the Research**

Methodology of this research is based on the method of economic and mathematical modeling of the state and development of socio-economic systems and method of factor analysis, with the help of which the model of educational services market in the region is built and influence of various factors on it is determined. The work also uses the method of problem and systemic analysis, induction, deduction, and synthesis.

The object of this research is the sphere of higher education, as a special segment of regional educational services market. The topic of the research is organizational and economic ties and relations which emerge in the sphere of higher education in the process of formation of educational clusters in view of development of educational services market in the region.

## **4 Results**

### ***4.1 Sense and Specifics of Educational Clusters***

Under the conditions of globalization, the global educational environment becomes larger. Together with development of informational and communicational technologies and expansion of their use in the sphere of education, this leads to increase of possibilities of remote provision of educational services. A possibility of remote access to educational resources from various countries of the world increases applicants' interest to receipt of education abroad.



Being obliged to compete with the oldest and popular educational establishments, regional universities strive to maximally use available tools for supporting and increasing their competitiveness. One of the most effective and popular tools is formation of educational clusters, as, joining into clusters, educational establishments receive a possibility for raising the total share of the market and keeping their market positions.

While in educational clusters, universities can effectively exchange new knowledge and educational technologies, develop educational programs, perform investment projects for implementation of the newest educational technologies which have been inaccessible outside the cluster etc. The key advantages of educational clusters are activation of innovative activities of cluster members, strengthening of the cluster members' brand, and attraction of large total number of applicants into educational establishments of the cluster.

While separate educational establishments in the region cannot successively compete with regional supporting universities or, moreover, larger foreign universities, their attractiveness and competitiveness grow significantly if they are in clusters. The sense of educational clusters is expressed in joining the efforts of various educational establishments in the region for joint attraction of applicants and maximization of total competitiveness. Specifics of educational clusters consists in necessity for finding balance between commercial interests and social responsibility as suppliers of educational services which represent public goods to a large extent.

## ***4.2 Factors of Development of Educational Services Market in Region***

This work offers the following economic & mathematical model of development of educational services market in the region:

$$DES_{\text{region}} = (VF + IA + LM + VD) * (CR/SR) \quad (1)$$

where  $DES_{\text{region}}$ —development educational services market in region;  
 VF—volume of financing of development of educational services market in region;  
 IA—innovational activity of educational establishments in region;  
 LM—level of cooperation and correspondence of the rank of educational services in region to requirements of labor market;  
 VD—volume of demand for educational services in region;  
 CR—level of competition in educational services market in region;  
 SR—state regulation of educational services market in region.

As is seen from formula (1), development of educational services market in region is influenced by the following main factors:

- Volume of financing of development of educational services market in region.  
Attraction of state and private investments into development of regional

educational services market is necessary for supporting and renovating the buildings and equipment of educational establishments, as well as for implementation of innovations into educational process. State financing is an external factor as to regional educational services market in region, and private investments of educational establishments are an internal factor;

- Innovational activity of educational establishments in region. The more often educational programs are updated, depending on peculiarities of change of demand for educational services in region, the more actively innovational technologies are used in educational process and the more actively this market develops. Innovational activity is an internal factor as to this market;
- Level of cooperation and correspondence of the rank of educational services in region to requirements of labor market. The more the offered directions of specialists' training and educational programs correspond to tendencies of development of labor market, the more developed the educational services market in region is. Establishment of relations with employers is an internal factor of educational services market;
- Volume of demand for educational services in region. The larger the demand for services of regional educational establishments, the more developed this market is, as new universities appear which strive to maximally correspond to requirements of applicants and educational establishments of region receive necessary financing—from the state within state educational programs and from consumers within provision of educational services on a paid basis. Demand for educational services is determined by demographic situation and number of applicants, which is an external factors as to this market, and by level of attractiveness of educational establishments, which is an internal factor;
- Level of competition in educational services market in region. The higher the level of competition in the market, the more stimuli educational establishments have for improvement of their activities and increase of economic effectiveness. The level of competition depends not only on educational establishments in region but on other universities which are represented in the global educational environment, so it is an external factor as to the studied factor;
- State regulation of educational services market in the region. The state performs licensing and control over activities of educational establishments in region and sets educational standards. It can slow down or stimulate development of this market. State regulation is external factors as to educational services market in the region.

Clustering stimulates increase of positive influence of internal factors of development of educational services market in region: attraction of investments by means of uniting the capital of cluster members, growth of their innovational activity, increase of their attractiveness for consumers, and increase of demand for educational services in region. Therefore, educational clusters are a factor of development of educational services market in region.

### ***4.3 Role of Educational Clusters in Development of Educational Services Market in Region***

Educational clusters stimulate development of educational services market in region due to a range of reasons. Firstly, educational clusters perform a role of internal market regulators of educational services market in region. Establishment of regional supporting universities leads to oligopolization of this market, and creation of educational clusters—to preservation and increase of competition, both in the market and among cluster members.

Secondly, educational clusters perform coordinating function in educational services market in region. Clusters help their educational establishments to form a common strategy of development and opposing competition with large market players and to jointly solve various problems in their work. Besides, while in clusters, it is easier for regional educational establishments to obtain state support and credit resources.

Thirdly, educational clusters stimulate increase of innovational activity of members of educational services market in region. Taking into account that regional supporting universities are state and, therefore, are not inclined for implementation of innovations, clustering is an important mechanism of innovational development of educational services market in regions of Russia.

At present, the tendency for clustering of educational services market is not popular in regions of Russia. The most serious obstacles for formation of educational clusters in Russia is lack of complete normative and legal base in the sphere of clustering of economy, lack of stimuli for clustering in the sphere of education, and educational establishments' being unready for cooperation and unification into clusters.

Perspectives of activation of cluster initiative in regional educational services market and development of cluster processes in regions of modern Russia are related to creation of normative and legal basis for clustering of Russian economy and creation of regional supporting universities, which leads to objective necessity for clustering of other members of the market. This supposes growth of state interest in development of regional educational services market.

## **5 Discussion**

Thus, as a result of the research the offered hypothesis was proved, which confirms the correctness of attribution of educational clusters to the factors of development of educational services market in region. Enlargement of private universities and their joining the educational clusters in regions of Russia will really stimulate development of educational services market in region. The following recommendations for activation of cluster initiative in the region are offered:

- creation of a special state commission for explaining possibilities and perspectives of clustering for educational establishments in regions of Russia;
- popularization of cluster initiatives at regional educational services market at the state level;

- provision of additional state financing for educational clusters at initial stage of start of the tendency of clustering of educational services market in regions of Russia.

Implementation of these recommendations will allow attracting attention of small and medium private educational establishments in regions of Russia to the issue of creation of educational clusters.

## 6 Conclusion

It should be concluded that despite a relative novelty of the very idea of creation of educational clusters in Russia, it is possible to expect the appearance of the first educational clusters in Russian regions, and in the long term it is possible to expect massive clustering of Russian educational services market in regions. This will allow Russian educational establishments in educational clusters not only to preserve their positions at regional and national level but also to pretend for high positions in the global educational services market and become rivals for educational establishments with global brands.

Under the conditions of the global competition, clustering is an important source of competitive advantages of educational establishments in region. Ignoring the possibilities and perspectives of creation of educational clusters could be a serious threat to development of educational services market in regions of Russia, especially with lack of other factors of development of this market.

The work sets conceptual foundations for use of educational clusters as a tool of development of educational services market in region. The work contributes into development of the concept of regionalization of educational services market, clustering of educational establishments, and theory of provision of competitiveness of educational establishments. Based on the authors' conclusions, it is possible to recommend creation of educational clusters for development of educational services market in region, which determines high practical significance of this work.

This research is performed by the example of educational services market of modern Russia, so conclusions and recommendations are oriented at this market. Development of these recommendations and conduct of similar research by the example of other countries of the world for the purpose of distribution of the received conclusions on them provide perspectives for further research in this sphere.

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# Development of Entrepreneurial Component and a Factor of Increase of Effectiveness of Cluster Structures Management

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**Abstract** The article is devoted to study of perspectives of increase of effectiveness of cluster structures management by means of development of entrepreneurial component. For determination of the level of effectiveness of cluster structures management, the work uses the method of structural and logical modeling and builds a model for determination of effectiveness cluster structures management with the help of economic and mathematical instrumentarium. In the process of the research, the authors determine peculiarities of cluster structures management, determine factors of effectiveness of cluster structures management, outline perspectives of increase of effectiveness of cluster structures management by means of development of entrepreneurial component, and offer recommendations for development of entrepreneurial component of cluster structures management. The performed analysis showed that development of entrepreneurial component positively influences all factors of effectiveness of cluster structures management. Therefore, effectiveness of cluster structures management could be increased by means of maximization of use the market mechanism and organization of self-management of clusters. This is done by means of development of entrepreneurial components in the process of cluster structures management.

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## 1 Introduction

Clusters play an important role in development of modern economic systems. Due to clustering of economy, its competitiveness and investment attractiveness grow, and higher rate of economic growth is achieved. Despite the growth of entrepreneurial structures in the process of their unification into clusters, competition is preserved in the market and among cluster members. This makes cluster structures unique as to their nature, as stimulation of cluster processes is an indirect measure of state regulation of economy, based on action of market mechanism and realization of own cluster initiatives of enterprises in the market.

At present, cluster structures are viewed in many countries as an effective solution for finding a balance of interests of entrepreneurs and consumers. Thus, on the one hand, clustering stimulates preservation and support for national production, and, on the other hand, does not hinder appearance of new, including foreign, players in the market, thus supporting healthy competition. As a result, there is stimulation of innovational activity which ensures increase of quality and diversity of products in the market and reduction of its price, which is a main landmark for development of modern socio-economic systems.

Clusters also allow developing international cooperation. Within realization of transnational cluster initiatives, entrepreneurial structures from various countries and regions of the world unite. This simplifies national enterprises' entering new markets and strengthens their positions in the international arena. Transnational clusters stimulate growth of rates of economic growth of all countries, members of which are represented in clusters. They are a perspective tool of development of foreign economic relations and stimulate development of international integration processes.

As any complex multi-component systems, clusters require special attention to the issues of management. Even at the level of separate enterprise, coordination of actions of various departments is a difficult task—despite the fact that they all seek the same goal—and at the level of cluster the complexity of management growth manifold, as interests of cluster members largely differ. At that, it is necessary to find consensus of not only interests of various enterprises within the cluster but of their private interests and common interests of development of cluster entity.

Issues of clusters management become the most difficult in case of their branched structure, when cluster includes not only horizontally integrated enterprises-rivals but also vertically integrated enterprises of the common chain of creation of added value, R&D centers, investment funds, etc. Due to the important role of cluster entities in development of economy, the state is interested in their development and strives for direct or indirect participation in their management.

As it is known, the state cannot provide high economic effectiveness of management, so there appears a problem of increase of effectiveness of cluster structures management. This article is devoted to solving this problem. The authors offer a hypothesis that effectiveness of cluster structures management could be increased by means of maximization of the use of the mechanism of market and organizations of clusters self-management. This requires increase of the role of entrepreneurial component in the process of cluster structures management. The purpose of the

article is to verify the offered hypothesis and study perspectives of increase of effectiveness of cluster structures management by means of development of entrepreneurial component.

## 2 Literature Overview

Entrepreneurial activities form foundations of modern market economy (Chowdhury et al. 2015). The higher the entrepreneurial activity in economic system, the higher the rates of its development, the better its position in the global economy, and the more perspective it is (Woolley 2014). Entrepreneurial activity depends on the type of socio-economic system, state economic policy, conditions for business, and investment attractiveness of economy (Scholman et al. 2015).

The most important characteristics of entrepreneurial activities are sectorial specifics, innovative activity, level of production capacities use, etc. (Ahking 2015). The state plays an important role in regulation of entrepreneurial activity in economy, setting “rules of the game” for business structures and controlling their execution (Malikov et al. 2015). The state is mostly interested in development of the top-priority spheres of economy, so it stimulates entrepreneurial activity in them (Nadtochey 2011).

Clustering of economy leads to change of its structure and enlargement of enterprises, which stimulates increase of corporate responsibility (Ibert et al. 2015). Economic clusters are created in various spheres of economy and in joint spheres (Yang et al. 2015). As clustering ensures inflow of investment resources and increase of innovational activity of enterprises in the market and stimulates competition and development of entrepreneurship, regions and countries are interested in creation of clusters on their territory and actively compete for such possibility (Razvadovskaya et al. 2015).

Many countries conduct the whole cluster policy aimed at creation of favorable conditions for clustering of economy and development of existing clusters (Murzabekov et al. 2015). The most popularity was achieved by clusters of small and medium enterprises, as joining cluster structures allows them to compete with large entrepreneurial structures (Zakharova et al. 2015). Clusters stipulate economic growth and development of modern economic systems (Popkova et al. 2013a).

Structure of cluster entities could be various: clusters may join around one or several leaders or may not have a leader at all (Veselovsky et al. 2015). While in a cluster, enterprises can unite their capitals for strengthening of the common brand of cluster and have common budget, realize joint investment and innovational projects (Ganushchak-Yefimenko 2015). Management of cluster structures may be performed by the leader of a cluster or by all or selected members of a cluster with participation of other interested parties, including the state (Bocquet and Mothe 2015).

Complexity of cluster structures management consists in necessity for organization of joint activities of various members of cluster and provision of their successful interaction (Coletti and Di Maria 2015). Effectiveness of cluster structures management is largely determined by unity of market policy of cluster members and capability for promotion of the goals of development of cluster in



the market (Knop 2015). Preservation of unity and integrity of cluster entity and provision of its development (growth of added value) is the most important criterion of effectiveness of cluster structures management (Popkova et al. 2013b).

As a result of literature overview on the topic of the research, it is possible to conclude that the concept of entrepreneurial activities and clustering of economy is well-developed and viewed in multiple works of modern authors. However, they pay insufficient attention to issues of increase of effectiveness of cluster structures management and to its relation to entrepreneurial component. Thus, it is necessary to conduct further research, related to study of the sense and perspectives of development of entrepreneurial component as a factor of increase of effectiveness of cluster structures management.

### 3 Research Materials and Methods

For determination of the level of effectiveness of cluster structures management, this work uses the method of structural and logical modeling which supposes the use of economic and mathematical instrumentarium. The proprietary model is used for determination of the main factors of effectiveness of cluster structures management. During the conduct of the research, the authors also use the method of systemic and problem analysis, synthesis, induction, deduction, and other general scientific methods of the research.

## 4 Results

### 4.1 Peculiarities of Cluster Structures Management

Organizational structure of cluster entities is characterized by high complexity due to a large number of structural elements and multiple connections between them. In a generalized form, cluster structure includes the following key components (Morozova and Volkov 2014):

- core of cluster—cluster forms around them, and they are the largest and the most successful enterprises;
- managerial apparatus of cluster—it can coincide with other cluster members or even be external as to the cluster;
- peripheral enterprises—enterprises which manufacture products that are a basis of cluster;
- R&D centers—they do not manufacture any products but create innovational technologies necessary for development of cluster and its members;
- suppliers of resources—suppliers of raw materials, investments, equipment, etc., which can be within a cluster or outside it.

Thus, during the process of cluster structures management, it is necessary to solve a large number of issues. Management of cluster is built on the basis of the principle of optimality according to Pareto and supposes constant regulation of contradictions of interests of various members of cluster, balancing their possibilities and striving for maximization of general usefulness and maximally possible improvement of the position of all enterprises in a cluster structure.

Despite a wide diversity of opinions of cluster members regarding perspectives of its development, it is necessary to select a common strategy and realize common policy of a cluster, ensure its execution by all cluster members, and coordinate their actions. It is also necessary to manage external relations of cluster and its connections with consumers, suppliers, investors, state, and rivals in the market, etc.; it is necessary to take into account a lot of factors during management of cluster structure. It is possible to distinguish the following main peculiarities of cluster structures management (Morozova et al. 2013):

- necessity for paying special attention to management of network management of cluster members;
- domination of process approach to cluster management due to a large diversity of managerial processes;
- strict limitation of budget, as participation in a cluster should provide more advantages than expenses, related to its management, to enterprises;
- necessity for stimulation of competition and provision of equality and profit for cluster members.

These peculiarities determine high complexity and multidimensionality of the process of cluster structures management.

## ***4.2 Factors of Effectiveness of Cluster Structures Management***

Economic effectiveness is traditionally defined as ratio of profit to costs of its provision. In the context of cluster structures management, at the input of this process there are managerial costs, at the output—profit related to successful functioning and development of a cluster. Structural and logical model for determination of effectiveness of cluster structures management with the help of economic and mathematical instrumentarium has the following formula form:

$$E_{cm} = (CP \times (TV + IP) + SB + CC + LRS) / ME \quad (1)$$

$E_{cm}$ —effectiveness of cluster structures management;

$CP$ —cost of production by cluster members;

$TV$ —total volume of production of regular goods by cluster members;

$IP$ —total volume of production of innovational products by cluster members;

SB—strength of brand of cluster structure;  
CC—closeness of connection of cluster members;  
LRS—level of realization of strategy of cluster development;  
MC—managerial expenses of a cluster structure.

Based on the formula (1), it is possible to distinguish seven main factors of effectiveness of cluster structures management. Let us view factors that determine profits from functioning of cluster structure. The first factor is cost of production by cluster members. The lower the cost of manufactured products, the more effectively production process of cluster members is organized. Implementation of innovational technologies into production allows reducing cost of products manufacture.

Second factor is a total volume of product manufacture by members of cluster. The larger the production volume, the more successfully cluster develops. Growth of production volume shows the growth of demand for products of cluster members. As the growth of competitiveness and total share of market is the most important goal of creation of cluster structures and a key managerial landmark of cluster, growth of production volume shows successful achievement of this goal.

The separate third factor is the total volume of manufacture of innovational products by cluster members. This factor could be viewed as the share of innovational products in total structure of production. As higher innovational activity of cluster members—as compared to other market players—is the most important reasons of creation of a cluster, attraction of investment, and provision of state support, efforts of managerial apparatus of cluster structure should be aimed at increase of innovational activity.

The fourth factor is strength of brand of cluster structure. One of the main advantages of cluster that make enterprises join them is a stronger brand. Cluster members jointly form and develop cluster's brand. The stronger the cluster structure's brand, the more possibilities its members have for promotion of their products in the market and attraction of investments for development.

Close connection between cluster members forms the fifth factor. If cluster members do not cooperate closely, the necessity for cooperation disappears and risk of cluster break-up appears. That's why one of the tasks of managerial apparatus of cluster structure is provision of constant and strong cooperation of enterprises of the cluster. Cooperation includes exchange of knowledge, experience, information, resources, etc.

The sixth factor is the level of realization of the strategy of cluster development. As any entrepreneurial structure, cluster has a strategy and goals of development. If this goal is achieved and the strategy is realizes, cluster management is successful and effective—in the opposite case, it is necessary to change the approach to management or use other managerial tools.

The last, seventh, factor is managerial expenses of cluster structure. Minimization of expenses for management of cluster structure is a perspective direction of increase of effectiveness of this process. It should be noted that the above factors could be viewed in static position based on the data of the studied year and based on

the dynamics for a range of years—which will allow change of effectiveness of cluster structures management.

### ***4.3 Perspectives of Increase of Effectiveness of Cluster Structures Management by Means of Development of Entrepreneurial Component***

Entrepreneurial component is treated in this work as entrepreneurial sensitivity inside organizational environment of the cluster that reflects capability of cluster structure for realization of entrepreneurial potential of its members through their striving and readiness for implementation of innovations into production. Entrepreneurial component provides flexibility and adaptability of cluster structure to the smallest changes of market environment and is a manifestation of competition both inside a cluster and outside (Morozova 2015).

Perspectives of increase of effectiveness of cluster structures management are closely connected to development of entrepreneurial component. Therefore, management of cluster structures should be performed by the principles of entrepreneurial activities. This supposes necessity for maximization of the use of market mechanism in this market and organization of clusters self-management.

As a result of development of entrepreneurial component, effectiveness of cluster structures management grows. Firstly, it is manifested in increase of innovational activity of cluster members. The more flexible and operative cluster management is, the more successful stimuli are for implementation of innovations into production activities of its members. Management on the basis of state principle does not suppose stimulation of innovational activity, which makes entrepreneurial component an inseparable condition for successful functioning and development of cluster structures.

Secondly, as a result of increase of innovational activity of cluster member, reduction of products cost is achieved. It would be impossible without development of entrepreneurial component, and cluster would not develop at all. Thirdly, entrepreneurial component allows mobilizing resources of cluster members for development of cluster's brand. This leads to increase of demand for its members' products and growth of total volume of production of cluster structures.

Fourthly, due to development of entrepreneurial component in the process of cluster structures management, cooperation between managerial apparatus and cluster members grows, which leads to democratic style of cluster management, at which initiatives and contacts of cluster members are stimulated. As a result, connection between cluster members grows. Fifthly, development of entrepreneurial component increases the level of orientation at the result, which increases the level of realization of the strategy of cluster development.

Sixthly, under the influence of development of entrepreneurial component of cluster structures management, accountability of managerial apparatus and its

orientation at minimization of expenses for the management process grow, through improvement of organizational structure of managerial apparatus, optimization of managerial processes, etc. As a result, managerial expenses of cluster structure reduce.

## 5 Discussion

As a result of the research, the offered hypothesis was proved—effectiveness of cluster structures management could be raised by means of maximization of the use in this process of the market mechanism of organization of clusters self-management. This takes place by means of development of entrepreneurial component in the process of cluster structures management.

The performed analysis showed that development of entrepreneurial component positively influences all factors of effectiveness of cluster structures management. This work offers the following recommendations for development of entrepreneurial component of cluster structures management:

- determination of managerial apparatus of cluster structure on the basis of the principle of free competition—there's necessity for selection of managerial apparatus of cluster;
- orientation at implementation of managerial innovations in the process of cluster structures management—striving for implementation of novelties is necessary for improvement of managerial process;
- increase of involvement of cluster members in the process of management—this will allow taking into account interests of all interested parties;
- development of mechanism of cluster structures self-management—this supposes reduction of state participation in managerial process;
- attraction of external private organizations to the process of cluster structures management—management of cluster on the basis of outsourcing corresponds to the idea of labor management and will allow avoiding managerial apparatus' seeking private goals during management of the cluster.

## 6 Conclusions

Thus, it is possible to conclude that successful functioning and development of cluster structures management process in modern market economy should be based on principles of entrepreneurial activities. At present, entrepreneurial component of many clusters, especially in developing countries, is underdeveloped, which reduces effectiveness of management and slows their development down. The state should take up the role of controlling body, not a direct member of cluster, which will allow reducing state expenses and costs of cluster management.

It should be concluded that cluster, as any other system, is subject to constant changes due to emergence of new ties between its members and external environment, due to purchase and use of new knowledge and experience, and due to necessity for adapting to changing conditions of market environment. With development of the cluster, the process of its management should be modernized and improved as well, and entrepreneurial component plays an important role in this process.

The performed research contributes into development of the concept of development of cluster structures, concept of development of entrepreneurship, and the concept of state regulation of economy, which predetermines its high theoretical significance. The work has a high practical significance, as the developed recommendations could be used for perfection of the process of management of modern cluster structures and development of entrepreneurial components in this process.

A limitation of the performed research is its dominating fundamental character. Perspectives of further research in this sphere are primarily connected to analysis of statistical information on management of cluster structures, determination of the share of entrepreneurial component in cluster structures management on the basis of results of such analysis, and approbation of the developed model of effectiveness of cluster structures management and the offered recommendations in practical activities of modern cluster structures.

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# Two-Level Economic and Mathematical Model of Monotown Development on the Basis of Cognitive Maps

Aleksey F. Rogachev

**Abstract** The article deals with theoretical and methodological approaches to economic and mathematical modeling of development of medium cities and monotowns which take into account their peculiarities at the modern stage of development, including distribution of labor resources and investment flows. Expediency of two-level modeling on the basis of cognitive approach is substantiated, which includes compilation of cognitive maps that allow accounting and determining complex factors of connection between them, peculiar for the modeled cities.

A mono-profile town (monotown) is a municipal entity in the functioning of which the determining role belongs to one or several strategic enterprises. This definition is true for some Russian medium cities. The mentioned strategic enterprises usually belong to one or neighboring spheres of economy and create a single technological chain, creating at least a half of gross added value of the city, and their employees constitute not less than a quarter of economically active population of the monotown (Maslova 2011; Decree of the Government of the Russian Federation 2014).

Concentration of population and material resources in city agglomerations leads to a range of social, ecological, transport, and food problems (Goridko and Nizhegorodtsev 2015; Medvedeva 2012; Rogachev 2015a, c; Medium city: from crisis to modernization 2014; Rogachev et al. 2015; Skiter et al. 2015). For small and medium cities and monotowns, these problems are complicated by insufficient development of infrastructure—primarily, transport network and road infrastructure. Strategic management of development of medium cities and monotowns in post-crisis period makes the executive power bodies of various levels use the instrumentarium that ensures realization of basic principles of management: integrity, innovational direction, and corporativity in management of economic system, modernized and intellectual direction, and scientific integration on the basis of technological platforms.

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The above problems of development of infrastructure of medium cities and monotowns of Russia are viewed in the works of Russian and foreign researchers: E. Buchwald, S. Ivankovskiy, A. Maslova, L. Medvedeva, Y. Milyukov, T. Mitrakhovich, R. Nizhegorodtsev, A. Pavlenko, E. Popkova, M. Starovoytov, V. Timiryasov, E. Iskrenko (Great Britain) (Maslova 2011; Davydova et al. 2011; *Medium city: from crisis to modernization* 2014), etc. Optimization of investment flows of small cities and monotowns requires a complex approach with the use of methods of economic and mathematical modeling (Maslova 2011; Davydova et al. 2011). At that, together with well-studied methods of dynamic modeling of socio-economic systems, realized in macro- and micro-economics, there is necessity for perfection of methodology of economic and mathematical modeling—primarily, in the part of multi-level combined approaches. This could be realized on the basis of new cognitive approaches to modeling and analysis of studied economic systems (Goridko and Nizhegorodtsev 2015; Kamaev 2012; Decree of the Government of the Russian Federation 2014), primarily during evaluation of influence of key factors and their connections in view of peculiarities of interaction of modeled elements and environment.

The purpose of this research is to substantiate the methodology of building and computer realization of economic and mathematical models of development of medium cities and monotowns in view of their specifics, including investment and labor resources.

According to the criteria of assigning of communities to monotowns in the RF (Decree of the Government of the Russian Federation 2014), the list of monotowns is regularly reconsidered—now they include, for example, Gukovo, Zverevo, and Donetsk, Rostov Oblast (Goridko and Nizhegorodtsev 2015). Mikhaylovka could be a typical monotown for Volgograd Oblast, and Volzhsky can be a medium city and an object of modeling and research.

The city of Volzhsky is a typical representative of medium cities, namely medium cities of polyfunctional type, industrial complex of which consists 94 % of the total volume of products, issued by the city enterprises. Analysis of dynamics of main indicators of work of enterprises of Volzhsky over the recent years shows that the city industry went through the period of adaptation to the conditions of market economy and can increase the issue of products. Strengthening of position of medium city will be connected to creation of conditions for development of competitive and economically stable industrial and investment potential. In its turn, it will require targeted investment policy for formation of conditions for modernization of existing and creation of new productions.

Strategic enterprises determine not only the population's well-being but the level of development of their infrastructure. The problems of such enterprises influence the life of the whole city. Limitation of the labor market may lead to long and full-scale unemployment, which stimulates the appearance of social upheaval (Goridko and Nizhegorodtsev 2015; Davydova et al. 2011). At that it is noted that strategic enterprises cannot be viewed without production activities and social spheres of monotown, and, while viewing the possible restructuring of such enterprises, it is necessary to analyze the necessity for restructuring of the monotown. However, this

does not exclude that medium cities and monotowns can systematically appear in the risk zone due to one-sidedly formed and old production and economic basis and they are the first to lose sustainability in crisis situation.

Additional peculiarities of functioning of monotowns include aggravation of the found problem and the growth of pressure on Russian economy due to the sanctions from Western countries (Goridko and Nizhegorodtsev 2015). Enterprises of the spheres that traditionally used imported equipment, technologies, or components are doomed to stop their production activities until they find and create alternative to foreign supplied and/or solving the problem of import substitution. However, this does not exclude the fact that monotowns can appear in the risk zone due to one-sidedly developed and underdeveloped economic base and they are the first to lose balance in a crisis situation.

The work (Goridko and Nizhegorodtsev 2015) offers to use monotowns with sufficient scientific and technical potential to form technology cities specialized in high-tech spheres (biotechnologies, chemistry, alternative energetics). Personnel with high qualifications could be attracted to such territories. Innovational character of development of monotowns could be attractive by the fact that the market of science-intensive goods is rather flexible, as technological information can be effectively used by other, not unnecessarily neighboring, spheres, including primarily informational products. Successful examples of activities of such monotowns in Russia include Obninsk, Dubna, and Pushchino. Thus, instrumentarium of mathematical modeling of medium cities and monotowns should provide description of industrial and innovational diversification, which is the most desired scenario of development of modern mono-profile cities, and technological progress caused by quick development of IT.

Another peculiarity of the economy of the RF is insufficiently valued labor, which not only hinders the inflow of labor resources into small cities but stimulates preservation of technological underdevelopment due to high cost of energy effective equipment, as compared to cheap unqualified labor (Goridko and Nizhegorodtsev 2015). In its turn, investments into old technologies lead to inflation processes, caused by increased spending of resources. During the period of inflation, price cost grows slower than other production factors, which forms a closed circle with downward trajectory of phase dynamics of indicators of macro-system. In this case, it is necessary to model the development of not the Hegel's ascending spiral but descending "underdevelopment whirlpool" (Popkova and Mitrakhovich 2011), which characterizes economic degradation providing narrowing reproduction.

Mathematical modeling of development of medium cities and monotowns could be realized with the help of models that suppose the use of cognitive approaches, including fuzzy approach. Classical cognitive models are based on creation of cognitive maps which are orgraphs, the peaks of which correspond to modeled factors, and the targeted peak is a certain future state of the object of management. The bows that connect factors show similarities and differences of the influence of modeled multitude of factors on the object of management. The bows that connect factors with the peak of the state have "width" that is determined by weights and

signs that correspond to strength and direction of influence of this factors on the speed of transition of the object of management in the future state.

Expenses for modeling and research of the above problems of development of monotowns are very resource-intensive (Medvedeva 2012; Rogachev 2014; Medium city: from crisis to modernization 2014). This is caused by character of socio-economic parameters of such systems which, as a rule, are difficult to realize. In view of these circumstances, it was decided to use cognitive modeling at the lowest preliminary level, which is the method of analysis that ensures generalized determination of direction and level of influence of a range of factors on the studied object of management for the purpose of its transition into the targeted state (Kamaev 2012; Rogachev 2014). The use of cognitive approaches to modeling within the developed methodology allows building generalized models which take into account peculiarities of development of economic systems of monotowns under the conditions of incompleteness and uncertainty of information: incomplete sustainability of development, threat of bifurcations due to external influences, influence of human factor, and others. Application of cognitive modeling at the level of modeling will allow determining the main key parameters and the level of their mutual influence within the viewed systems.

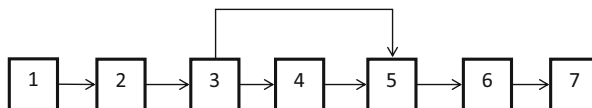
The technology of building cognitive models by the example of development of a medium city could include the following stages (Fig. 1):

Stages 1 and 2 of cognitive modeling should be performed by knowledge engineers, stages 3, 5, and 7—by specialists—analysts, and stage 4 admits the use of computer support with the use, for example, of specialized program FCMapper.

In the process of models building, a preliminary conceptual structuring of the subject spheres is used, which supposes determination of future targeted and undesired states of the object of management and the most significant factors of management and external environment which influence the transition of the object into these states. At that, causal connections between them are formed at the qualitative level, which take into account mutual influence of factors on each other. The results of the performed cognitive structuring are reflected with the help of a cognitive map which allows building recursive calculation scheme for quantitative modeling.

Various modifications of cognitive maps are used in applied modeling (Kamaev 2012; Rogachev 2014, 2015b)—for example, on the basis of fuzzy description.

Fuzzy cognitive map sets numerical values of the levels of influence of connections which describe interdependence of concepts. If values of weights of causal



**Fig. 1** Technology of cognitive modeling and analysis of development of rural community. 1—initial idea of the modelled economic system; 2—creation of conceptual scheme and structure of cognitive models on its basis; 3—structural analysis of cognitive models; 4—modeling of system’s development; 5—scenario analysis; 6—interpretation of results; 7—analysis of modeling results

connections are determined in the process of training of a formed network, the weights take random values from the multitude  $\{-1; 1\}$ .

Fuzzy cognitive map models the network on a weighted graph  $G$

$$G = (C, W), \quad (1)$$

where  $C$ —multitude of concepts;

$W$ —multitude of connections between the concepts  $w(ci, cj)$ .

Mathematical apparatus of cognitive modeling includes:

1. Modeling of self-development of situation described by the equation:

$$X(t) = (I + A + A^2 + \dots + A^n)X(0), \quad (2)$$

where  $X(t)$ —dynamics of the state of models;  $I$ —single matrix;  $A$ —matrix of adjacency of the value  $n \times n$ ;  $x(o)$ —initial conditions

2. Modeling of managed development of the system:

$$X(t + 1) = P(0) \cdot A^n \quad (3)$$

where  $P(0)$ —impulse;  $A$ —matrix of adjacency of the value  $(n \times n)$ .

Experience of previous research shows that building and analysis of fuzzy cognitive map could be performed in the system FCMapper. At that, another problem is determination of conditions and provision of process convergence, modeled by matrix range, for which preliminary transformation of adjacency matrix may be needed.

The object of modeling was the group of enterprises, substantiated in the work (Davydova et al. 2011), (material, fund-building, and consumer) which ensure functioning of the city infrastructure as the level of their influence on its economy. The model took into account the mobility of labor resources and investments which could easily move between enterprises. Production possibilities of each group of enterprises were set in the form of production functions:

$$X_i = F_i(K_i, L_i, I_i), \quad i = 0, 1, 2, \quad (4)$$

where  $X_i$ ,  $K_i$ ,  $L_i$ ,  $I_i$ —issue of products, main production funds, number of enterprises of the  $i$ -th group, and investments into  $i$ -th group of enterprises, accordingly.

In order to specify the influence of investment flows, speed of their change  $dK_i/dt$  was taken into account. The received structural scheme of interaction of material and financial flows and labor resources in the city economy was realized by a cognitive map. Time  $t$  in cognitive models is measured discretely.

Realization of the procedure of cognitive modeling is performed with preliminary building of adjacency matrices which take into account the level of mutual influence of model factors—a fragment of it is shown in Fig. 2.

The main criterion of cognitive analysis of development of medium cities and monotowns should be the maximal economic effect from total investments.

During the process of modeling, optimal distribution of investment flows, in particular, between main groups of enterprises (material, fund-building, and consumer), should be determined, and the forecast of increase of growth rates of gross regional product should be assessed (Medvedeva 2012). The received results of cognitive modeling, in particular, factors which influence criterial indicators and the level of their mutual influence, may be taken into account during creation of stricter analytical models at the higher level of modeling.

Successful solution of tasks of development of medium cities and monotowns requires provision of formation of innovational infrastructure with technological parks, engineering center, and venture fund; formation of technological platforms for their further integration into European ones; observation of ecological norms of protection of city environment; formation of rational schemes of distribution of investments; implementation of innovations into industrial production; creation of conditions for intellectual entrepreneurship. Successful solution of these problems requires optimization of distribution of investments, material resources, and labor resources with the use of multi-level modeling on the basis of cognitive approach.

Thus, expediency of the using the cognitive approach to study of socio-economic development of medium cities and monotowns is reasoned, which includes creation and research of fuzzy cognitive maps which describe peculiarities of investment, material, and labor flows. The study of self-development of the modeled systems—medium cities and monotowns—and their controlled development allow determining the most significant factors and their interdependencies for creation of analytical research models. In view of results of quantitative modeling of economic dynamics of monotowns, programs of their socio-economic development with optimization of distribution of labor and investment flows will be created.

	A	B	C	D	E	F	G	H
1	fishery manager	dKO/dt	dK1/dt	dK2/dt	X0	X1	X2	L
2	dKO/dt	0,00	0,00	0,00	0,60	0,00	0,00	0,00
3	dK1/dt	0,00	0,00	0,00	0,00	0,90	0,00	0,00
4	dK2/dt	0,00	0,00	0,00	0,00	0,00	0,70	0,00
5	X0	0,00	0,00	0,00	0,00	0,50	0,90	0,00
6	X1	0,60	0,60	0,80	0,00	0,00	0,00	0,00
7	X2	0,00	0,00	0,00	0,00	0,00	0,00	0,00
8	L	0,00	0,00	0,00	0,70	0,80	0,70	0,00

Fig. 2 Formation of adjacency matrix for a cognitive map

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# Rational Environmental Management: The Platform for Integration and Optimization of Resources

Mikhail K. Starovoytov, Lyudmila N. Medvedeva, Konstantin Y. Kozenko, Yana M. Starovoytova, Gennady I. Lukyanov, and Mikhail A. Timoshenko

**Abstract** The article is devoted to questions of optimization of resource management, namely, the management of the city authorities. The article gives a definition to a city as a cluster, as an integrated expression of the predicted productivity of efforts of the city authorities indicators of a development of the city, satisfaction of its inhabitants have to act with work and life. Also, the paper provides materials of calculation of an index of development of industrially developed average cities. Approaches to strategic planning in the cities are defined. It is proved that ensuring dynamic balance and positive dynamics in development of social, ecological, and economic systems of the cities can be based on the principles of foresight-management. Authors offer the concept of the green cities as the most perspective concept in the twenty-first century. The question of development in the city of a specialized cluster of green construction is considered.

The modern global economy is an urban economy: nowadays a half of the population of the planet lives in them, it increases every year by 65 million people; in the cities the 80 % of world gross product is produced (Medvedeva and Starovoytova 2013). In the report of the Organisation for Economic Co-operation and Development (OECD), within the project [Future Global Shocks](#), main potential risks which

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with the increasing force will cause a loss to mankind are designated: virus pandemics; cyberattacks on the main infrastructure objects; financial crises; social disorders; climate changes. The coherence and complexity of the occurring phenomena cause needs the weighed and optimum control of the resources which are situated in management of the city authorities. It allocates the cities conditionality with the real power which is similar to the rights and obligations of large corporations. American scientific G.E. Frug considered (Frug 1980), that “the modern city is not staff in a miniature, and it is rather, commercial (business) corporation: put it—reasonably to manage local affairs and was able to use (commercial) methods in the scheme of municipal management”. The authorities of the cities can successfully or inefficiently operate the resources as heads of the companies, which are available at their order. The cities can be insolvent in providing the obligations and to become bankrupts as well as corporations have municipal property and during a certain period of development. In the USA, in case of bankruptcy of the city of its power the obligation passes to the higher level of territorial education—the staff. In 2011 the largest district of America—the State of Alabama declared the bankruptcy. The district ran into debt to creditors (banks and finance corporations) of \$4.1 billion. It was not the first municipal bankruptcy in the USA—in 2011 the bankruptcy was declared by the capital of the State of Pennsylvania—Harrisburg. According to laws of the USA, any administrative unit which declared itself a bankrupt is exempted from debt burden and carries out sanitation of the obligations. For Russia, it is rather useful experience, as during world crisis many small and average cities can’t provide social payments, for they actually are legally insolvent subjects. Creating the institute of the municipal right in the cities, the federal authority not only unites in it the public and local administration, but also creates prerequisites for a choice of an independent way of development. Throughout all history scientists and practitioners tried to prove the mechanism of emergence and formation of institute of the cities. The works devoted to this topic include: Eduard Meyer (theory of “iron will of the sovereign”) (Protasova 1938), M. Weber (Weber 1922), Richard Whitley (Whitley 1980), L. Wirt (Wirt 1969), W. Maitland (Maitland 1962), F. Ratzel (Ratzel 1923), I. Thunen (Thunen 1850), D.M. Petrushevsky (Petrushevskiy 1912), V.V. Stoklitskaya-Tereshkovich (Stoklickaya-Tereshkovich 1960), V.G. Davidovich (Davidovich 1959), L. Velikhov, R. Grinberg, V. Lexin, E. Pertsik, A. Netshadin, et al. In their researches the city appears as concentration of “spirit of the age”, as the uniform organism penetrated by numerous communications and the relations of objects of economy and society. By the nature of the city have the dual nature: on the one hand, it the “central places” serving needs of the adjacent territory, with another—“knots” of various networks, including international, going beyond controlled space. Such state provides them necessary stability, and creates the base for further transformation. The subject of education and development of clusters, it always was among priorities of world science. The author and the developer of the theory of clusters M. Porter considered that “the cluster is a group of geographically adjoining interconnected companies and the related organizations of education, state bodies operating in a certain sphere and complementary each other”. Scientific views of M. Porter concerning subjects, and the communications arising between us in a cluster



quite “keep within” urban economics. If we look at the city, we can see that it is the complex of producers and consumers, the stockholder is connected by the developed relations for a rather large period of time created in a certain territory. The problem of identification of clusters is permanently actual for scientists and for governing bodies. The institute of strategy and competitiveness of Harvard Business School (USA) analyzed the structure of a large number of clusters and classification of kinds of activity in them is made. It was proved that a big variety of elements of system (cluster) provides it with large stability and adaptability, and “maintenance of a necessary variety” provides its structural flexibility. In Peter Dicken’s works clusters are subdivided into two groups: generalized, based on the territorial concentration and positive externalities arising, in particular, in the course of an urbanization, and specialized, based on concentration of efforts of subjects in one branch. There are reasons to believe that each city is the general cluster in which there can be specialized clusters. Taking into account that the IT component share grows in the world in management, it is possible to assume that authorities of the cities more and more become certain “service company” which as “information umbrella” blocks and coordinates all city resources and information streams. The cluster paradigm as initial frame of reference on development of world economy is exposed to serious changes. It is necessary to consider that a role of the cities as independent subjects of the international relations becomes more significant. It becomes increasingly important to gain “intimacy” for them between such subjects as institutional, geographical, organizational, cognitive, social, communicative, and entrepreneurial.

In 2010, the population of the Russian Federation lived in 2386 city settlements and 134,000 rural settlements (Table 1).

The tendencies of development of world economy differ in complexity and divergence; very often the cities which are at different stages of development are at the same time involved in similar processes under the influence of objective and subjective conditions. The conducted research (with use of the program “Statistical

**Table 1** Change of population in the Russian cities

The grouping of urban settlements	The number of urban settlements		The number of inhabitants in them, thousands people		Number Residents in 2010 in % as to 2002	Number residents % of total	
	2002	2010	2002	2010		2002	2010
Total cities with a population (thousand people):	1098	1100	95,916	97,527	101.7	100	100
Up to 50	768	781	16,623	16,445	98.9	17.3	16.9
50–100	163	155	11,083	10,854	97.9	11.6	11.1
100–250	92	91	13,817	14,105	102.1	14.4	14.5
250–500	42	36	14,574	12,146	83.3	15.2	12.4
500–1000	20	25	12,403	15,755	127.0	12.9	16.2
1000 and more	13	12	27,416	28,222	102.9	28.6	28.9

Note: (URL: <http://www.perepis-2010.ru>)

Package for Social Scientists”) allowed structuring the group of industrially developed average cities, with a characteristic set of demographic, economic and dynamic characteristics. The group of 16 average industrially developed cities creates the integrated spatial cluster of the average industrially developed cities. Scientific concepts, programs, and development models developed for one city with full success can be embodied in other city which enters this integrated cluster. For quite a long time, the Swedish authorities have been offering the program of a sustainable development of the city—Symbio City. Implementation of the Symbio City project will allow local authorities to use effectively city natural resources, to provide interaction of various city systems and technologies. Authors of the project claim that there are a lot of advantages at the model, it rather flexible, it is capable to be arranged under needs of the concrete city. However, the practice shows that distribution of symbiotic model goes very slowly. The model developed by authors: “The typology of the cities on an economic state and tendencies of development”, allows to classify the cities for association in the integrated clusters (Table 2).

As integrated expression of the predicted productivity of efforts of the city authorities of group of the average industrially developed cities indicators of a development of the city, satisfaction of its inhabitants with work and life will act. The main indicators of the reached level of development (CDI) industrially developed average cities are presented in Table 3.

Calculation of an index of development of industrially developed average cities, except for basic indicators (a level of development of infrastructure of the city; waste disposals; state of health and education of the population; the volume of release of a city product) includes additional ones (road condition, number of cars per 1000 people, security with kindergartens per 1000 people, indicators of development of MSP and introduction of innovations, state of ecology, level of improvement and visual appeal of the city). Improvement of quality of life of citizens is a strategic reference point of activity of authorities. The simple increase in investments into city infrastructure and construction isn’t panacea from all problems. Very often, traditional decisions lead a development of the city up a blind alley, or are connected with big expenses, and aren’t capable to change life of most of the population qualitatively. If the city authorities neglect those opportunities which are

**Table 2** A matrix for justification of creation of the integrated cluster of a certain group of the cities

		Economic state			
		Steady	Rather unstable	Stagnation	Crisis
Level of development	High	Strategically steady	Economically developed	Economically problematic	Economically underdeveloped
	Average	Tactically steady	Rather economically developed	Rather economically problematic	Economically problematic
	Low	Quickly steady	Economically underdeveloped	Economically highly problematic	Economic crisis

**Table 3** A cluster of industrially developed average cities with development indicators—CDI, 2014

No.	Cities	Index of city development	Including sub-indices				City product
			Infrastructure	Housing comfort	Population health	Education of population	
1	Magnitogorsk	68.58	60.20	89.0	41.90	82.70	69.10
2	Nizhny Tagil	65.60	60.10	90.50	41.10	80.10	53.60
3	Volzhskiy	58.82	59.40	91.00	44.50	83.00	38.70
4	Cherepovets	75.16	60.80	89.50	40.80	82.00	81.70
5	Surgut	75.90	67.70	90.50	42.20	83.60	95.70
6	Sterlitamak	60.98	60.00	90.00	42.00	83.40	29.50
7	Komsomolsk-on-Amur	58.50	65.20	88.30	41.60	80.70	16.70
8	Taganrog	58.24	60.40	87.90	43.20	80.90	18.30
9	Nizhnevartovsk	95.50	67.70	89.0	42.20	85.50	193.10
10	Bratsk	60.24	61.60	86.40	39.40	84.00	29.80
11	Novorossiysk	57.84	63.80	86.10	42.30	82.70	14.30
12	Nizhnekamsk	82.86	62.70	91.10	42.80	82.20	135.50
13	Stary Oskol	68.42	59.50	89.30	42.80	84.00	66.50
14	Norilsk	76.22	68.90	90.90	41.70	83.40	96.20
15	Dzerzhinsk	59.82	58.00	89.40	41.30	84.50	25.90
16	Orsk	58.38	61.60	90.60	41.80	82.20	16.70

Source: Prepared by L.N. Medvedev in the basis of the research materials (Medvedeva 2011)

opened before them by green economy in the field of management and preservation of natural resources, at best they will continue “to mark time”, and in the worst—will appear outsiders and start losing the main resource—human. Today, the search of decisions is conducted in areas: from the increase of efficiency of power to more perfect system of recycling, from development of clever transport infrastructure before safety and comfort of the dwelling. The presence of information technologies only strengthens movement of resources, expands borders of the traditional markets, strengthens the international division of labor. The analysis of foreign and domestic experience indicates the need of the differentiated approach at the solution of questions of development of the average industrially developed cities. The main requirements of development of strategy of the city have to be the following: creation of conditions for attraction of investments (introduction of effective instruments of financing and budgeting); development of the state and public institutes (definition of the interdepartmental working group responsible for preparation and realization of strategy); advance of innovative (green) technologies; information stimulation of city community (the forums, conferences advancing image of the city and its transformations).

On June 28, 2014 the Federal Law No. 172 “On strategic planning in the Russian Federation” was adopted. Activities for strategic planning in the cities, as well as documents, became legitimate, are entered into a legal framework. Under the difficult conditions of global competitive fight, it is difficult for local authorities to count on serious positive changes without processes of strategic planning. Different schools of science offer the approaches to the contents, staging, and process of a strategy making in the cities. In the majority of the developed countries of the world the document Strategic Urban Planning is the cornerstone of strategy of the cities. Process of development is carried out through coordination of interests of various key communities. Under the adopted law of strategy of the cities have to coordinate with long-term goals of development of Russia in general, and also separate sectors and branches of economy. Coordination of strategy of development of the cities with federal programs happens on interaction—“management by results” that allows to provide interrelation of results of activity of authorities with the budgetary process. As emergence of strategy as a tool of management with anticipation of the future is obliged to corporations, it starts getting the model of management connected with processing of the considerable arrays of information which are difficult giving in to the analysis. Allocation is more whole, definition of internal and external conditions of development of the cities; establishment of opportunities and restrictions in the social and economic sphere; definition of resources; identification of stakeholders and designation of competitors; establishment of indicators of development, allow to create the mechanism of activities of authorities for achievement of a main goal—to improvement of quality of life of citizens. Use in strategic management of certain tools—models of the balanced indicators, road map, system of RM, the theory of restrictions of TOS—opens before governing bodies by the wide horizon for the analysis and decision-making. Each of the used models in strategic planning has the theoretical base, the principles, and algorithm of decisions. For example, the concept of economical

technologies of management (SCPM) explaining manifestation of synergetic effect in planning has a strategic map, a matrix of the balanced indicators, and a matrix of ranging of processes in the baggage. Any successful techniques demand reconsideration depending on a concrete context (historical, economic).

Local authorities can make realization of strategy on a basis: standard of Total Quality Management (TQM); theories of performance management (Performance Management); concepts of management of competences (Competence Management), etc. (Senge 2005). To operate the modern city means to carry out functions: analysis, planning and forecasting, ensuring control, motivation of workers; to realize the principles: integrity, territorial security, strategic and innovative orientation, and corporation culture; to use by methods of impact on the social and economic sphere. Winners Nobel awards George Akerlof and Robert Schiller to correlate theoretical bases of strategic management to the changing operating conditions of world economy have suggested the authorities of the cities to use the project—"SAGA" ([S]mart, [A]ttractive, [G]reen, [A]ccessible). Ensuring dynamic balance, balance, and positive dynamics in development of social, ecological, and economic systems of the cities can be based on the principles of foresight management (Hines 2007; Jemala 2010). Foresight's methodology helps local authorities on the basis of calculation of competitive advantages, strong and weaknesses—to create 'the desirable future of the city'. The offered Foresight's matrix helps the authorities to concentrate on those sites of management which are most critical for the present, and especially for the future. The main values of Foresight management in the cities are the following: effective management of the human capital, quality of goods and services (from a position of "customer satisfaction") to the concept of "customer delight" (Kolesnikov 2014). Main objectives and the directions of strategy of development of the middle industrially developed city are presented in Table 4.

When developing a strategy of development of the average cities, it is necessary to consider not only today's situation, but also history and evolution of the city, his settled communications, features of a geographical arrangement and inclusion in the international division. The city authorities have to find the answer to questions: what competitive advantages city resources have? How can the global competition affect development of the city? One of the ways of development of the averages which are industrially developed lies in the plane of green economy. Innovative solutions in the sphere of ecology and careful attitude to natural resources, alternative energy sources and resource-saving innovations, and technologies of full processing of waste are called "green technologies". The use of innovative developments, the progressive ideas concerning spatial development, public transport, urban economy, and waste-free technologies will allow increasing competitiveness of this group of the cities. The modern municipal government includes the following spheres of activity: providing the population with the main services (safe drinking water, housing, and high-quality services in health care and education); effective use of local resources; formation of an ecological framework and innovative infrastructure. During the assessment of municipal economy it is very important to provide the correct accounting of extent of impact of the person on

**Table 4** The main directions of development of the middle city, included in strategy

Purposes of the strategic direction	Problems of the direction
Introduction of quality management system	To transfer work of services of administration Quality management system of ISO 9000:2008 and standards of green economy
Strengthening of ties with other cities	To increase the management level, technical and information capacity of structures of management
Advance of the city in world space	To continue work on strengthening of reputation of the city as most well-planned middle city
Introduction in work of innovative methods	To create system of the interconnected innovative centers, technological parks, financial institutions and investment structures in the city
Integration into world information space	To create modern image of the city in information space. To continue development of model of "The electronic city"
Creation of image of the well-planned average city	Creation of image of the well-planned average city
Formation of zones of activity of business	To legislatively fix zones of activity of business activity, to open the center of green technologies
Development of a network clever city automobile and electro transport	To create the uniform control system of the motor transport supplementing and interconnected with system of city electro transport; to develop the project development by clever transport
Development of the infrastructure engineering	To increase quality of drinking water for the population; to reduce specific consumption of energy and water resources
Improvement of an ecological situation in the city	To protect environment from an adverse effect of production wastes; to realize the production and ecological project: "The big Estuary"
Formation of the social environment of high-quality services	To promote employment of the population, to open green workplaces; to create effective system of social protection of a family and the childhood
Solution of a housing problem	To improve living conditions of needy and socially unprotected citizens. Fund of resettlement from shabby housing
Reforming of system of housing and communal services	To create the competitive environment and an effective control system and service of housing stock
Creation of conditions for safe life of the personality, family	To reduce the level of technogenic and natural dangers to the population. To increase social safety of the personality, a family and society

environment. It is possible to carry to types of human impact on the nature: industrial influence according to branch features; municipal and transport influence; impact on the natural and landscape environment. At discussion of a problem of natural resources on average the city more and more attention is paid to the resources connected with existence of the person, health of society. The management of natural resources with focus on health of the person has put in the forefront the requirement: from minimization of impact on environment to minimization of harmful effects on the person. Interaction with environment relies, besides the

power and technological bases on knowledge of laws of society, on the one hand, and the nature—with another. The understanding of laws of development of a civilization is an understanding and using the saved-up thousand-year experience of generations of people. The mechanism of management of rational use of natural resources on average the city represents system of the relations in which creation of organizational and institutional communications and the relations between economic entities, the society and environment is provided on the basis of the balanced approach (Fig. 1).

In reproduction process of the cities rational use of natural resources is defined on the basis of the made decisions and the fundamental principles: the differentiated approach to establishment of the mode of use of objects of environmental management; evidence-based combination of ecological and economic interests of society; blaze of publicity about a condition of environment; priorities of precautionary measures in the field of environmental protection; availability at a price of the environmental management and indemnification caused to environment; stage-by-stage introduction of green technologies in municipal economy. The data obtained in the course of activity of the city administration forma the system of indicators on the basis of which it is possible to draw the scientifically based and statistically confirmed conclusions about efficiency use of natural resources in the city (Table 5).

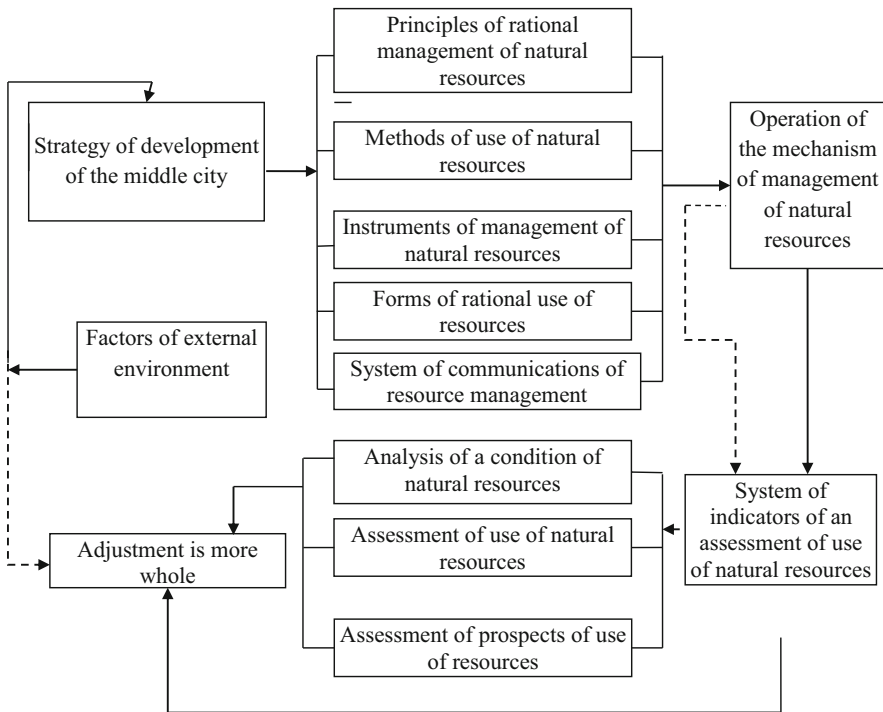


Fig. 1 The mechanism of management of natural resources in average industrially developed city

**Table 5** System of indicators of an assessment of rational use of natural resources at the city level

Resource security of the city	Readiness for rational use of natural resources	Productivity of use of natural resources
1. Total area of lands of forest fund, thousand hectares per capita. 2. Area of green plantings: thousand hectares per capita; m3. 3. The area of especially protected lands, one thousand hectares/persons. 4. Use of water, thousand m3 per capita. 5. A water intake from natural sources, m3 persons. 6. Costs of environmental protection, \$ thousand per capita. 7. Financing of nature protection actions, \$ thousand/persons.	1. Number of the operating organizations, the processing productions/1000 people 2. Number of the operating organizations, production and distribution of the electric power, gas and water/1000 people 3. Permissions to dumping of the polluting substances into water objects, quantity. 4. Permissions to emission of the polluting substances in air, quantity. 5. Actions for control of objects of economic activity/1000 people. 6. Acts concerning rational environmental management, quantity. 8. Examination of compliance to the planned activity to requirements of the nature protection legislation, quantity.	1. Dumping of the polluted sewage into superficial water objects, one thousand m3/persons. 2. Emissions of the polluting substances in air departing from stationary sources, thousand tons per capita. 3. Production wastes and consumption in a year, one thousand tons/persons. 4. Incidence of the population on groups per 1000 people 5. Investments into environment, \$1000 per capita. 6. The size of tax revenues in the budget from the use of natural resources, \$ per capita. 7. Payment for negative impact on environment, \$.

The city, big or small, constantly seeks for updating its functions. The main directions of sustainable development of the average cities on the platform of green economy are created (Table 6).

Contemporary view on the issue of economy in middle-sized city should be based on the idea that balance of ratio of socio-economic needs and rational nature use should be equal.

This could be determined with the help of the following formula:

$$F_t(L, K, P, I) \leq F_{t+1}(L, K, P, I), \tag{1}$$

where:  $F_t(L, K, P, I)$  function of sustainable development  
 $L, P$  labor and natural resources  
 $K$  artificially created (physical) capital, production means  
 $I$  institutional factor  
 $t$  time factor (at  $0 \leq t$ ).

The main ecological indicator, which should be taken into account by local authorities, includes:



**Table 6** The main directions of development of the average cities on the basis of realization of the principles and provisions of green economy

Name	Specific directions
First level—greening of components of a city landscape	
Restoration of quality of air	Law: “The code on air” Control of pollutants of air Improvement of the quality standards Phytomelioration
Improvement of quality of drinking water	Law: “The code on water” Program of “steady water consumption” Reduction of dumping of pollution into water
Restoration of soil properties	Law: “Code about soils” Restoration of properties of soils (aeration, washing, and microbic restoration) Phytomelioration
Restoration of flora and fauna	Law: “The code about city flora and fauna” “Green channels” Creation of sites of “the wild nature”, gardening of roofs and walls
Restoration of a relief, hydrosphere	Law: “The code of development of city landscapes” Recultivation, prosthetics of the broken landscape Restoration of quality and condition of ground waters
Second level—greening of a city economy	
Greening of transport	Adoption of the Ecotransport program Encouragement of eco-friendly means of transport Encouragement of pedestrian also conducted—the movements
Greening of a power complex	Adoption of the Steady Power Complex program Energy saving, warmth utilization Use of new power sources
Greening of industry	Modernization of the Industry taking into account Requirements of Ecology” program Eco-biotechnologies and “clever” equipment Use of resource-saving technologies
Greening of architecture, construction	Application of a wide complex of eco-friendly buildings and engineering constructions Creation of a beautiful and eco-friendly framework of the city
Third level—greening of needs of residents	
Biological requirements	Providing with clear drinking water and air Physical comfort in the city and in each dwelling Providing necessary vital space Eco-friendly clothes, food, furniture, phyto-design
Economic requirements	Green workplaces Work in which not renewable, rare or dangerous resources aren’t used
Social requirements	Guarantee of civil liberties and addresses, support of initiatives

## 1. Indicator of atmospheric pollutant emissions:

$$B_n = \sum_{i=2} (1 - \Delta B_i / B_{oi}), \quad (2)$$

where:  $B_{oi}$  total pollutant emissions for  $i$ -th component at the beginning of the forecast period, thousand tons per year

$\Delta B_i$  reduction of pollutant emissions for  $i$ -th component at the end of the forecast period by means of nature protection measures, thousand tons per year

– indicator of waste water discharge into water basin:

$$C_n = \sum_{i=2} (1 - \Delta C_i / C_{oi}), \quad (3)$$

where:  $C_{oi}$  total pollution discharge for  $i$ -th component at the beginning of the forecast period, million cubic meters per year

$\Delta C_i$  reduction of pollution discharge for  $i$ -th component at the end of the forecast period by means of nature protection measures, million cubic meters per year

## 2. Indicator of soil pollution in city:

$$O_n = \sum_{i=1} (1 - \Delta O_i / O_{oi}), \quad (4)$$

where:  $O_{oi}$  volume for  $i$ -th type of waste at the beginning of the forecast period, thousand tons per year

$\Delta O_i$  reduction of volume for  $i$ -th type of waste at the end of the forecast period by means of nature protection measures, their secondary use or processing, thousand tons per year

## 3. Indicator of area of greening of city territory:

$$S_n = \sum_{i=1} (1 - \Delta S / S_{IIK0}), \quad (5)$$

where:  $S_{IK0}$  area of green plantings at the beginning of the forecast period, thousand hectares per year  
 $\Delta S$  growth of the area of green plantings at the end of the forecast period, thousand hectares per year.

Ecological indicators include:

4. Indicator of the use of city territory, taken out from the system of city nature use:

$$F_n = \sum_{i=1} (1 - \Delta F / F_3), \tag{6}$$

where:  $F_3$  area of real estate development at the beginning of the forecast period, thousand square meters per year  
 $\Delta F$  growth of real estate development at the end of the forecast period, thousand square meters per year.

5. Indicators of the use of public transport (passenger turnover of public transport):

$$T_n = \sum_{i=1} (1 - \Delta T_i / T_{0i}), \tag{7}$$

where:  $T_{0i}$  passenger turnover of i-th type of public transport at the beginning of the forecast period, billion passenger-km per year  
 $\Delta T_i$  growth of passenger turnover of i-th type of public transport the end of the forecast period, billion passenger-km per year.

6. Indicator of the time of excess of the normed pollution of the atmosphere (number of days in a year with pollution, which exceeds average daily maximum permissible discharges in the atmosphere):

$$Q_{ni} = \sum_{i=1} (\Delta Q_i / 365), \tag{8}$$

where:  $\Delta Q_i$  number of days with concentration of i-th component which exceeds average daily maximum permissible discharges in the atmosphere at the end of the forecast period, days; 365—number of days in a year

7. Indicator of ecological investments (investments into basic capital, aimed at protection of environment and rational use of natural resources):

$$I_n = \sum_{i=1} (1 - \Delta I / I_3), \tag{9}$$

- where:  $I_3$  investments into basic capital, aimed at protection of environment and rational use of natural resources at the beginning of the forecast period, RUB thousand per year
- $\Delta I$  increase of investments into basic capital, aimed at protection of environment and rational use of natural resources at the end of the forecast period, RUB thousand per year.

For city authorities, it is important to found on generalizing ecological indicator during economic decisions making:

$$Et = Bn \times Cn \times On \times Sn, \quad (10)$$

where:  $Bn, Cn, On, Sn$  –particular adjustable indicators of pollutant emissions into atmosphere, waste water discharges, soil pollution, and greening area. Value  $Et < 1$  shows improvement of the quality of city environment (Starovoytov and Medvedeva 2010).

The city which is capable to be responsible for the actions and for life of citizens is the one on the side of new philosophy of rational environmental management. Development in the city of a specialized cluster of green construction stimulates not just the market of construction materials and technologies, and stimulates new standards of life. With transition of the construction industry to green rails citizens get chance to begin to live not only in safe, but also much more comfortable, power effective and ecological environment which conforms to the most advanced international standards of quality. Now the international certification of production is carried out on all life cycle and considers influence of components of a product on environment and health of the person. Among the studied product parameters the main are: sources and ways of production of raw materials, production (power consumption and toxicity of emissions), the volume of necessary transportations of raw materials to the enterprise and finished goods to the consumer, structure and level of toxicity of finished goods for the person, possibilities of secondary processing of production, the address with packing. In the world there are 400 green markings and standards, however wide use was received by standards of the ISO 14020 series from which is flagman—ISO 14024. Eco-marking of the I type means that production is certified taking into account influence on environment and the person. Ecomarkings of the I type estimate on the standard: sources and ways of production of raw materials; features of production (its power consumption and environmental pollution); the volume of necessary transportations of raw materials to the enterprise and to the consumer; structure and level of toxicity of finished goods for the person; a possibility of secondary processing of production at the end of life cycle; the address with packing of production. Often, to show belonging of the product to the sphere of EKO, producers resort to such tool as the self-declaration. The majority of programs of eco-marking of the 1st type are included into the World association of eco-marking (Global Ecolabelling Network, GEN). Among them such known as “The European flower” (EU), “A blue angel”

(Germany), “A northern swan” (Scandinavian countries). In Russia ecological marking of the 1st type—“A life leaf”, developed by Company “Ecological Union” is recognized by the international expert community (Fig. 2).

Certifications “A life leaf” are a part of the system standards for: finishing and construction materials, eco-offices, eco-hotels, eco-shops, household chemicals, cosmetics, electronics, food. Standards of “A life leaf” differ in strict sanitary standards to emission of harmful substances from finished goods. For example, the most admissible level of emission of formaldehyde from heat-insulating materials and floor coverings is established at the level of 3 mkg/m<sup>3</sup> while the legislation of the Russian Federation allows norm in 10 mkg/m<sup>3</sup>, and the European marking “A blue angel”—60 mkg/m<sup>3</sup>. Observance of requirements of standards stimulates producers to introduce more and more technological and transport chains for decrease in emissions of CO<sub>2</sub>, to increase use percent in production of own waste. Besides, eco-marking becomes marketing advantage, opens new opportunities for work, both on internal, and in foreign markets. As for certification of services, this direction has some features which are defined by activity of the company. For example, the general for offices, hotels, shops are requirements for existence of system of green purchases, policy of resource-saving, the competent address with waste, programs for formation of ecological culture. Greening of a service sector in the cities is also a very perspective segment, as it promotes creation of a favorable situation for work of employees and does functioning of the company economic due to decrease in resources consumption. In order to be able to call ecological building green, it is necessary to respect certain standards and the rules on each of construction stages. Special tools are voluntary systems of certification of buildings which at the moment in the world there are several tens have been developed for an adequate assessment of projects in the sphere of real estate in the developed countries. The two widespread systems of a rating assessment of buildings are most known. It is the BREEAM system developed by the British institute Bre Global and the LEED system developed by the American Council for ecological building. According to the analytical company McGraw-Hill in 2013, 67 % of the American developer companies were implemented by the ecological principles in 60 % of the projects, and 94 % plan to reach this level to 2017. Growth rates of the industry of green construction abroad—30 % a year, the emphasis on ecological

**Fig. 2** The green standard “Life Leaf” in Russia



properties is considered many one of the main competitive advantages of the companies. In practice it is shown in green buildings are more expensive than those built on traditional technologies. So, in the USA, the houses in the country cottage settlement certified according to the LEED standard cost by an average 30% more than usual ones. But that doesn't stop buyers as the desire to live in harmony with the surrounding nature becomes prevailing. One more international standard of WELL positions idea of "the healthy building" (the rights for the standard belong to the American company Delos Living LLC). Emphasis is put on health and comfort of the people who are considerable part of time in the building. So version 1.0 of the WELL standard has 102 standards, the part from which is looked through also in other standards, concerns illumination, thermal comfort, a condition of air, lack of toxic substances in materials, protection against pollution on entrances and in the building, a smoking ban. Others are quite specific: for example, requirements to cleaning and to cleaners, to water disinfection, a ban on transgene fats, the equipment of rooms for meal, space for rest and a dream. A large attention is paid to actions which are urged to create "healthy" behavior at workers. In the LBC standard of 20 requirements are called "imperatives". They are distributed between seven categories: "Place", "Water", "Energy", "Health and happiness", "Materials", "Equality and beauty". Two basic rules of LBC considerably distinguish it from other green standards. First, all requirements of the standard are obligatory for performance only for object of any scale and appointment. Secondly, certification is based on check of actual indicators of functioning of the building, but not on settlement, as in other systems. The project has to be constructed and put into operation and work not less than 12 months till the moment when it is possible to estimate observance of the majority of imperatives. On completion of construction only preliminary audit is booked. Many countries

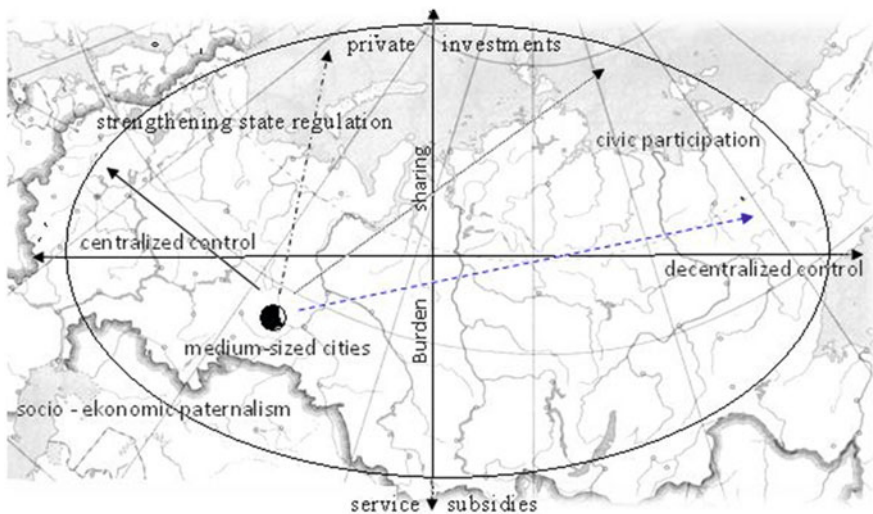


Fig. 3 Trends of development of the averages which are industrially developed in Russia

(Japan, Australia, Germany, New Zealand, and Canada) create the national green standards. Others take someone else's standard as a basis and under the leadership of his owner prepare the national versions. Norwegians (BREEAM NOR standard), Swedes (BREEAM-SE) have acted this way, for example. India and Italy adapted for themselves LEED, having released the national versions. Today's average industrial cities are not only a zone of the increased household comfort, but also business incubators, science and technology parks, a cluster of green construction and green technologies. In Fig. 3 the main trends of development of the average industrially developed cities in Russia are presented: 1—undesirable trend, 2— inertial trend, 3—most desirable trend, 4—a realistic trend.

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# Green Technologies: The Basis for Integration and Clustering of Subjects at the Regional Level of Economy

Viktor V. Melikhov, Alexey A. Novikov, Lyudmila N. Medvedeva, and Olga P. Komarova

**Abstract** The authors consider the green technology as a platform to bring together the interests of business structures to expand business boundaries and improve the quality of life of the population. Development in the South Russian regions and cluster seed is not only a way to food security, but to the landscape gardening of cities and rural settlements. The use in landscaping cities of the matrices of Pete Oudolfa will bring the unique plants growing in the natural park of nature reserves in the region to urban human habitat. Knowledge and compliance with environmental laws should help mankind realize the need to search for and transition to a new stage of development of the world economy—“economy of ecology”. The emergence of the concept of ecological settlements “after oil green city” (Post Carbon Cities), “bio-positive sustainable settlement” (AN Tetior) eco-polis (D. Kavtardze), and green city based on industrialized medium-sized cities (L.N. Medvedeva) will provide an understanding of how life is seen in cities across the decades. Cluster policy model in regional economic systems will allow a differentiated approach to stimulate the cluster of subjects. The management of “lean technologies” will ensure the effective functioning of the cluster seed and achievement of identified milestones.

In the twenty-first century, the international community continued to search for ways to optimize the human relationship with nature. It is known that nature provides for human conditions, without which it cannot exist. Namely, the ozone layer and ecosystem, which convert waste into resources, reduce CO<sub>2</sub> levels in the atmosphere. But the man with the increasing needs, often unfounded, depletes natural resources. Created innovations remain today “non-environmental”; they lead to irreversible processes in the natural environment. The rate and speed of formation of the “natural technology” commensurate with the length of human life.

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About a hundred years were spent on the formation of new “natural” technologies, seven years were spent for the creation of new industrial technologies. Super-active activity for the development of human nature has led to: a decrease in biodiversity in nature, increase of pollution of the oceans, reduction of the area of forest depletion of fresh water resources, and desertification of areas (UNDP 2011).

Some ecosystems (for example, marine) are close to the threshold of irreversible changes (Millennium Ecosystem Assessment 2005). The “average” citizen’s cost nature is expensive: to provide its vital functions, each year about 50 tons of raw material are extracted and moved from nature; 3.6 kW of power capacity and 800 tons of water are spent; about 50 tons of waste and 2 tons of reworked products are recycled. The area required for human food, wood, and natural fibers increased to 0.69 hectares; ecological space needed for a comfortable existence reached the mark of 10 hectares. Studies to determine the extent of human influence on nature allowed the American ecologist B. Kommoneru to formulate several environmental laws. The first one—everything is connected to everything (actions committed by a person in the nature cause chain effects tend to be irreversible). Second—everything must go somewhere (any pollution of nature returns to man in the form of “ecological boomerang”). Third—Nature knows best (human actions aimed at the conquest of nature must change to adapt to natural resources). Fourth—nothing comes for free (if the person does not invest in the protection of nature, it will pay with health). Knowledge of and compliance with environmental laws should help mankind realize the need to search for and transition to a new stage of development of the world economy—“economy of ecology”.

In international reports, it became increasingly justified the need for the transition to a green economy, “green” industries (green industry), “green” markets (green markets), “green” employment (green jobs). Green economy, as a new stage in human development, has been mentioned in the “green economy project”, which was subsequently entered in the report on the sustainable development of mankind. Supporters of the green economy are the following scientists: M. Bookchin, J. Jacobs, R. Carson, E.F. Schumacher, Robert Costanza, L. Margulis, J. Daly, D. Meadows, P. Hawke, et al.

In science and practice, there are several approaches to the definition of the green economy; one of the, states that green economy is the one that improves the welfare of the people and ensures social justice, while significantly reducing environmental risks (United Nations Environment Program (UNEP)); a strategy that is based on environmentally sustainable economic progress to promote low-carbon consumption (Economic and Social Commission for Asia and the Pacific (ESCAP)); an initiative that promotes economic development, providing quality environmental services, on which depends the welfare of the people, serving as a catalyst for investment and innovation that will lead to the emergence of new opportunities (Organization for Economic Cooperation and Development (OECD)); a system of economic activities, which should be based on “economy of ecology” technologies which lead to improved human welfare (Green Economy: “Everyone’s talking about it”, 2012). The most authoritative and widely used definition of a green economy is the one formulated by UNEP (2011): “Green” economy is economy that ensures the

long-term well-being of people and the reduction of inequalities, while allowing future generations to avoid environmentally significant risk environment and its depletion. Green technologies include general environmental management, energy production from alternative energy sources, reduction of harmful emissions into the atmosphere, improving fuel efficiency, lighting, and landscaping. The basic terminology of the green economy includes concepts such as environmental technology, the use of which is favorable for the person; the carbon footprint of the country—the country’s degree of pressure on the environment through the release of carbon dioxide into the atmosphere; economic model of green growth—activity-based cost-conscious innovation; ecological backpack—the total amount (kg) of materials extracted from nature to create a product or service minus the actual weight of the goods. Factor backpack (MI) is the total number of natural materials (kg) required to generate 1 kg of raw material and the level of loading of the goods from the environment. According to the method, all materials are weighed and production are multiplied by factors of a backpack (Ri), and then summed (Fomicheva 2007):

$$MI = \text{SUM}(Mi \times Ri)$$

Where

Mi an ecological rucksack

Ri factor backpack.

For example, steel is an ecological backpack—21 (i.e., 1 kg of steel carries an ecological rucksack of 21 kg), aluminum—85, gold—540,000, diamond—53 million, and rubber—5. All this shows how costly technology is for the main products of nature and how relevant is the search for solutions to optimize production and reduce costs. Humanity has at all times sought to provide themselves with a comfortable and safe conditions for life.

So, at one time there appeared a concept of environmentally friendly life settlements “after oil green city” (Post Carbon Cities), which does not require vehicle traffic with the industry’s health and recreation or renewable energy sources; “Bio-positive sustainable settlement” (A.N. Tetior) with a maximum volume of use of environmental health technologies that minimize or eliminate the introduction of contaminants into the natural environment (see Table 1); Eco-polises (Kavtanadze 1987) of the city, combined with rural settlements, where people and wildlife are complementary, natural and man-made system is in equilibrium (see Table 2); concept of development of the strategy of green cities on the basis of industrial medium-sized cities (Medvedeva 2015).

Modern green settlement should provide the residents with not only the required level of service and accomplishment, but form a desire to live and work here in the future, to develop their own business to grow and get environmentally friendly products. The introduction of management of territories “best available techniques”, especially with the adoption of the Federal Law “On Environmental Protection” (2014), has allowed for a different look at the processes taking place in the economy, in particular on the process of integration towards the formation of clusters and increase of business efficiency.

**Table 1** Key Bio-positive creating sustainable settlements

Directions				
Improving space	Visio—ecology. The use of renewable energy	Ecological zoning, favorable business	Phytomelioration, horizontal and vertical greening of homes	Deep cleaning of waste water and waste treatment system
New eco-friendly solutions	Achieving the ecological balance	Decision touch Ecology	Deep disposal of waste	Eco-Village
Creature eco-friendly places	Ecological balance: nature and man	Biopositive human settlement sites	Biopositive settlement sites in the region	Biopositive resettlement places in the country

**Table 2** Main objectives and conditions for the creation of Eco-polis: the city with suburbs

For residents	For nature
1. Improving the quality of life	1. Recovery of the biosphere
2. Environmental education population	2. Greening, creating green corridors
3. Community residents in municipalities	3. Reduction of the nature of pollution from the city
4. Provision of health	4. The use of renewable energy
5. Ensuring social justice	5. Preservation of natural landscapes
6. SME Development	6. Reduction of pollution
7. Promotion of natural technologies	7. Changing people's attitudes to nature
8. Respect for the historical heritage	8. Preservation of natural systems
9. City as a component of the natural environment	9. Maintaining the ecological balance

In the public mind is firmly entrenched, the term “economic efficiency”, as the ratio between the obtained results, on the one hand, and labor costs—on the other. Projecting the concept of efficiency in the clustering process, you can expect the relative effect (efficiency), defined as the ratio of the effect (result) cluster structure operations to the cost of the formation and organization of clusters. In justifying the performance criteria of business structures at the regional level, functional, technological, economic, institutional, fiscal, social, and environmental impact of cluster components must be considered.

Factors of development of clusters are derived from its essential characteristics: if the latter determine the potential association of subjects, the factors can directly determine the effectiveness of its development. Effective integration of economic subjects depends on their level of preparedness for the establishment of appropriate organizational, economic and economic and legal conditions. The development of clusters in regional economic systems based on: analysis of the operational environment; theory of transaction costs; assessment of the achievement of competitive advantages, evaluating the benefits of long-term business relationship. Factors of efficiency of the clustering process are shown in Fig. 1.

Factors of efficiency of clustering processes in regional economies	
external	internal
<b>Institutional</b>	<b>Economic &amp; geographical</b>
Using legislative initiatives Cost savings, maintenance contracts	The synergy from the interaction of agents, the presence of industrial and technological relations
<b>Market conditions</b>	<b>Production &amp; technical</b>
Strategic stability and competitiveness at the complementarity and mutual support agents	Economies of scale, structure and specifics of production, administrative and commercial costs
<b>Innovative</b>	<b>Investment &amp; financial</b>
Modernization of production and business, based on innovation and economics of ecology technology	Domestic investment potential of the cluster entities, joint warranty

**Fig. 1** Classification of factors of efficiency of the clustering process

Studies show that the dominant entity within the regional cluster policy is the executive and legislative authorities of regions that are in the process of implementation of the clustering policy programs are the link between the federal authorities, municipal authorities and associated and integrated business structures, and scientific institutions. Cluster policy of regional economic systems should be based on the analysis of the social, natural and climatic and economic & geography component production and determine the employment, level of transport infrastructure, and proximity to major sources of raw materials and markets. Accordingly, the aim of the regional cluster policy will increase business efficiency and increase budget revenues and improving living standards (The State Program 2013; The Doctrine of the Russian Federation 2010; [The Concept of Sustainable Development of Rural Territories 2010](#)).

Currently, theorists and practitioners of regional economic systems have identified a number of clusters of models. First-generation cluster policy model is based on a set of activities undertaken by federal and regional authorities to determine the geography of functioning clusters of subjects. Cluster policy of the second generation is based on a differentiated approach to policy stimuli available in the country or region of clusters (Table 3).

**Table 3** Model of cluster policy, conducted by federal and regional authorities

	Model type	Purpose of development	Events	country
Mega-level	Model national benefits	Strategy of development of priority sectors	Identification of the cluster, preferences	Canada, Sweden, the Netherlands
Meso-level	Model of Regional Development	Improving the competitiveness of the cluster of subjects	Investment protectionism businesses and science	Scotland Canada
Micro-level	Municipality level	Support for SMEs, science, innovative companies forming mini- clusters	Development of infrastructure and entrepreneurial capacity	Austria, Germany

Depending on the position occupied by the regional government cluster policy divided into the following types:

the catalyst, when regional authorities to stimulate greater interaction potential clustering of subjects (economic agents, research and engineering companies, educational institutions) with limited financial support;  
 infrastructure where the government direct investment on cluster infrastructure in the district;  
 protectionist when government authorities spend directorial supportive policy towards the regional cluster structures.

Currently, regional clusters are considered as a priority cross-cutting systems, which determine (bringing into the mainstream) the development of a post-industrial economy.

In general, clustering of regional economy allows obtaining the following results:

1. Combining different forms of ownership, organizational and legal status, productive sector, and geographical origin in the organization of the final product complete system of production with high added value.
2. The emergence of clusters, which members retain their legal and economic independence without creating a hierarchy of controls, thus reducing the administrative and organizational costs.
3. Establishing trust between members of the cluster cooperation relationships enables sharing the brand and other intangible assets.
4. Governance cluster as a “meso-structure”, in contradistinction to the regulation of the activities of individual companies, develops inter-regional connections, allowing to develop innovative infrastructure and public-private partnerships. Cluster paradigm as the original system of views on the creation and development of regional economic systems is in the process of dynamic changes and the formation of “clouds” intercluster interactions—one of the ways to increase its effectiveness (The Doctrine of the Russian Federation 2010).

One of possible variants of formation of a new cluster in the Volgograd region is the union of production and area-based seed producers. The central figure of the cluster is to become a center for the production of seeds of high reproductions of crops for feed and landscaping areas through public-private partnerships and agricultural cooperation. Participants will become the center of production, farmers, and scientific organizations. Currently, the cluster model is being developed by scientists of Government Institute “All-Russian Research Institute of Irrigated Agriculture” in Volgograd. Figure 2 shows a model of the cluster. Urgency of appearance of this cluster has a number of reasons:

Seed is one of the risk areas for the food security of Russia, since up to 80 % of the Russian market is occupied by foreign companies.

Material and technical base of breeding centers and seed farms are so outdated that even the achievements in the field of selection cannot be realized in the market.

Foreign varieties have the advantage in the first year of cultivation, and in the subsequent yield is sharply reduced. In addition, they are resistant to diseases and pests.

Seed is the basis for the production of competitive products, and at a strategic level seed provides the country’s food security and effective development of the national economy. The global seed outlined the following trends: the elimination of varieties with the yield of 180–190 quintals per hectare (in Russia, the level of the yield is 20 quintals per hectare); varieties with high resistance to pests and diseases (used to reduce the amount of chemical means of protection); increased investment in fundamental—research development in the field of seed production; the formation of large integrated structures, technically equipped, capable of creating new

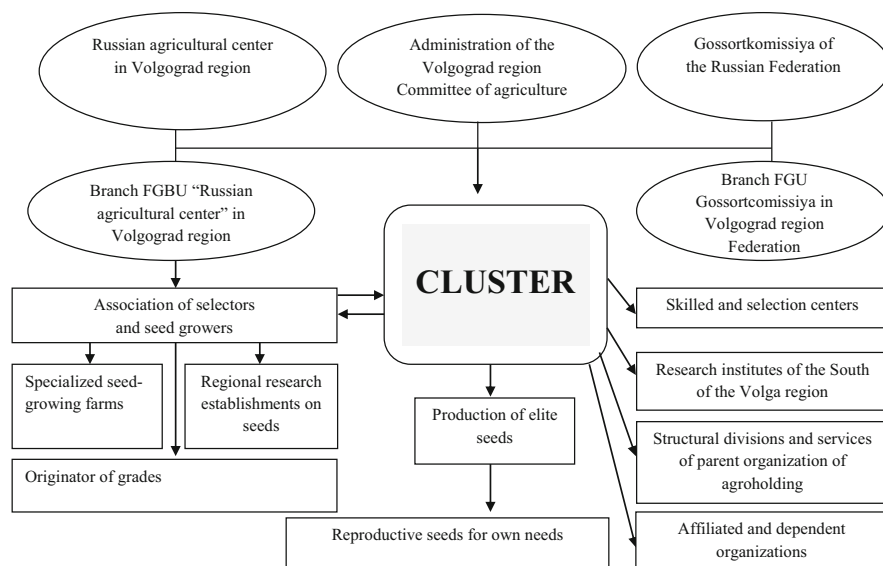


Fig. 2 Scheme of the interaction of economic agents of seed cluster in Volgograd Region, 2016

varieties and cropping techniques (The State Program 2013). Issues of reproduction of quality seeds for feed in agriculture sector are relevant to Russia's science and practice. At present, the domestic seed production, experiencing the dominant policy of large foreign seed companies for a quarter of a century, is located at the stage of embryonic development, a debilitating condition. In particular, the majority of managing subjects of agriculture is used for the reproduction of livestock fodder foreign seeds (under the existing rate of ruble against foreign currencies, it's very expensive for many entrepreneurs to purchase such); violated economically, reasonably possible variety change and strain renovation and varieties, many times reseeded in farm production, cannot reveal their biological potential and gradually lose their competitive edge to increase agricultural production. Illegal turnover of seed (use at sowing seeds of unknown origin, lower sowing qualities) is still present; Russia does not have the infrastructure to provide consumers with high-quality seeds (certified) and seed material of high reproduction zones; outdated material and technical and technological base of breeding and seed production. In this situation, it is impossible to effectively carry out the selection process and to ensure the production of high-quality seeds in the required quantities: share sowing certified seeds for major crops reaches only 30 %, under these conditions, grade realizes its potential yield of only 15–30 %; destroyed the system of staffing breeding and seed production, because of what the experience of broken transmission system by highly qualified professionals to the younger breeders, seed growers; lack proper state support of domestic seed production, especially primary of its links, and as a result—low profitability; old, “state”, seed system collapsed, and the new, with the participation of the private sector, has not yet been formed (The State Program 2013; Sectoral Program 2011).

In order to solve the problems, it's expedient to use the Federal Law of dated July 13, 2015, No. 224-FZ “On public-private partnership, municipal-private partnership in the Russian Federation and the Introduction of Amendments to Certain Legislative Acts of the Russian Federation” in the development of seed-growing and cattle breeding. So far, the question of public-private interaction in the agricultural sector has been the subject of intense debate in the research of domestic and foreign scientists. Nevertheless, this form of public-private partnerships for use in the Russian practice is new and has not yet received wide distribution. Most brightly it could manifest itself in the depressed regions, whose budgets are no funds for co-financing of innovation and investment projects, resulting in agricultural regions with scarce budget cannot participate in the implementation of targeted productive sector's programs and to modernize the industries located on their territories. Even though targeted programs for the acquisition of equipment were developed, leasing of equipment for seed remains inaccessible. The development of new market mechanisms of selection and seed production in the Russian Federation shall be based on the assimilation of market experience of developed countries and the positive national experience. There are risks because of insufficient developed rules of interaction of subjects of agricultural cooperation between themselves and the criteria of the expected results. Currently, the majority of Russian seed farms have problems with the sale of seeds, providing them with

quality technical equipment to perform quality bookmarks seed crops of agronomic, logistic and other specific works in the seed. Underdeveloped commodity and credit support infrastructure, which limits the access of producers to domestic and foreign markets, holding back the development of seed. These problems can be solved by developing a network of cooperatives.

It should be noted that the main activities of agricultural consumer cooperatives are harvesting, storage, processing and marketing venues for agricultural products (milk, meat, fish, and vegetables). The seed development cooperation is not observed. However, seed growers' cooperatives can provide one of the main conditions for a sustainable fodder in animal husbandry at the expense of high-quality seeds of forage crops [9.14], including in Volgograd region, through the establishment of modern seed production complex, which is the initiator of the Government Institute "All-Russian Research Institute of Irrigated Agriculture" in and other agricultural organizations. In accordance with the planned increase in the quantity of animals, an increase in acreage of forage land in the Volgograd region the annual demand for seed material increases up to 10 thousand tons. The planned capacity of the seed factory of the complex will be 5 thousand tons in stock and must ensure that 50 % of sales in the regional market. To accelerate the formation of this structure prevents inconsistency of the cooperative legislation in Russia. According to some experts and scholars, co-operative legislation is a framework [7.12], not established an appropriate legal and institutional infrastructure. Processing service cooperatives, which have essentially industrial character, according to the legislation are related to non-profit organizations, although, commercial organizations, are working in the market, profit, pay taxes. The created clusters of seed-the-art control technology similar structures will be used in the Volgograd region. In particular, to ensure the stable operation of the cluster agents throughout the period, require the formation of several planning horizons. Figure 3 presents a model of the three horizons of growth, which can be used to evaluate the possibility of further development of the cluster.

Level one—the most important business areas, which are primarily associated with the name of the cluster, provides a normal profit. At this stage, the main focus is on improving the efficiency of the existing ties.

Level two includes new possible cluster development, including the emergence of new actors, who cannot always make a profit in the right amount. Level three focused on embodied in the lives of those ideas that give a real chance to achieve the increase in profits in the longer term through the implementation of research and development, pilot projects. The cluster can be used by one of the most popular systems of modern management—"Lean" (Lean production, TPS, kaizen). The basic principles of "lean production"—is a reduction in costs, due to the synergies arising from the mutual activities of the cluster actors (see Fig. 4). As a result, an organization within the cluster appears savings business of the annual budget—10 %. Control structures of the cluster and regional authorities can use the experience of appearing in the seed for the organization of kaizen—Attendance (Medvedeva 2015).



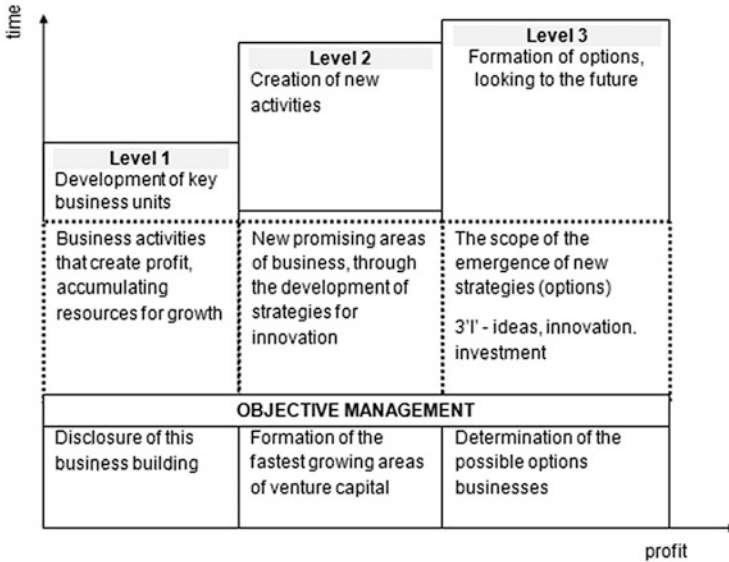


Fig. 3 Scheme of the planning level in the seed cluster

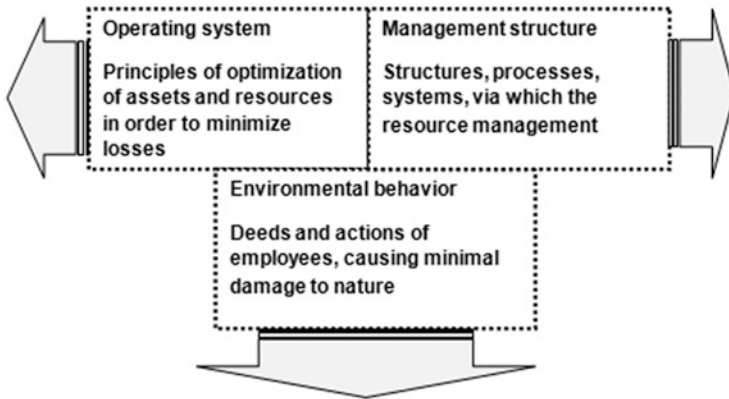


Fig. 4 The scheme of the lean technology in agriculture cluster—seed

Used to assess the effectiveness of the structures, within the cluster seed, “Heat Map” allows outlining the future development of the business (see Figs. 5 and 6).

The seed structure of the center will be made available following the production and operation: combine harvesting, transporting seed to the seed-cleaning complex, pre-treatment, the active ventilation—drying, bringing to sowing conditions in complex and special machines, warehousing in modern Seed Vault, an à la carte weighing, dressing and bagging in bags or special containers, transport users or storage (see Fig. 7).

Business Unit 1	Business Unit 2	Business Unit 3	Business-unit 4	
				Marketing and Consulting Service
				Service Logistics and Purchasing
				Service policy decisions
				personnel and production service
				Office of Management and Economics
	Below average level of efficiency			
	Average level of efficiency			
	Above average level of efficiency			

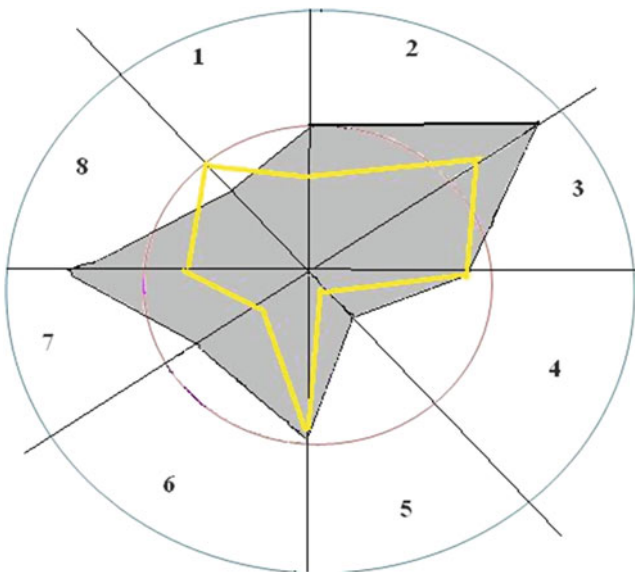
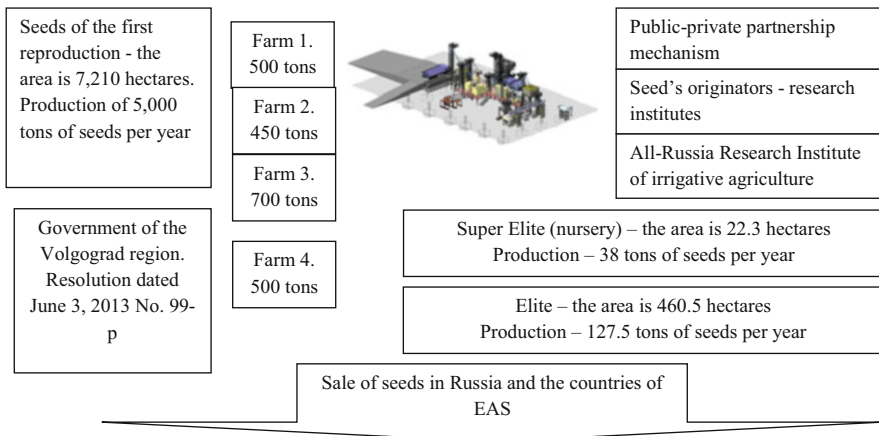


Fig. 5 Heat Map “Seed Center” of Volgograd region

1	Strategic alignment and positioning
2	The mentality of target setting
3	Performance management
4	The strategy of creating value by category
5	Procurement procedures on grades
6	Information and knowledge management
7	Institutional framework
8	cross-functional interaction
Designation:	
	The behavior of companies
	The median of regional clusters

**Fig. 6** Strategy of improvement of the activity of the cluster of subjects in the field of marketing and consulting



**Fig. 7** Model of the center for the production of seeds of high reproductions of crops for feed and landscaping areas of the Volgograd region

One of the direction of the Center is growing of seeds for urban greening. Modern approaches to landscaping can solve environmental problems without a radical transformation of the urban environment practices, an important area is the development of modern methods of forming the ecological zones of comfort in a sealed building. One of the urban greening options—creation of lawns. At different stages of development of the territory, in different climatic conditions they worked out their own special methods of gardening and art landscape. New landscaping in cities was the idea of landscape environment as a holistic system of man-made

object and natural landscapes. Gardening system of town and villages includes three groups of plants: public, restricted use and special purpose (Komarova 2015; Melikhov 2011; Novikov 2014).

Each of these categories of plants is characterized by certain functional symptoms (Table 4).

As of January 1, 2014, the public green area (parks, squares, quays, and boulevards) per 1 citizen of Volgograd Oblast was less than 5 square meters. According to the sanitary standards (SNIP 2.07.01.89 “Urban planning, Planning and construction of urban and rural settlements”), the area of common areas should be at least 10 square meters per citizen (Table 5).

In conditions of high anthropogenic pressure, low levels of landscaping require a progressive method of improving the aesthetic and ecological state of the city. As one of the ways to solve the problems of the urban environment improvement proposes the creation of urban facilities more environmentally friendly than nature itself. A sufficiently convincing example of the possibility of establishing scientific inventions of Leonardo da Vinci is artificial eco-systems.

Da Vinci was watching birds and thinking about the shape of wings, frequency of their movement, and internal structure of the body—thus coming to the

**Table 4** Landscape and nature complexes territories

Protected areas	Nature reserves, wildlife sanctuaries, natural parks, cultural and historical areas
Landscape objects	– Water-green system; open space centers; – Industrial zones; Area residential development; – Protective green zone; Parks, gardens and parks; – Fitness area
Landscape objects spatial areas	Recreational facilities – Short rest area; area long rest; – Spa area; green routes Objects of economic purpose – Water Protection Zones; – Reclamation zone; – Agricultural land

**Table 5** Limits of plantations per inhabitant in cities of different size, m<sup>2</sup>

Green spaces	City		
	Large	Average	Small
Citywide parks, gardens and squares	5	4	7
Regional parks, gardens and squares	7	5	–
Gardens Micro-District	5	5	5
Plantings stadiums (sports park)	2.6	2.6	2.8
Plantings in the streets	5	4	3
Total public spaces	24.6	20.6	17.8

conclusion that one cannot imitate the birds and cannot fly. Nevertheless, he was able to understand the mechanism of the bird's flight; he found an alternative solution to the problem of flight—invented the propeller, and it surpassed nature. What Leonardo da Vinci did in the field of flying machines must be done in the form of urban ecosystems, capable of developing in parallel with the balance of nature. Growth in the Center for seed of new varieties of lawn grasses will allow the city to form a natural frame. The main producers of lawn grasses in the world are companies from the USA, Denmark, France and Canada. The leader in terms of sales is FELDSAATEN FREUDENBERGER GmbH, DLF-Denmark. Figure 8 and Table 6 show the mixture of herbs for urban lawns.

One of the most interesting solutions in the field of urban greening is to use a matrix model, created by Pete Oudolf resort on the island of Nantucket, Massachusetts, the project James Corner Field Operations. Use in landscape gardening plant matrices of perennials and grasses. The gradual transition from plant layout blocks, drift, islands, with the inclusion of accent of herbs, to a completely new design for landscape and completely natural to the nature of the matrix—this is what distinguishes the matrix of Pete Oudolfa from other landscape creations. In his understanding: the matrix—it requires minimal maintenance, natural landscape sustainable, growing over time without significant human intervention (Figs. 9 and 10).

Matrix is not just a combination of various elements and design methods—it is strict adherence to a certain style of decorative compositions, color, based on plants native to a particular area. In Volgograd, several matrices can occur through the use of seeds from seed production centers, which could embody the bright pictures of flora in southern Russia. In particular, the arrays could be used plants growing in natural parks and nature reserves in the region: Dzhanybek hospital Tersinsky Kozlovsky and forest belts; Don parks, Nizhnehopersky, Ust-Medveditsk, Scherbakovsky, Eltonsky “Volga-Akhtuba floodplain” (Table 7).

Variably future: it is not rooted in the past, and depends on the decisions of participants and stakeholders. There are areas in relation to which it is possible to forecast, but in general you cannot reliably predict the future. You can prepare for



**Fig. 8** Herbs produced by foreign companies and shipped to the Russian Federation

**Table 6** Main lawn seeds used for planting in urban and rural settlements in the south of Russia

Name	Using	Composition	Norms
Grass lawn Sport	For sports facilities, playgrounds and children's playgrounds, tennis courts, football and volleyball fields.	Red fescue (ROLAND), red fescue (ECHO), perennial ryegrass (HENRIETTA), perennial ryegrass (TALGO), Kentucky bluegrass (BALIN)	The shape of seed: 30–35 g/m <sup>2</sup>
Mixture Universal	For landscaping areas exposed to moderate mechanical stresses, for lawns in parks	Red fescue cultivar Roland, red fescue cultivar Echo, perennial ryegrass cultivar Henrietta perennial ryegrass cultivar Talgi, Kentucky bluegrass variety Balin	Seeding rate: 30–35 g/m <sup>2</sup>
Shadow Mixture	For lawns in shady areas of the park, gardens	Tall fescue—60 % Red fescue 40 %	Seeding rate: 30–35 g/m <sup>2</sup>
Mixture Sunshine (Manufacturer: DLF-Denmark)	To create a lawn in the conditions of high temperatures and lack of irrigation water	Tall fescue, 45 % Red fescue -20 % Perennial ryegrass 25 % Poa pratensis 10 %.	Seed Consumption rate: from 30 to 40 g per 1 m <sup>2</sup>
Mixture Ornamental (Manufacturer: DLF-Denmark).	To create a lawn in cities	Red fescue s-50 %; Perennial Ryegrass, 35 %; Kentucky bluegrass, 5 %; Red Fescue the changed -5 %; Fescue sheep -5 %.	Seed Consumption rate: from 30 to 40 g per 1 m <sup>2</sup>
Mixture of San Manufacturer: DLF (Denmark).	For lawns in hot dry climate with lack of irrigation water and poor soils	Tall fescue, 45 %; Red fescue 20 %; Perennial Ryegrass, 30 %; Poa pratensis 5 %	Seed Consumption rate: from 30 to 50 g per 1 m <sup>2</sup>
Lawn grass for the southern regions	For lawns, parks	Tall fescue—60 % Red fescue—40 %	Seeding rate: 30 to 40 g per 1 m <sup>2</sup>
Mixture Road Manufacturer: DLF (Denmark).	Designed to create urban lawns resistant to adverse climatic conditions	Red fescue—45 % Perennial ryegrass 35 %; Perennial mnogoukosny-15 %; Poa pratensis 5 %	Seed Consumption rate: from 30 to 50 g per 1 m <sup>2</sup>
Mixture City Classic	To create an urban lawn with optimal climatic conditions	Timothy, 40 %; Festulolium 20 %; Perennial ryegrass 20 %; Tall fescue -20 %	Seed Consumption rate: from 30 to 50 g per 1 m <sup>2</sup>
Mixture "South"	For landscaping territories in poor condition	Red fescue—30 %; Tall fescue—35 %; Cocksfoot—35 %;	Seed Consumption rate: 3–5 kg per 100 m <sup>2</sup>



**Fig. 9** Greening the city through the use of the landscape matrix



**Fig. 10** Matrix of the natural landscape in the urban space

**Table 7** Natural monuments of the Volgograd region, which can be used to create a landscape matrix

Dolgov Padin	Natural complex forest of pedunculate oak and white poplar
Tract Large claw	Community floodplain meadows and forests, which are a place of growth and habitat of, small, rare and endangered plant species
The tract trenches	Steppe complex unplowed feather grass steppes, which grow rare and endangered plant species listed in the Red Book of the field
Tract Dips	The complex of floodplain forests with growth of small, rare and endangered species of plants, including listed in the Red Book of the field
Belyaevsky tulip meadow	The natural complex of rare and endangered species of plants, including tulips Gessner (Schrenk), listed in the Red Book of the Volgograd region
Kurnaevsky tulip meadow	Location of rare and endangered species of plants, including tulips Gessner (Schrenk), listed in the Red Book of the Volgograd region
Chernichkin garden	The complex is an artificially created forest with valuable aesthetic, natural and recreational properties

that future, what we want to see, or prepare it themselves. It is based on these principles, the creation of the cluster seed in the South of Russia, will determine the further development of agriculture, improvement of the living standards of the population.

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# Effectiveness of State Territorial Administration in Provision of Sustainable Economic Growth of the Region

Elena Petrova, Andrey Shevandrin, and Vera Kalinina

**Abstract** Under the conditions of overcoming the post-crisis recession and need of modernization of national economic system, the efficiency of the sphere of public administration should be considered as a significant factor of socio-economic development of territories. Increase of productivity of the system of public administration at the regional level requires introduction of new elements of the transactional mechanism of executive authorities' activities with simultaneous monitoring of its efficiency by means of modern information methods. This article introduces an approach allowing creating an assessment of the efficiency of territorial governance which includes the same system of indicators for all the regions and highly correlates with the main socio-economic development indicators of a region. The authors use the method of the canonical correlation analysis that allows revealing analytical expression of correlation between indicators of socio-economic development and efficiency of regional executive authorities' performance.

## 1 Introduction

Sustainable economic growth of the region represents the stability of the dynamic type and can be accomplished only under a certain ratio of transformational and transactional factors that characterize the state of a complex open socio-economic system. The global financial and economic crisis, which affected Russian economy beginning from 2008, has led to the change from economic growth to a slump, causing aggravation of social problems and uncertain prospects for the future. Since 2009, the national economy has entered a recession, accompanied by a devaluation of ruble, growth of unemployment rate, suspension of investment programs, and negative dynamics of industrial production. This situation is observed in almost all regions of the country, which is confirmed by the current statistics of the socio-economic development of the regions of the Russian Federation for 2007–2014, published by Rosstat (The Federal State Statistics Service). That allows us to make

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assessments whether it is possible for the regions of the country to recover from a deep recession.

It should be noted that the issues related to the identification and analysis of the problems of economic growth in the regions and related governance issues have already been discussed by Russian economists (Artobolevskiy 1999; Minaker 2001). The research in this field was also conducted by a member of the Russian Academy of Sciences A. Granberg (2001, 2011), who identified the main trends of development of Russian territories: divergence (differentiation), disintegration, and demographic contraction.

The solution of the national economic growth objectives requires a shift from the policy of leveling-off socio-economic development of the territories by redistribution of the budget funds to the system of dissemination of best reform implementation at the regional and local levels. Particular emphasis should be given to the level of municipalities, as the municipalities are the main subjects in the solution of area development issues.

The dissemination of a particular model of public management is based on a set of objective measurements of socio-economic conditions in the region and the efficiency of public administration. It updates the research in the field of inter-territorial measurements and correlations enabling to find representative information analysis base.

The problem of a drastic differentiation of the regions is one of the most important issues of socio-economic policy since Soviet times. In order to solve this problem, such means were applied as the central funding of the economy and social sphere of regions, the subvention subsidies, various social compensators, plan prices, etc. However, differences between Russian regions on key socio-economic indicators were rather significant.

The beginning of market-type reforms in 1991 only intensified regional differences. It can be explained in two ways. Firstly, the market competition took effect and the different structure of regional economies led to unequal adaptability of the regions to the market. Secondly, the regulatory role of the state significantly weakened (reduction of state financial support, abolition of most of the regional economic and social compensators), and the actual inequality of subjects of the Russian Federation in relations with the center remained.

Despite the growing criticism of the gross regional product (GRP) per capita, it remains a key indicator of the development of the regional economy. It allows tracing the differences in regions of Russia. Table 1 shows the values of this index for the leaders and outsiders of Russian regions for 2007–2013 divided by federal districts.

Analysis of the dynamics of this indicator shows the preservation of regional imbalances. So in 2007 the spread of values ranged from 40,572.6 rubles per person (the Chechen Republic) to 831,305.3 rubles per person (Tyumen Oblast)—thus, GRP per capita in the Tyumen Oblast is almost 20.5 times higher than the value of this indicator in the Chechen Republic. In 2013, the maximum value of this indicator remained in the Tyumen Oblast and equaled 1,422,113.3 rubles per person that is 16 times higher than the minimum value in the Chechen Republic.

**Table 1** Changes in GRP per capita, the highest and the lowest values in regions by federal districts for 2007–2013

Federal district/region	2007	2008	2009	2011	2013
<i>Central FD</i>					
Moscow	601,146.9	734,242.0	628,930.3	859,355.1	965,842.7
Ivanovo Oblast	68,865.7	80,708.5	81,286.7	121,945.5	150,791.8
<i>Northwestern FD</i>					
Komi Republic	256,586.2	314,251.6	329,967.4	487,363.5	559,984.3
Pskov Oblast	87,456.7	105,449	108,797.9	150,199.9	173,354.5
<i>Southern FD</i>					
Volgograd Oblast	126,313.1	159,001.5			
Krasnodar Krai			165,555.1	236,750.6	301,436.1
Republic of Kalmykia	58,925.2	71,450.7	82,586.8	101,873.2	145,318.3
<i>North Caucasian FD</i>					
Stavropol Krai	80,715.3	99,503.3	99,994.7	142,409.2	171,295.6
Republic of Ingushetia		47,002.3	46,174.4	63,569.7	
Chechen Republic	40,572.6				88,462.4
<i>Volga FD</i>					
Republic of Tatarstan	201,172.1	245,628.5	234,206.4	344,092.5	403,941.9
Mari El Republic	77,919.2	93,512.4	98,888.9	140,243.8	180,416.2
<i>Ural FD</i>					
Tyumen Oblast	831,305.3	934,229.6	852,920	1,198,186	1,422,113.3
Kurgan Oblast	86,224.4	114,237.4	117,058.7	151,046.4	187,361.2
<i>Siberian FD</i>					
Krasnoyarsk Krai	258,394.3	260,318.2	264,478.7	413,172.4	440,993.8
Tuva Republic	63,959.4	78,381	87,889.5	108,178	134,193.8
<i>Far Eastern FD</i>					
Sakhalin Oblast	559,774.1	657,783.3		1,210,003.9	1,369,003.1
Chukotka Autonomous District			872,422		
Jewish Autonomous Oblast	132,505.0	134,377.5	142,388	225,065.5	220,875.0
Average in Russia	195,819.0	237,552.2	224,163.3	317,515.3	376383.0

During the last 7 years, there has been strong growth in the territorial concentration of GRP. In 2013, two regions—Moscow and the Moscow Region and Tyumen Region and Chukotka Autonomous District accounted for 34.3 % of GRP of the country, despite the fact that their share does not exceed 12.7 % of the population of Russia.

The second biggest problem of Russian regions is the disintegration of economic space, which is understood as a weakening of domestic economic coherence. The reasons for this weakening of connection between the regions are high transport tariffs, which cause separation of the territory; liberalization of foreign economic relations as well as the policy of regional authorities aimed at the protection of the regional economy. As a result, the share of interregional relations significantly decreased in the structure of economic relations of the subjects of the Russian

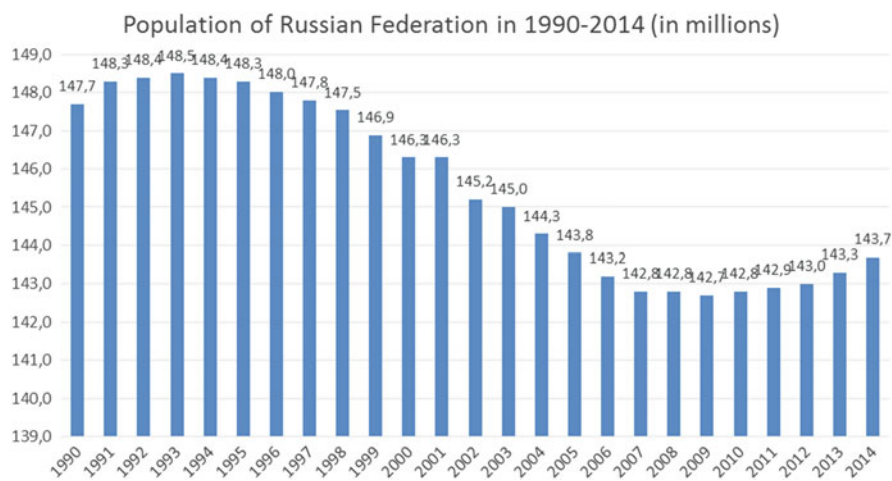
Federation, whereas, in contrast, the share of intraregional and international relations increased. However, the factors that lead to the development of this trend (elimination of the administrative management of interregional relations, modification of price relation and transport tariffs, the slump in demand in the major market segments, etc.) is currently moderated by the federal government. The introduction of bilateral sanctions and worsening of the geopolitical situation in the world caused greater increase in disintegration of the Russian regions.

The third issue of territorial development remains unresolved—population decline in the Russian regions as a result of the negative natural increase and migration outflow.

Since the mid-1990s, the population decline was observed in the Russian Federation. In 2010, the population decline reached its end. According to Rosstat, in 2012 Russia's population increased for the first time, and in the first half of 2013 the population was 143.3 million. During 2014, the population of Russia, taking into account the population of the Crimean peninsula, increased by 100,926 people, or by 0.07%. In 2014, about 1,932,227 children were born and about 1,907,361 people died. That is the second consecutive year when the Russian population had a positive natural increase (the number of births exceeds the number of deaths) (Figs. 1 and 2).

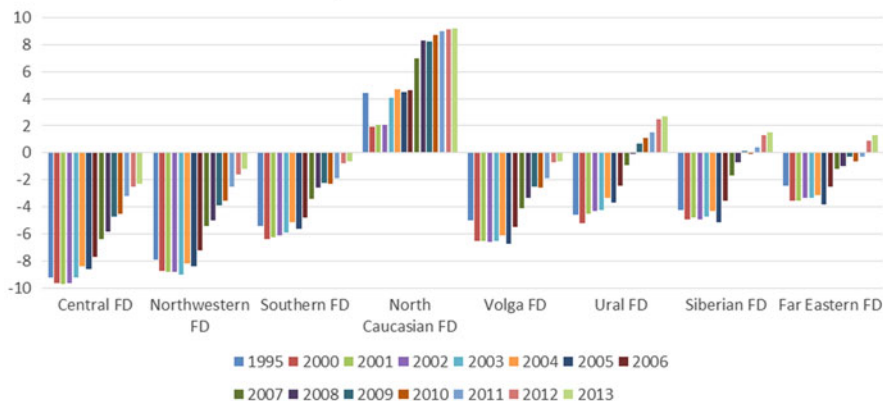
The new problem that aggravates the demographic crisis in the country is the immigration challenging the national identity. Currently, the stabilization of the population in Russia has been achieved by migration balance (in 2012 the number of the remaining migrants amounted to 294,930 people).

The first years after the collapse of the Soviet Union were characterized by two streams of migration: the Russian population of the former Soviet republics migrated to Russia and Russian population migrated from Russia to Europe, the USA, and Israel. During the first stage took place the inflow and outflow of highly qualified personnel.



**Fig. 1** Population of the Russian Federation in 1990–2014 (in millions)

## The dynamics of natural population growth by Federal Districts



**Fig. 2** The dynamics of natural population growth by Federal Districts, per 1000 people

The outflow of the population declined by the end of the 1990s. In the 2000s, the outflow of skilled labor reduced, while the labor migration to Russia increased from a number of CIS countries. The correlation in the dynamics of migration inflows of people from the CIS countries (Ukraine, Moldova, Armenia, Azerbaijan, and republics of the Central Asia) shows their employment capacity. Exception is represented by migrants from Kazakhstan who, in many cases, have Russian roots and move to Russia for permanent residence and not as a part of labor migration.

In 2012, 91 % of the total migration growth was accounted for the CIS countries, 50 % of them fell to the republics practicing Islam (Azerbaijan, Tajikistan, Turkmenistan, Kyrgyzstan, and Uzbekistan) and Kazakhstan (63.5 %). The inflow of the low skilled workforce on the one hand and an increase of the followers of other religious denominations on the other hand raise the question of immigration challenging national identity.

The above-mentioned problems of regional development require the reforms of regional and municipal management, which, in its turn, sets a task to improve the objective measurements of socio-economic conditions of the region, as well as the effectiveness of the regional governance.

The currently applied method of monitoring and evaluating the effectiveness of executive authorities at various levels of management, approved by the Ministry for Economic Development (Presidential Decree of August 21, 2012 № 1999), allows to evaluate their performance only on the basis of generalized statistical indicators that do not reflect the specific conditions and characteristics of the different regions (Kalinina and Shevandrin 2013). The results of the performance evaluation of the executive bodies of subjects of the Russian Federation on individual indicators and composite index, as well as the rating of the subjects of the Russian Federation are calculated on the basis of the entire set of indicators presented in the report in

accordance with the adopted methodology (The report on the evaluation of the effectiveness of the executive bodies of subjects of the Russian Federation on the basis of 2013). The performance evaluation is conducted on the basis of 295 indicators grouped into different sets (macro-economic development, agriculture, health, etc.). Previously, the researchers showed that the indicators summarized by each group used in this method correlate poorly with the main socio-economic indicators of regional development (Petrova et al. 2014a, b; Shevandrin and Kalinina 2013). The widespread approach to management that focuses on building evaluation indicator system of state management in accordance with the processes implemented in the executive branch cannot be used as a single methodological basis in Russia because of the lack of uniform standards for the organization of these processes. The use of strategic territorial development indicators also causes certain difficulties associated with differentiation and multidirectionality of territorial development, and sometimes a lack of clear strategic guidelines that cannot always be evaluated quantitatively (Petrova et al. 2014a, b).

Theoretical issues and problems of public authorities performance evaluation are widely represented in modern scientific literature in the papers of Bocharova (2012), Kalinin and Sofrygin (2010), Fateeva (2014), Jemirova and Dzhigkaev (2015) and others. Their works focus on the analysis of the shortcomings of the methodology of performance evaluation of the executive bodies of subjects of the Russian Federation, used by the Ministry for Regional Development of the Russian Federation, various mechanisms for the creation of new, more effective methods are proposed, some of them include the methods of mathematical statistics, method of summability, point assessment. Nevertheless, remains open the question of creation of a uniform methodology of the public authorities' performance evaluation that would equally allow analyzing this process in any region of the Russian Federation (Petrova et al. 2015).

In this paper, the authors offer a system of indicators that have a strong correlation with the main socio-economic indicators of the territorial development and are applicable at the federal level.

Analysis of the effectiveness of the executive authorities can be described on two levels: the internal evaluation of governance effectiveness, and external evaluation, carried out at the federal level. Internal evaluation of the effectiveness of the executive authorities can be linked to the achievement of strategic targets in each subject of the Russian Federation. In such case, the approach proposed in this study may be used for evaluation, but the socio-economic indicators should be replaced with the indicators approved in the socio-economic development strategy of the region. It does not seem possible to suggest a single set of such indicators as each region has its own specific features.

## 2 Research Methodology

The main research method used in the paper is the analysis of canonical correlations, which allows evaluating the correlation ratio and obtaining an analytic expression for the two groups of indicators: key socio-economic indicators by

region and indicators characterizing the performance of public authorities (Petrova et al. 2013).

The application of the canonical correlations analysis is widespread in foreign empirical analytical researches that are focused on the correlation between effective governance (“good governance”) and sustainable economic development. In terms of modeling techniques, regularities and description of the results several foreign studies should be noted. In one of the studies the method of the canonical correlation analysis is used to estimate the interconnection of institutions, governance system and economic development in 123 countries (Verspagen 2012). The author of the paper uses data on 93 variables to establish hidden interconnections that allows defining the properties of the institutional environment and management systems for countries with different economic development. In another study, the author reveals the category of “good governance” through the analysis of canonical correlation of the indicators of institutions development and economic growth (Meisel 2008). We should note the study by Kaufmann D. and Kraay A. (2002), where on the data of 175 countries over the period from 1997 to 2001 the authors found that some national economies are characterized by anticausality, when economic growth is not accompanied by efficient governance.

In the publications of Russian researchers, canonical correlation analysis is used, as a rule, as a basis of the complexes of diagnostic indicators of economic systems of different levels. In particular, the paper of Guryanova and Nepomnyashchiy (2013) and Kusakina and Skiperskaya (2012) shows the technology of creation of an enterprise aspect of information model using the simultaneous analysis of a great number of output indicators and a large number of determining factors and their ranking based on the analysis of canonical variables structure. Among the studies of economic systems at meso-level, it is possible to note the paper on the regional innovation system performance evaluation and the definition of statistically significant factors affecting the socio-economic development of regions of Russia, where it is shown that the application of the method of conical correlation analysis of the regional statistic data allows achieving the scientific validity of the results (Kolinko–Makarenko 2010; Efimova et al. 2015).

For the purpose of conduct of canonical analysis, the authors formed a sample of initial values, which contains 160 values for the selected parameters for all subjects of the Russian Federation for 2012 and 2013 that were standardized in accordance with to the formula of standardized values (Regions of Russia, 2014). This study uses Statistica 6.0 for the territorial governance performance evaluation on the proposed method.

As the resultant indicators were selected, the main characteristics that reflect socio-economic development of regions of Russia are the following: se1—income per capita (in rubles per month.); se2—volume of investment in fixed capital (excluding the budgetary funds) per person; se3—consumer spending on average per capita; se4—fixed assets in the economy per 10,000 people; se5—gross regional product per capita; se6—unemployment rate (in per cent); se7—population change (annual population growth, in per cent).

The indicators characterizing the performance of the public authorities are: g1—number of students in educational institutions of higher professional education per 10,000 people; g2—number of places in hospitals (per 10,000 people); g3—number



of employees of the state bodies and local government bodies, per 10,000 people; g4—nominal imputed average monthly wage of employees of state (municipal) health care facilities; g5—nominal imputed average monthly wage of employees of state (municipal) institutions for culture and art; g6—nominal imputed average monthly wage of employees of state (municipal) educational institutions; g7—nominal imputed average monthly wage of employees of state (municipal) institutions for social protection of the population; g8—nominal imputed average monthly wage of public employees (municipal) of physical education and sports facilities; g9—expenditures of consolidated budget of subjects of the Russian Federation on federal expenses per capita; g10—expenditures of consolidated budget of subjects of the Russian Federation on the national economy per capita; g11—expenditures of consolidated budget of subjects of the Russian Federation on housing and communal services per capita; g12—expenditures of consolidated budget of subjects of the Russian Federation on education per capita; g13—expenditures of consolidated budget of subjects of the Russian Federation on health care per capita; g14—expenditures of consolidated budget of subjects of the Russian Federation on social policy per capita; g15—number of employees of territorial bodies of federal executive bodies per 10,000 people; g16—imputed average monthly wage of employees of local governments.

The selection was carried out by step-by-step algorithm from a set of indicators, collected and published by the Federal State Statistics Service (Rosstat) in the digest “Regions of Russia. Socio-economic development indicators” in accordance with the value of the canonical correlation coefficient.

### 3 Main Results

The results of the canonical analysis are presented in Table 1.

The value of the canonical correlation coefficient  $R$  is sufficiently large (0.97) and highly significant ( $p < 0.001$ ). The obtained  $R$  belongs to the first and the most significant root and shows the correlation between the weighted sums of the variables in the first and second sets. Total redundancy shows that, by using the values of all canonical roots and by calculating the values of variables in the right set (indicators characterizing the performance of the public authorities), we can explain 76.4% of the variance of variables in the left set (the socio-economic development). These results suggest strong relations between the variables of two sets.

To test the significance of canonical roots, a chi-squared test was performed (see Table 2). The greatest number of roots, which can be found, is equal to the smallest number of variables in subsets, in this case seven. At the level of  $p < 0.05$  six canonical roots are statistically significant. According to the  $R$  value the most significant were the first three roots that were used for further analysis.

However, the final decision on the number of roots must be taken from the values of the extracted variance, quantitative evaluation of which are shown in the analysis results (Table 3).

**Table 2** Results of canonical analysis

Canonical analysis	Left set	Right set
Number of variables	7	16
Variance extracted	100.000 %	88.448 %
Total redundancy	63.6921 %	76.4150
Canonical R	0.977	
p	0.0000	

As the result, the first root is the most statistically significant according to the values of the extracted variance. The first canonical root in the left set extracts an average of 38 % of the variance of the variables corresponding to the socio-economic development. Furthermore, setting the values of the variables in the right set (indicators characterizing the performance of public authorities) may explain about 36 % of the variance in the variables in the left set. The first canonical root in the right set also corresponds to the highest loadings in the variables related to the performance of public authorities. According to the results given in Table 3, the first canonical root explains 61 % of the variance in the right part of the set of variables, thus, setting the values of variables associated with a socio-economic development can explain 59 % of the variance in the other variables.

Let's consider obtained loadings in the left and right sets (Tables 4 and 5):

As seen from the results in the table, the first canonical root corresponds to the highest loading for the five variables characterizing the socio-economic development: se1—income per capita (in rubles a month.); se2—volume of investment in fixed capital (excluding the budgetary funds) per person; se3—consumer spending on average per capita; se4—fixed assets in the economy per 10,000 people; se5—gross regional product per capita (Table 6).

According to the results given in Table 4, the first canonical root corresponds to the highest loading of the five variables that characterize the 14 variables, not significant indicators are: g1—number of students in educational institutions of higher professional education per 10,000 people; g2—number of places in hospitals (per 10,000 people).

Figure 3 represents a graph showing the relation between the values of the canonical variables of right and left set. The obtained allocation suggests that the results of canonical analysis are reliable.

The research conducted by the authors allowed developing a system of indicators to evaluate executive authorities' performance that have a close relation with the main indicators of socio-economic development of the region. The obtained factor structures of the right and the left sets (Tables 4 and 5) show that the maximum correlation coefficient  $r_1 = 0.977$  is achieved at the original standardized variables form the next pair of canonical variables:

**Table 3** Chi-squared test for canonical roots

Root removed	Chi-square tests with successive roots removed (AaHHble)					
	Canonical R	Canonical R-sqr.	Chi-sqr	df	p	Lambda prime
0	0.977417	0.955343	1084,437	112	0.000000	0.000625
1	0.914341	0.836020	627,451	90	0.000000	0.014005
2	0.826169	0.682555	361,673	70	0.000000	0.085404
3	0.654255	0.428049	192,998	52	0.000000	0.269035
4	0.586712	0.344232	110,869	36	0.000000	0.470382
5	0.450198	0.202678	48,843	22	0.000844	0.717299
6	0.316804	0.100365	15,548	10	0.113396	0.899636

**Table 4** Factor loadings of the canonical roots

Values	Root 1	Root 2	Root 3	Root 4	Root 5	Root 6	Root 7
Left set							
Variance extracted	0.38	0.11	0.05	0.1	0.2	0.05	0.08
Redundancy	0.36	0.09	0.03	0.04	0.07	0.01	0.008
Right set							
Variance extracted	0.61	0.15	0.02	0.01	0.03	0.01	0.01
Redundancy	0.59	0.13	0.01	0.007	0.01	0.003	0.001

$$U_1 = 0,92 se_1 + 0,47se_2 + 0,59 se_3 + 0,71 se_4 + 0,83 se_5 - 0,19 se_6 + 0,07 se_7$$

$$V_1 = -0,062g_1 + 0,41g_2 + 0,61 g_3 + 0,9 g_4 + 0,89 g_5 + 0,92 g_6 + 0,9 g_7 + 0,79 g_8 + 0,82 g_9 + 0,82 g_{10} + 0,87 g_{11} + 0,85 g_{12} + 0,86 g_{13} + 0,82 g_{14} + 0,6 g_{15} + 0,86 g_{16}$$

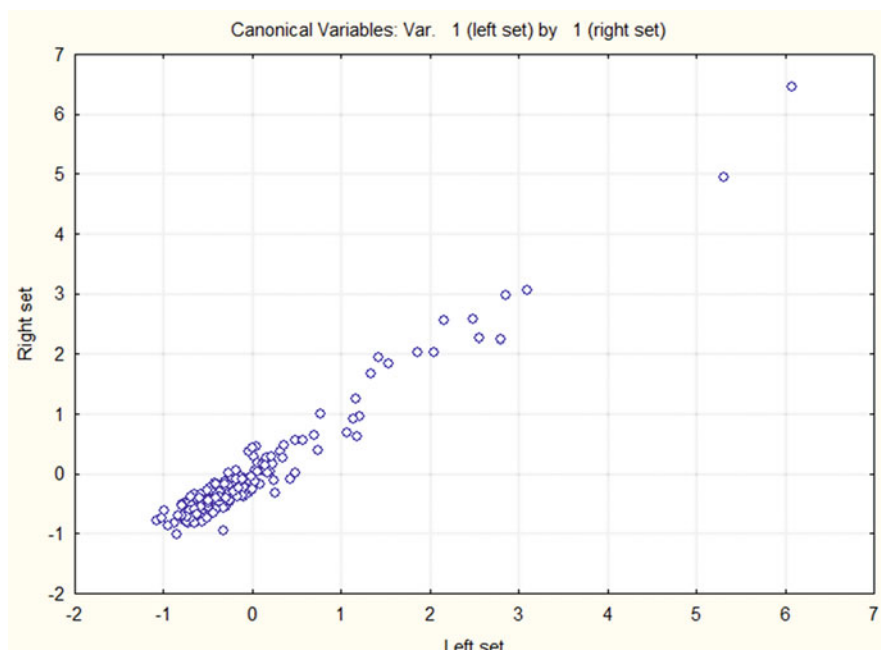
The coefficients of the canonical variables characterize the influence of corresponding factors and indicators to the level of relation between them, so it is arguable that the greatest impact on a set of socio-economic indicators have the next indicators:  $g_4$ —nominal imputed average monthly wage of employees of state (municipal) health care facilities;  $g_6$ —nominal imputed average monthly wage of employees of state (municipal) educational institutions;  $g_7$ —nominal imputed average monthly wage of employees of state (municipal) institutions for social protection of the population. Although it should be noted that the variation of these values is not very large, the scope of variation is equal to 0.86 units of measurement. Considering the canonical variables  $U_1$ ,  $U_2$ , and  $U_3$  (only three roots are selected because they have the highest value of canonical correlation coefficient), it can be noticed that by these linear combinations reserves the highest factor at  $g_7$  (nominal imputed average monthly wage of employees of state (municipal) institutions for social protection of the population), the other factors not only reverse sign, but also

**Table 5** Factor structure of the left set

Root variable	Factor structure, left set (AaHHble)						
	Root 1	Root 2	Root 3	Root 4	Root 5	Root 6	Root 7
se1	0.923573	0.237330	0.238246	-0.027865	-0.115568	0.133635	-0.043992
se2	0.472890	-0.016527	0.113474	-0.782228	-0.320834	-0.215973	-0.042020
se3	0.597188	0.611759	0.420289	-0.079771	-0.261534	0.083817	-0.103373
se4	0.716715	0.446125	-0.355397	-0.291414	-0.194054	-0.113841	0.159516
se5	0.832064	0.200750	0.064968	-0.101910	-0.312322	-0.381698	0.097593
se6	-0.192549	-0.233273	0.060611	-0.102985	0.604827	-0.086274	0.721782
se7	0.075873	0.315469	0.143995	-0.014623	0.859362	-0.365519	0.040839

**Table 6** Factor structure of the right set

Root variable	Factor structure, right set (AaHHble)						
	Root 1	Root 2	Root 3	Root 4	Root 5	Root 6	Root 7
g1	-0.062135	0.383796	0.316643	0.204889	-0.255526	0.179597	-0.309661
g2	0.414444	-0.383365	-0.159284	-0.077987	-0.624435	0.191774	-0.262451
g3	0.612247	-0.648395	-0.283689	-0.024475	0.009601	0.138663	-0.027187
g4	0.905135	0.252302	0.144254	-0.086781	-0.046557	0.117780	-0.063528
g5	0.890126	0.330261	0.159729	-0.005852	-0.031514	0.024200	0.060061
g6	0.925449	0.261596	0.129897	-0.055436	-0.020761	0.115904	0.039476
g7	0.905271	0.256757	0.149723	-0.079057	-0.073262	0.115043	-0.039814
g8	0.791764	0.275380	0.123943	0.046865	-0.042883	0.108349	0.008031
g9	0.829797	-0.502119	0.022621	-0.053224	-0.011695	-0.115645	-0.014684
g10	0.823579	-0.364275	-0.074737	0.317971	-0.028194	-0.150631	-0.007717
g11	0.870830	-0.420148	0.067808	0.156011	-0.075408	-0.057214	0.063558
g12	0.857418	-0.430912	0.061161	0.030485	0.063903	0.072747	-0.111784
g13	0.866424	-0.418885	0.138094	-0.055914	-0.134926	0.046768	-0.060214
g14	0.829634	-0.258634	0.177260	0.035171	-0.131715	0.193192	0.083392
g15	0.607104	-0.584673	-0.157361	-0.086549	-0.102556	0.269632	-0.027740
g16	0.866425	0.326323	-0.058733	-0.295440	-0.103757	0.004430	-0.017514



**Fig. 3** The most significant correlation between the canonical roots

significantly vary in magnitude. This suggests that this indicator brings in any linear combination the same information about the levels of performance indicators.

The authors did not use the population (customer) satisfaction score with the quality of public services in the system of indicators due to the lack of objective quantitative sociological research in all regions over the past 2 years. The Ministry for Economic Development publishes reports on the evaluation of the effectiveness of the executive authorities that lack the indicators of the population satisfaction score. As the only source of this data can be named independent public opinion polls conducted by non-governmental organizations (the “Public Opinion” fund and the “Institute of Economic and Social Research” fund). By conducting the evaluation of the governor performance, it is also useful to include an indicator of the objectivity of the regional elections, since it is the institution of elections that in recent years has lost the confidence of the citizens. The solutions to this problem can be found in an expert assessment for all subjects of the Russian Federation. The direction for further research is to clarify and to adjust the proposed methodology.

## 4 Conclusions

Based on the results of the empirical research the authors propose methods of analysis the efficiency of local public administration in the context of the sustainable economic growth in the region. The technique involves the analysis of assessment of performance at two levels: the internal performance evaluation the performance (meso-level), and external assessment, conducted by the federal government (macro-level). It is reasonable to relate the internal performance evaluation of the executive authorities to the achievement of strategic targets in each subject of the Russian Federation; the same approach as proposed in this study can be used for the evaluation, but the socio-economic indicators should be replaced with the indicators approved in the socio-economic development strategy of the region (strategic development indicators). It does not seem possible to suggest a single set of such indicators for all the subjects of the Russian Federation as each region has its own specific features, line of development and development targets. But the methods of the evaluation will be the same at both internal and external levels.

The first stage of evaluation is a selection of socio-economic development indicators of the region, that reflect the current level of development of the regions of the Russian Federation: income per capita (in rubles per month); volume of investment in fixed capital (excluding the budgetary funds) per person; consumer spending on average per capita; fixed assets in the economy per 10,000 people; gross regional product per capita; unemployment rate (in percent); population change (annual population growth, in percent). They have low cross-correlation and can be used as summary development characteristics.

The second stage represents the creation of a unified system of indicators that allows measuring regional government performance and highly correlates with indicators of socio-economic development of the region and allows analyzing this process in any region of Russia on the basis of the same set of indicators. These indicators include number of students in educational institutions of higher professional education per 10,000 people; number of places in hospitals (per 10,000 people); number of employees of the state bodies and local government bodies, per 10,000 people; nominal imputed average monthly wage of employees of state (municipal) health care facilities; nominal imputed average monthly wage of employees of state (municipal) institutions for culture and art; nominal imputed average monthly wage of employees of state (municipal) educational institutions; nominal imputed average monthly wage of employees of state (municipal) institutions for social protection of the population; nominal imputed average monthly wage of public employees (municipal) of physical education and sports facilities; expenditures of consolidated budget of subjects of the Russian Federation on federal expenses per capita; expenditures of consolidated budget of subjects of the Russian Federation on the national economy per capita; expenditures of consolidated budget of subjects of the Russian Federation on housing and communal services per capita; expenditures of consolidated budget of subjects of the Russian

Federation on education per capita; expenditures of consolidated budget of subjects of the Russian Federation on health care per capita; expenditures of consolidated budget of subjects of the Russian Federation on social policy per capita; number of employees of territorial bodies of federal executive bodies per 10,000 people; imputed average monthly wage of employees of local governments.

The selection was carried out by step-by-step algorithm from a set of indicators, collected and published by the Federal State Statistics Service (Rosstat) in the digest "Regions of Russia. Socio-economic development indicators" in accordance to the value of the canonical correlation coefficient.

The third stage represents the construction of the canonical variables obtained during the analysis of canonical correlations of the two systems of economic indicators mentioned above. These variables allow obtaining integral indicators of both the socio-economic development of the territory and of the regional governance performance.

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# Economic and Mathematical Modeling During Organization and Conduct of Business Games

Anastasia A. Ermakova

**Abstract** The article is devoted to the questions of organizing and performing business games while training the economists in a university. Use of the mathematical apparatus of the game theory is considered the top-priority direction of the achievement of the goal. The definitions of the concepts “modeling”, “mathematical modeling”, “social and economic processes”, “business game”, “virtual model”, and “simulator” are given in the article. The authors of the article perform key stages of mathematical modeling of social and economic phenomenon. The main qualitative characteristics of modeling of social and economic processes and specific recommendations about their application are provided in the scientific work. The main aim of the research is to describe concept of organizing and performing business games, define their elements, relations and interconnections and realize a mathematical model of economic process in the form of specific business game simulator.

Everyone recognizes economics as a science. Everyone recognizes economics as a “social science”. It assesses the relationship between the consumption and production of goods and services in an environment of finite resources. The discipline of economics plays a decisive role in all spheres of the society. It is an area of life that satisfies the material needs of society. Economics is the material and comfortable base to describe the modern level of engineering and technology. That’s why teaching and learning economics is one of the most important tasks of national education. Obviously, it is necessary to develop new approaches to the analysis of socio-economic phenomena. As in other social sciences, economics does incorporate mathematics in the theoretical and analytical framework of the discipline (McConnell & Brue 1999).

Application of mathematics in economic research is not limited to selecting appropriate formulas, introducing some numbers therein and producing a response; language of mathematics makes it possible to have a precise perception of the most important parameters of a subject or phenomenon under review and to forecast in

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some sense future events (Allen 1963). Mathematical research methods are a multi-purpose tool to solve many tasks, encountered by scientists in various spheres of knowledge and, in particular, economics. Wide use of mathematical methods in the economic sphere is due to a number of specific features of mathematics as a sphere of scientific knowledge (Alexandrov 1964):

- form, being abstract from contents, constituting an independent object;
- key parameters of mathematical objects, represented as theorems, are proven by a logical conclusion from main notions and assumptions;
- experience is not a mathematical argument;
- indisputability of mathematical conclusions;
- hierarchy of mathematical abstractions and formation of new mathematical notions based on existing ones;
- multi-purpose application of mathematics;
- a specific position among natural and social sciences (formal sphere of knowledge, specific language) (Alexandrov 1964).

The above mentioned specific features of mathematics fully justify the popularity of mathematical research methods to analyze social and economic phenomena.

First mention of mathematical application in economics dates back to 1758, when François Quesnay published the Economic Table, considered as the first attempt to describe the social reproduction by mathematical methods. Now such methods are considered an obligatory element of economics. The Nobel Prize winner in economics for 1975, an outstanding Soviet mathematician and economist L. Kantorovich (1972) noted: “Economic mentality is close to mathematical. The process of extended reproduction has become absolutely clear when Marx developed his diagrams of realization. He pointed out that key notions of the economic science became complete and clear through their formalization by mathematical means”.

Kantorovich identified four groups of mathematical methods in economics:

1. Macro-economic models;
2. Interaction models of economic units (based on game theory);
3. Linear programming;
4. Optimization models, extending outside of linear modeling limits (dynamic, non-linear, whole number, and stochastic programming).

Academician V. Nemchinov (1967) proposed the following classification of mathematical methods in economics:

- balance method;
- method of mathematical modeling;
- vector and matrix method;
- method of economic and mathematical multipliers (for optimal social estimates);
- method of consecutive approximation.

The uncontested leader in solving real planning tasks is the method of mathematical modeling of social and economic phenomena.

A starting point in mathematical modeling is some empirical situation challenging a researcher with a task which requires a solution. First of all, the scientist must identify the problem he needs to solve. This is a fairly complicated process, since real situations are seldom clear, while complicated interaction environment makes task determination even more complicated. The process of problem identification takes time and requires mastering habits, not related to mathematics (discussions with colleagues, reading various books etc.). Together with the process of target setting there is a process of identifying significant specific features of a phenomenon under review. After these features are identified, a next stage follows to convert these factors into a formal mathematical language. Once a model is built, it is to be checked. First of all, the mathematical basis of a model must not be contradictory, comply with the laws of mathematic logic, and adequately describe the original situation. Finally, there comes interpretation of conclusions arising from the model. A researcher must translate back from the mathematical language to the language of original task formulation.

A model starts from most simple and develops, acquiring more complex features as a more profound perception of a phenomenon is achieved.

The described method of building mathematical models is not the only one. In another possible variant, the first step would be building a simple model of several most inherent features of a process or a phenomenon. Then, a simple model is generalized to cover other factors until an adequate solution is found. In another approach a large number of factors are introduced since the process beginning. This approach is often used in analysis of operations; such models are usually researched by simulation methods using computers.

Now let us have a look at mathematical modeling of social and economic phenomena. This process is obviously fairly complicated and specific, since the social and economic system in economy has a number of specific features:

- the system is being constantly perfected;
- system parameters are updated due to the scientific and technical progress;
- requirement to consider a complex of biotic, ecological, and other factors;
- requirement to consider a complex of environmental factors;
- requirement to consider such factors as competition, offer and demand laws.

By a social and economic system in economy, we can understand certain persons, a group of persons, personnel of enterprise, organization, economic system of a certain country; therefore, mathematical modeling of economic phenomenon is a comprehensive and a very complicated process as we have to consider a multitude of interacting and inter affecting elements.

When it comes to modeling social and economic processes we mean first of all mathematical methods applied to their analysis. However, in most cases it is not easy to create a precise mathematical model of a real economic process, especially for students of economics. There are no common principles, which if applied to analysis of some phenomenon, would bring about an adequate set of equations for

description of a particular phenomenon. The key obstacle is inability to cover all the variety of a real object by a typical model, therefore our target is to form an adequate phenomenological concept of social and economic events by means of mathematical methods. We need to find an adequate model, describing a particular phenomenon, obtain by means of mathematical analysis data on the object and provide practical recommendations. An adequate model, apart from helping to assess the prospects of a company or technological process, will also constitute a feasible basis for taking important management decisions.

There are several aspects in checking adequacy. First of all the issue of model adequacy depends upon results achieved on the basis of this model and how correctly they represent the situation for the purpose of a target under review. You can spend a lot of time trying to improve a solution for the model, not justified by target setting. For example, this can be due to precision degree of test data. In particular, if available baseline data are known with some error, then it is of course useless to consider a model, providing less error. Besides, it is common practice that approximated result of mathematical modeling of social and economic phenomenon is more efficient than a precise answer, which takes more time.

Economic processes are modeled for various purposes. The main one is the necessity in forecasting new results or new parameters of a phenomenon. Such forecasts are possibly due to the spread of existing results or may be of a more sustainable nature. Forecasts can be related to events which cannot be experimentally researched. In some cases it may be enough to master mathematical description of economic system functioning to have a deeper understanding of phenomenon. Most models in economics are aimed at facilitating management decision making.

It is worth noting that the process of economic and mathematical modeling should start with deciding on the nature of mathematical variables under review. As a rule, parameters of modeled system are split in two classes:

- determinate variables;
- stochastic variables.

The first class incorporates the known characteristics, i.e. values which can be precisely measured and controlled.

The class of stochastic variables contains unknown characteristics, i.e. values which cannot be precisely measured and have random nature. A model with having stochastic variables should be described by the theory of probability and mathematical statistics or by the game theory.

The use of mathematical modeling methods makes it possible to present processes in dynamics and forecast the development of economic situation. This calls for implementing and using mathematical modeling as the most consistent and profound analysis of complex economic systems. The purpose of mathematical modeling of social and economic systems is mathematical description of tasks, arising in economy with subsequent computer based solution.

The technology of economic and mathematical modeling has been fairly well mastered.

Key stages of mathematical modeling social and economic phenomenon are as follows:

1. Description of a subject under modeling.  
This stage is crucial for model shaping as it contains the structural description of planned process, system interface elements. The hypotheses on the process development, restrictions on the use of a future economic and mathematical model, and all known values of parameters are formed.
2. Building a mathematical model.  
During this stage a mathematical mechanism of model construction is selected, all properties of an object are represented in the form of equations or arithmetical correlations. This way all qualitative characteristics of a model are transformed into a typical mathematical language.
3. Mathematical analysis of modeling results.  
Estimating prospects of model application, updating the parameters, setting qualitative characteristics of social and economic phenomenon, eliminating model deficiencies. At present, mathematical research identifies general model parameters and its implementation. It is important to prove the existence of solutions for a formulated task.
4. Preparation of baseline information.  
Most efforts are consumed by the stage modeling. During preparation of baseline information we use methods of the probability theory, game theory, theoretical and mathematical statistics and to organize selective research and assess the trustworthiness of data etc.
5. Numerical solution.  
Developing algorithms of numerical solution, software and making calculations. Conclusions drawn from a model in the mathematical language are interpreted into the language, used in economics. The large amount of economic tasks is the most challenging thing here.
6. Analysis of numerical results and their application.  
The issue of consistency and completeness of modeling results and their application both in practice and for model optimization are to be solved at this stage. First of all, one should check model adequacy and make sure that the experimental results comply with theoretical consequences from the model within the established precision range.
7. Model verification.  
We check model adequacy and compare calculation results with respective factors and trends of real social and economic processes.
8. Model validation.  
The stage of model economic and mathematical validation is carried out after verification and incorporates comparison of data, received during machine simulation with real statistics on modeled economic process.
9. Model upgrade.  
At this stage, the model either gets more complicated to be better adapted to reality or more simple to achieve a feasible solution.

#### 10. Implementation of the modeling results.

The purpose of this final stage is to realize the received results. At this stage, application of the built economic and mathematical model is performed, and objective results are received to be documented in the form of detailed instruction manuals, easy for understanding by persons in charge of managing the social and economic system and its proper functioning.

Based on the above, mathematical models are a formal description of researched social and economic phenomenon by means of a formal language, in particular, using formulas, equations, in equations, logical conditions, matrices, operators, etc., reflecting the process of system functioning.

Nowadays, the development of economic disciplines is highly formalized. This is due to such mathematical disciplines as mathematical programming, game theory, theory of probability, mathematical statistics, mass service theory, etc. Most successful in the sphere of economic modeling are game theories, since due to vagueness of economic tasks for decision making, most optimal are methods and models, corresponding to the particular sphere of mathematics.

The modern economic reality contains a multitude of situations, where people compete. It is hard to list all possible options of behavior with many complicated targets. But in any case the purposes of one Party run counter to that of the opponent. This aspect of cooperation is basic for situations described by a relatively young mathematical science—game theory.

Game theory: what is it?

Game theory officially entered the world in Neumann and Morgenstern 1944 with the publication of “Theory of Games and Economic Behavior”. This was a joint collaboration of Oskar Morgenstern and John von Neumann.

Game theory is concerned with decision-making in an interactive world, so that the best decision of every decision-maker depends on what decisions other make. As a result, everyone in this interactive world, for advancing own interests, will need to predict decisions of others.

The authors described a method for finding optimal strategies in business game. In other words, Morgenstern and Von Neumann for the first time created a mathematical model of the behavior of players in any game.

Five years later, in 1949, John Nash significantly expanded in his publication the game theory. He introduced such notions as “cooperative games”, when players do not compete between themselves but cooperate to gain a common goal; “games with non-zero sum”, where the prize is not constant (games with non-zero sum), but varies depending upon actions of players.

At present the game theory is recognized by scientists throughout the world, as it is ideally suited not only for players’ behavior during a game, but also for behavior of any intellectual being. Besides economics, the game theory is widely used in all spheres of scientific knowledge, i.e. psychology, biology, political science, cybernetics, etc. (Yakovlev 2006).

So, game theory is set out in mathematical language description of the mechanisms of the thinking of the individual decision-making, caught in a simulated

situation (game). The game and the players are presented with a set of formulas, parameters and indicators, and any decision is reduced to a combinatorial equation (or system of equations).

There are different types of games determined and described, but it is not possible to classify all the variety based on some common features. So, all the existing games are classified by different features and criteria:

- Classification by equality of moves: symmetrical (games, whereby respective strategies of players will be equal, i.e. have same payments (prizes)) and non-symmetrical games.
- Classification by prize amount: games with zero sum (any possible party of some game has a zero sum of prizes for all players) and non-zero sum.
- Classification by possible cooperation of players: cooperative (a prize results not from players' actions, but from their certain agreements) and non-cooperative games.
- Classification by sequence of moves: parallel (games, when players make simultaneous moves, or at least are not aware of another player's choice until a move is made) and consecutive games (games, when participants can move in a pre-established or random order, but obtaining some information about previous moves of the others).
- Classification based on information available for players: games with full information (players know all moves, made before as well as possible strategies of rivals) and incomplete information (vague conditions).

Therefore, any game can be described by its position in this or that definition. The more definitions there are, the higher is the precision of game description.

Economic annexes to the game theory are fairly diverse, and the use of game methods in economic and mathematical modeling is absolutely justified, as:

- game theory provides a clear and exact language of research in various social and economic processes;
- game theory lets us verify intuitive notions for logical consistency;
- game theory helps us track the process from “observations” to fundamental assumptions and identify which assumptions make the cornerstone of private conclusions.

Therefore, game theory constitutes a formal structure of a process under review. It is presumed that all moves of each player can be exactly determined and that the game outcome can be determined numerically for any combination of moves. The purpose of any participant is to maximize his expected gain. Rivals are working on the same optimization. Although it is hard to expect within the game theory framework a full answer in large and complicated economic systems, if applied correctly, it can contribute to other aspects of the conflict study.

One of interpretations of game methods for training of economists are so called training business games.

First training business games were developed and conducted in the USSR in 1932 by M. Birshtein in the Leningrad Machinery and Economic Institute. This



game form was intended for training students, studying economic disciplines—economists and managers. Later, in the USA, the first program realization of business game was presented in 1955. Its idea was to simulate procurement for military bases. In 1957, the American Management Association presented and conducted at annual seminar on Sarank Lake the game called “Simulating top management decisions”. That was when the term “business game” was introduced.

Business game is a simulation of decision-making by managers or specialists in different production situations, performed on the basis of the set rules by groups of people or a person with PC in a dialogue mode, in the environment of conflict situations or information uncertainty.

The author of business game method M. Birstein (1989) identified the following typical features of a business game:

1. Modeling labor process (activity) of enterprise employees and specialists to develop management decisions.
2. Realizing “chain of decisions” process. Since the business game modeled system is considered dynamic, the game is not limited to solving one task, but requires a “chain of decisions”. The decision taken by game participants at the first stage, affects the model, modifying its original status. Status revision is fed into the game complex, and, based on information received, game participants take a decision at the second stage of game, etc.
3. Splitting the roles between game participants.
4. Difference in role purposes during decision-making contributes to contradictions and conflict of interests among the participants.
5. Controlled emotional stress.
6. Interaction of participants playing different roles.
7. Common game purpose for the whole team.
8. Collective decision making by game participants.
9. Multi-variety of decisions.
10. System of individual or team assessment of game participant performance (Belchikov & Birstein 1989).

Any business game is based on a particular problem, with all participants in the game situation focused on its solution throughout game stages, simulating some professional activity, receiving training and knowledge in taking optimal management decisions.

Most common classification of business games is their split by target purposes. As a rule, there are three classes:

- training business games;
- business games for practical management;
- project business games;
- research business games (Danilov & Inozemtsev 2004).

Training business games are conducted during training of economists, as well as during qualification upgrade of practicing specialists—managers and economists.

Business games for practicing management can be used in real management work, as they can model different options of decision making, depending upon effective factors.

Project business games can simulate real design of production systems; their outcome helps in adopting and supporting a production structure of an organization or enterprise, management structure, organization and legal status of enterprise, etc.

Research business games are most complicated to organize and perform. They model production activity of a running enterprise; their application helps forecast the financial and production situation at the enterprise.

Best result from using business games for training of economists can be expected when a game situation models a company's life cycle. Any company passes during its development through different stages of life cycle. Objective description of life cycle stage in each period of activity helps in correct selection of strategy for building game situation and as a result, in forming adequate management and appropriate use of funds. Depending on each stage of activities a company must update its goals, which requires from game participants, future managers taking decisions and consequently specific knowledge and habits. When speaking about simulation of social and economic phenomena, we should consider the whole complex of factors, affecting management decisions. It is extremely important to form the architecture of modeled economic process in accordance with the nature of specific management tasks at different life cycle stages of modeled production process.

The central element of economic business game (nucleus) is a process mathematical model, making it possible to realize the solution of a pending task. Acting as a modeled object is a group of people, personnel of an enterprise, organization, or economic system of a particular country. Participants in business game, as a rule, team up and fulfill individual or team roles. Rules of games are strictly established and monitored. Game activity is to be in exact compliance with methods of conduct.

If we talk about training of economists in a university, it becomes obvious that not only will they fail to form a mathematical model of social and economic phenomenon, using game theory methods, but they can hardly realize the game algorithm of economic process on their own. That is why our target is to realize a mathematical model program wisely, i.e. in the form of specific business game simulator. It is important that students, introducing inlet parameters of a social and economic phenomenon, can monitor within a short time development prospects, production risks etc., without going into complicated mathematical calculations. (Ermakova 2015).

Such software simulators are rated as virtual models.

A virtual model is a computer visual model of real or imagined space. The definition makes it clear that we model properties of some space with virtual presence of a user there. The most common model of virtual presence is Internet, presenting quite real world Internet economy.

Nowadays, virtual models are widely used in practical training. It is common knowledge that training process can be conducted in the form of mastering by a trainee of "ready" knowledge and in the form of research. A source of ready

knowledge is a book. Research is an experiment. It is a virtual training model (manipulating dynamic model), which makes it possible to experiment with objects of a virtual training medium. It is the method of computer reconstruction of a form, structure, and functions, inherent in some social and economic system. Students can interactively modify system parameters, analyzing its reaction, and research the system from various angles of its manifestation. This is a new information training culture.

Most comprehensive tools for creating virtual models are general purpose programming languages, such as Pascal or C / C++. Execution of these time consuming operations, i.e. creating an interface for a model simulator of business games, is achieved through program visual design—in particular, Delphi, Visual C++, and Lazarus. There are many special modeling tools for creating and researching models of social and economic phenomena, helping to achieve a target much faster and at a low cost (as compared to general purpose programming languages). Basically there are two directions in development of special modeling tools:

1. Programming tools for modeling a wide range of systems.

These program products include simulation modeling languages, such as SIMSCRIPT and packages of applied programs, used for modeling analytical methods, most popular of which are MathCad and MathLab. A serious disadvantage of using these program tools is that a researcher is supposed to have special training.

2. Programming tools for modeling a narrow range of systems, specialized in one specific subject.

In order to create model simulators of social and economic systems, we use MS Excel table processor as modeling environment. MS Excel popularity in program implementation of economic and mathematical models is due to a number of factors:

- MS Excel is established in all organizations;
- MS Excel is taught in higher education institutions, training of economists;
- MS Excel has a set of special adjustments which could be used for solving economic tasks;
- MS Excel is adapted to most program products.

Apart from using MS Excel, we suggest modeling social and economic processes by means of such program tool as Lazarus. Development environment for Lazarus software is the first and still the only Integrated Development Environment, available free of charge for government and educational institutions. Besides, this software is supported in many languages, including Russian, which makes it unique.

A model simulator is a controlled algorithmic model, which can be used as a simulation or business game for training of economists. We should develop methods of simulation game design and execution to arm students with habits of assessing production situations and taking strategic management decisions. Business game helps in developing mentality of future managers and better mastering of

training material. Simulation methods of social and economic system functioning presume substituting management practice of real production processes with handling a model simulator. When developing a social and economic game, one should create the most balanced model. A simulator must reflect most important technological, economic, and financial links of social and economic system objects.

When modeling and creating a virtual simulator of social and economic phenomenon, it is a must to use game theory. When developing a social and economic business game, we face the task of creating a most balanced and feasible test range to confirm mechanisms, described, in particular, by Morgenstern, Von Neumann, and Nash.

When designing games, it is necessary to adhere to certain methods.

A business game should be played, as a rule, after elaborating the relevant theoretical material at lectures and practical classes. During a preparation stage, students must be given questions for self-control on basic provisions of theoretical material to study on their own and master the given knowledge. Then a lecturer splits a student team into micro-groups of 1–3 persons and sets out role functions for each group. At the second stage, students are to work independently, carrying out pseudo professional activity in the virtual simulator environment. In accordance with the received roles, they process the baseline information on production, using mathematical methods, exchange results, and collect material for making a joint management decision. At the third, final stage, a general discussion takes place. After taking a final decision, for example, on prospects of manufacturing new products, a lecturer summarizes the results of business game and provides comments, clarification of conflict situation, and assessment of performance for each student.

Program implementation of games must reflect only most important factors of social and economic phenomena. Interface of virtual simulator should be neither too much obsessive nor trivial. It is important to consider different options for solving the modeled situation, provide feedback to reflect the system development as a result of the decision taken, and strictly observe the rules and interaction procedure for game participants. (Bonabeau, 2002).

We suggest building a virtual model of an agricultural production facility. The economic and mathematical model is based on application of game theory methods. Please see below the main stages of the business game, to be overcome by participants.

1. Information about facility.

Inlet parameters: facility director; geographical location; proximity to existing infrastructure, manpower; total project cost (amount of financial grant, own funds of project executor).

2. Marketing research before project execution.

At this stage, students are to perform preliminary analysis of specific product output volume and identification of potential competitors.

Inlet parameters: total output volume by potential competitors.

3. Requirements to production organization.

Inlet parameters: price of license, production equipment, cost of erection, raw and other materials; alternative sources of raw materials (if available); manpower; cost of professional training.

4. Marketing plan.

Here it is necessary to estimate the market sector in particular segment.

Inlet parameters: cost of product promotion, advertising; existing product price; commercial and sales expenses.

5. Organization plan.

Inlet parameters: company organization and legal status; company location, gains and losses in project realization; split of managerial responsibilities; production activity shifts, working hours.

6. Financial plan.

Inlet parameters: scope of funding; profit forecast; revenues and payments forecast.

7. Assessment of facility activity.

Outlet parameters: project internal profitability rate, payback period.

8. Key directions of company's development.

Having analyzed the modeling results, the students may propose various ways to optimize the production process of the facility, for example, expansion of the variety of products; use of energy saving equipment.

At each stage of business game, the values of inlet parameters are chosen from those offered, for example, one can choose the type of agricultural product, location of facility, etc.

Based on the presented methods to play a business game, the key elements of virtual model for social and economic phenomena are: game designers, i.e., persons, preparing game scenario, performing its program implementation, recommendations on its application, information support for a model simulator; game participant, both leaders of game process and students; game virtual model; a complex of program and technical means.

Obviously, the offered methods of organizing and playing a training business game can be modified. The idea is that program implementation of business game makes it possible to identify prospects of social and economic system, production risks, and economic efficiency without going into complicated mathematical calculations, which will undoubtedly allow us to promptly assess the grounds of taking a management decision.

Elaboration and implementation of common concept for building a virtual simulator of business games on the basis of game theory mathematics is the key purpose of our research.

Economic and mathematical modeling during organization and conduct of business games—in particular, creating a virtual model of social and economic phenomena—is a complicated and time consuming process, requiring sometimes several years of team work by professionals; however, good prospects of its application for training of economics students cannot be doubted. Active implementation of business games in training will allow future specialists to develop a

creative approach to solving real tasks and take promptly efficient management decisions.

Therefore, a perspective direction in researching comprehensive systems in education institutions is, in our view, the solution of the following issues:

- investigating specific features and organizational principles, playing business games;
- presenting all elements of economic and mathematical model in the form of hierarchy organizational structure;
- developing a common model for designing business games;
- building a generalized mathematical function, explicitly describing all structural elements of social and economic phenomena;
- identifying a complex of criteria to assess the quality of model simulator functioning;
- developing an algorithm for building a virtual model of social and economic phenomena to optimize training process in a higher education institution.

Summing up, it is worth noting that the scientific prospects in front of economic and mathematical modeling, in particular, production activity of industrial enterprises, are very broad and promising as of now. Comprehensive work in this direction is under way with great theoretical and technical resources for model creation.

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# Strategic Management of Clustering Policy During Provision of Sustainable Development

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**Abstract** Analysis of the problems of sustainable development of territories shows that one of the main methods for solving is transition to strategic management of the policy of clustering. Strategic management of the policy of clustering is pre-determined mainly by quick changes of external environment and emergence of hardly predictable economic and financial situations. An important precondition of transition to strategic management of the policy of clustering of territories is the process of globalization of the country's economy, which determines not only the necessity to use the resource potential effectively, but also to create conditions for creation and formation of new competitive advantages. Enterprises and organizations of small business should become their bearers. The Concept of long-term socio-economic development of the Russian Federation until 2020 sets one of the most important conditions for transition to innovational development as "creation of a network of territorial and production clusters which realize competitive potential of territories". Besides, the Strategy of innovational development of the Russian Federation until 2020 includes into the main goals of innovational policy of regions the transition to principles of innovational cluster policy. Thus, strategic documents of the federal level pay special attention to management of clustering policy through creation of a network of clusters which would allow increasing effectiveness of using competitive potential of territories and providing their

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sustainable development through development of the network of territorial and production clusters of subjects of small business.

## 1 Introduction

The policy of clustering is a system of interconnected actions of federal, regional, and municipal authorities, aimed at stimulation and support for initiatives of regional and municipal authorities and entrepreneurial structures for creation and development of clusters which realize competitive advantages of this territory. Strategic management of the policy of clustering stimulates formation and development of competitiveness of spheres and regions, due to mobilization of all resources, including intellectual, cooperation, and increase of the quality of manufactured goods and provided services.

Application of cluster approach is actual at the meso-level, as it supposes close cooperation between cluster members. Cluster includes firms and organizations related to the issue of final products and geographical location. Location of cluster in one region stimulates quick task setting, quick solving the problem, and joint search for the direction of activities that is the most competitive for this territory (Popkova et al. 2015). During formation of a regional cluster, a huge role belongs to actions of public authorities which have to show and support initiative for increase of region's competitiveness and understand that cluster structure of regional economy requires strengthening of competitiveness, investment attractiveness of the region, and, what's most important, sustainable development.

Enterprises-members of a cluster have additional competitive advantages due to an opportunity to perform internal specialization and standardization and to minimize production cost. During realization of the policy of clustering, attention is paid to advantages and problems of the region's economy, and intra-regional and inter-regional economic ties are strengthened (Coteur et al. 2016). Under the condition of entering the bodies of cluster management, regional authorities have an access to authentic and concentrated information on activities of cluster enterprises and labor resources market, which increases the quality of analytical work of public authorities.

Under the modern conditions, formation, development, and support for regional clusters is one of the top-priorities in development and increase of region's competitiveness. There are three main attributes of regional clusters: specialization, competition, and cooperation. The main task of effective functioning of regional clusters is acceleration of socio-economic development of the region by active involvement into this process of regional enterprises—this requires a mechanism of strategic management that allows forming directions of sustainable development of the region which represent both quantitative growth and qualitative changes. The sense of enterprises' activities changes. The main factor is not the presence of resources but effectiveness of their use. The most effective tools of management of economic development of a region are strategic planning and marketing which



should be realized and implemented by enterprises. The main issue to which the plan of strategic management, developed at an enterprise—member of a cluster—answers is how to get out of crisis, avoid crisis, increase the living standards, and set strong foundation for its sustainable development.

Sustainable development of the region is a key element of the complex of ecologically oriented marketing which takes part in almost all flows of entrepreneurial activities (marketing, production, trade, and information). Management of the process of products promotion and formation of consumers' preferences by means and methods of ecologically oriented marketing has a strategic character (Govindan et al. 2016). The strategies of ecologically oriented enterprises differ by a range of peculiarities peculiar only for the group of ecological goods, and the process of their selection and development could be divided into stage-by-stage strategies of improvement of ecological indicators aimed at increase of efficiency of company and its full socio-economic development: the strategy "Strategic study (product/market)", strategy "Eco-design. Evaluation of product's life cycle", strategy "Clean production", strategy "Optimized production", strategy "Communication system", and strategy "Minimization of waste".

## 2 Research Materials and Methods

The most successful among the "expanded" treatments of strategic management and marketing is the concept "7P", in which "4P" is supplemented by 3: People, Process, and Physical Evidence. This concept was created for service marketing, but more and more researchers try to apply it to "commodity" marketing. Thus it makes it more vulnerable for critics. There is another famous effort to change the canonic formula "4P", shifting the focus from the seller to the consumer—by refusing the "P". This is s-called concept "4C", offered by Bob Lauterborn in 1990. Its elements are: customer needs and wants, cost to the customer, communication, and convenience.

In this concept, consumers' preferences are top-priorities. At that, this priority works at all stages of the process of manufacture and realization of good and services. However, the traditional complex of marketing, which consists of "4P", also gives priority to consumers' preferences. During development of "product", "price", "promotion", and "distribution channels", marketing research is conducted and consumers' expectations are studied. Moreover, during development of marketing complex, not only consumers' preferences are taken into account, but rivals, suppliers, and contact audiences. At last, management of consumer is impossible, as this element of external environment cannot be managed directly.

The SIVA model is an alternative model of marketing complex; it was offered by Chekitan S. Dev и Don E. Schultz in the Marketing Management journal (January–February 2005). As a matter of fact, it is the same "4P" model but from the reverse side—seen with buyer's eyes. In this model, each element of the classic formula "4P" corresponds to an element of the SIVA model: Product—Solution,

Promotion—Information, Price—Value, Distribution—Access. Four elements of the SIVA model consist:

- Solution: To which extent the found solution satisfies the problem of consumers’ needs;
- Information: Do buyers know about the solution, and if they do, who do they get the information for making a decision on a purchase from?
- Value: Does a buyer know about the value of operation? What expenses will he suffer and what profits will he get? What can he sacrifice and what will be the reward?
- Access: Where does a buyer can find a solution? How easily can he buy and receive the supply? (Table 1)

Formation of a strategic complex of ecologically oriented marketing is a marketing solution that could also be called “marketing recipe”. One of the results of this research is development of this “marketing recipe”:

1. Enterprise—initiative. “Initiative” is entrepreneurial flexibility and initiative regarding the wish to create a product in view of requirements of ecologically-oriented activities—e.g., use energy-saving technologies and equipment and manufacture of product without any harm to environment and consumers.
2. Social responsibility. “Social responsibility” is enterprise’s participation in ecological and social projects and creation of own projects, aimed at improvement of quality of life of society and environment.

**Table 1** Comparative table of the main models of marketing complex

Model	English decipher
4P	Product, price, place, promotion
4P + 1S	Product, price, place, promotion, service
5P	Product, price, place, promotion, personnel
	Product, price, place, promotion, package
	Product, price, place, promotion, publicity
5P + 1S	Product, price, place, promotion, personnel, service
6P	Product, price, place, promotion, personnel, publicity
7P	Product, price, place, promotion, people, process, physical evidence
10P	Product, price, place, promotion, people, personnel, package, purchase, probe, public relations
12P	Product, price, place, promotion, PR, people, personnel, process, package, purchase, physical premises, profit
4C	Customer needs and wants, cost to the customer, communication, convenience
4A	Acceptability, affordability, availability, awareness
4E	Ethics, aesthetics, emotions, eternities
SIVA	Solution, information, value, access
2P + 2C + 3S	Personalisation, privacy, customer service, community, site, security, sales promotion

3. Safety. “Safety” is organization of safe production processes in view of existing requirements of ecological production.
4. Environmental issues—solving ecological problems. “Solving ecological problems” is implementation and realization of ecological principles into production, sales, and post-sale service—i.e., during the whole life-cycle of enterprise.
5. Customer needs and wants. This component of marketing complex is determination of consumer preferences in the targeted market, determination of main characteristics of consumers in this market, and search for methods and means of satisfaction of potential consumers’ needs.
6. Product. “Product” is constant improvement of a product according to modern tendencies of the market and, primarily, to consumers’ wishes.
7. Package. “Package” is development of such package that could reflect all advantages of the product, inform the buyer about all features and characteristics of the product, and show value and contribution of the whole entrepreneurial initiative of the manufacturer.
8. Communication—information exchange. This parameter is the key one in the complex of ecological marketing, and includes the methods of formation of the system of ecological information, means of informing the consumer on ecological certification and on enterprise’s participating in socially-responsible projects. If this element works ineffectively, the realized ecologically-oriented activities will be in vain, and the enterprise’s goals will not be achieved.

So, the strategy of enterprise’s management as a cluster member is a totality of parameters regulated at the level of marketing (elements of direct management which could be controlled); it performs the function of formation of a set that satisfies the enterprise’s purposes: call for feedback from the targeted market, satisfaction of potential clients’ needs, and maximization of enterprise’s effectiveness.

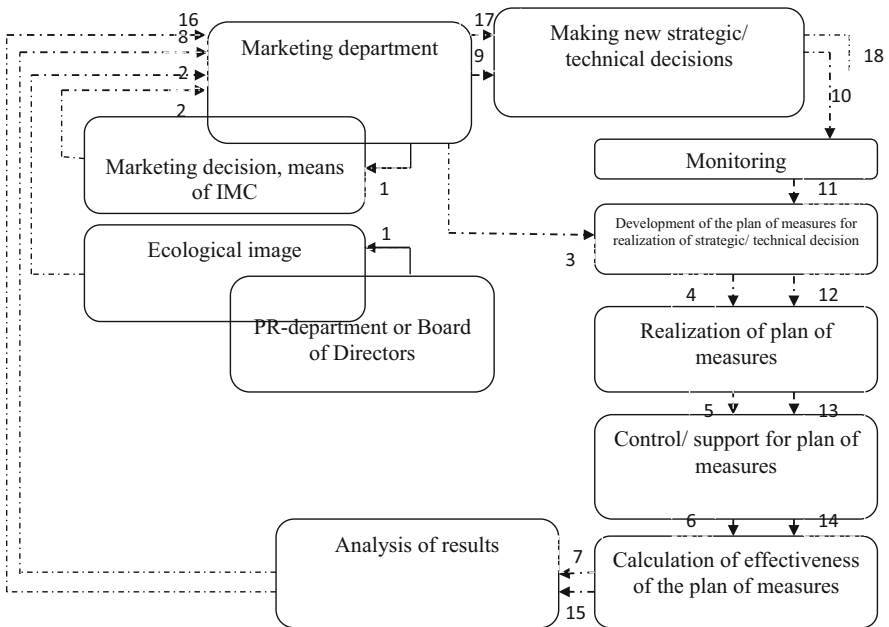
### 3 Results and Discussion

Ecological certification is viewed as a marketing solution, and ecological marking is viewed as a means of strategic management initiated by the marketing department at the enterprise; if the certificate is viewed as a sign of ecological image of enterprise, the initiator should be the PR-department and/or the Board of directors. Specifying these conclusions, it should be added that regardless of the level of decision on ecological certification—strategic or technical—realization of this solution is performed by employees of the marketing department. Let us present these interconnections from the position of cybernetics by building a functional logic diagram—a graphical model in the form of blocks and connections between them—direct and reverse. They are shown as arrows on the scheme. Blocks denote types of activities for transformation of information.

Stage 3 “Development of the plan of measures for realization of strategic/ technical decision” in Fig. 1 is aimed at the complex of ecological marketing and contains specific instructions at levels of parameters of marketing and includes the tasks, managerial means, and methods of control. The plan of strategic measures includes specification of period during which a certain work must be fulfilled on formation of the set levels of parameters of the complex of ecological marketing. The planning at this level includes appointing the responsible departments and specific performers. Requirements of the plan of strategic measure are executed in the form of instructions, orders, and other internal normative documents for the purpose of them having administrative power.

Stage 5 “Control/support for the plan of measures” is a control at the level of marketing complex and consists in comparing the plan and results in the part of the planned dates of execution of certain volumes of work. Controlling is activities for determination of deviations from the set goals and reasons for emergence of difficulties in enterprise’s activities on the basis of comparing the planned and actually achieved values of indicators. The comparison is performed at two levels: at the level of market goals of enterprise and at the level of parameters of direct management, planned in the system of ecological marketing.

After the execution of ecological certification, i.e., after all the steps for its realization are performed (stages 1–8 in Fig. 1), it is necessary to form the plan of further measures for promotion of ecological product—namely, to perform actions



**Fig. 1** Logic diagram of making a decision on ecological certification at enterprise and its realization

at stages 9–16 of Fig. 1. Figure 1 shows that the first stage in this chain of actions is monitoring—i.e., monitoring of consumer demand for ecological products in the targeted market (Volosatova et al. 2014). The means of the conduct of monitoring is marketing research (Pozdnyakova et al. 2015).

Selection of the strategy of management, determination of its structure and conditions of interaction and execution of its internal elements are a strategic decision which determines the effectiveness of entrepreneurial activities on the whole in the long-term. Then let us describe peculiarities of formation for the complex of marketing measures for promotion of products in the targeted market. Performance of these measures is a stage-by-stage process of realization of small marketing strategies aimed at sustainable development of the region. Let us view these strategies.

1. “Strategic research (product/market)” is a systemic analysis of effectiveness of design as to environment, healthcare, and safety during the whole life cycle of the product.
2. Strategy “Ecodesign. Evaluation of product’s life cycle” is a method of evaluation of influence on ecology, related to a certain product/service. These activities are divided into four stages: determination of goal and sphere of activities, analysis of the life cycle of material and technical stock; evaluation of influence of life cycle on environment (depletion of ozone layer, greenhouse effect, gas emissions and acid rains, etc.); interpretation of life cycle. Secondly, the strategy supposes determination of further directions of ecological certification for the purpose of ecological design of the product.
3. Strategy “Optimized production”—systematic elimination of losses (during reproduction, waiting, transportation, excess of stock, excessive operations of processing, and spoilage) and realization of concept of continuous technological process and sales. Optimized production in a basic form is a systematic reduction of non-production costs (reproduction of goods, delays, transportation, excess of stock, excessive operations of processing, and spoilage) and realization in practice of the concepts of continuity of technological flow and accounting of consumer demand.
4. The strategy “Communication system” is a study of market and provision of all elements of marketing process by necessary and timely information on the company’s influence and its rivals on environment. Information on ecological effectiveness of company’s activities is a basis for making marketing decisions. Therefore, entrepreneurial companies that use the strategies of ecological marketing should create the system of marketing ecological information. This will allow them to move away from the random and spontaneous process of collection and processing of information. Such information systems will allow managers to make effective decisions and function as a data base for answers for queries of market partners of the company. Secondly, it is provision of information to customers and market partners on ecological aspects of products and processes. Thus, product management should be dominated by approach which consists in the fact that all who contact the product after it leaves the “factory

gate” must receive advice and recommendations for exploitation and utilization of the product.

5. Strategy “Minimization of waste” is a succession of cyclic systems in which materials are used repeatedly or processes within the closed process. Within this strategy, enterprise can pick one or several of the following strategies.

The above complex of strategic measures for ecologically-oriented marketing is formed on the basis of developed theoretical recommendations on formation of complex of measures on promotion of product in the targeted market within a cluster. The offered private strategies could be used as a basis by any enterprise-member of a cluster and formed into a single complex of measures.

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# Conceptual Features of Management Tools of Enterprise Structures Under the Conditions of Globalization of the World Market

Tatyana L. Bezrukova, Y.N. Stepanova, Olga A. Boris, Anna V. Savtsova, R.A. Zulpuyev, and Boris A. Bezrukov

**Abstract** Results of analysis of scientific & methodological and applied works show that up to this time, despite many attempts, it was impossible to determine conceptual peculiarities of instrumentarium of business structures management under the conditions of globalization of the world market. Specialists in the sphere of scientific research of business structures develop various tools of management, but they do not reflect the influence of globalization of the world economy. This process aggravates the problem of competitiveness of business structures and emphasizes concentration and specialization on the most perspective directions of activities. Generally, it is necessary to systematize management tools, study factors which influence formation of demand of final users for product of business activities in the global world market, and analyze the process of formation of assortment of products of business structures which work in the globalizing world and changing external environment. The article shows results of reserch on determination of conceptual peculiarities which play an important role in the instrumentarium of business structures management.

It was found that the created algorithm of effectiveness of business structures functioning on the basis of factor of perspective, under the condition of free trade, will allow using optimal complex of managerial practice. With the help of the given examples, expected directions of development of business structures are determined, which will allow quickening the development of business and make it competitive on the basis of coordination of activities of financial, logistic, and other structures.

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## 1 Introduction

A guarantee of progressive development of any country and growth of living standards of its citizens is strong and competitive economy, one of components of which is entrepreneurship. Over the time of independence, entrepreneurial structures of the Kyrgyz Republic saw significant destructive changes which largely determined the further process and dynamics of development of the country (Asaul et al. 2005; Parakhina et al. 2014). Market transformation and strengthening of the Kyrgyz economy are fairly related to improvement of market relations in the country, which means full development of economic initiative and business. Scientific literature provides wide overview of created conditions for business structures, especially in the sphere of material production, for any transitional economy: Asaul (2009), Hirst (1996), Hoogvelt (1997), Omaha (2000). In practice, stabilization of the Kyrgyz economy and its exit from deep crisis, which started due to serious structural deformations caused by decades of management of administrative system and mistakes of initial stage of economy's reformation, were related to export of various kinds of raw materials and energy products. Quick joining the WTO was the last blow for the Kyrgyz business structures, ousting domestic products by the imported ones.

Recent decade, which passed under the sign of globalization of world economy, aggravated the problem of competitiveness of business structures which is especially actual today, under the conditions of preliminary period for the Kyrgyz Republic's joining the Customs Union, which includes Russia, Kazakhstan, and Belarus. According to some authors—(Kolesnichenko et al. 2015)—under the current conditions, an important role belongs to complex management of business structures, skill for building forecasts for further development and analyze the determined tendencies under the condition of entrepreneurs' orientation at satisfaction of consumers' needs. (Vasiltsova et al. 2015).

Scientific analysis of domestic experience shows that globalization of economy seriously influenced the development of business structures of Kyrgyzstan. At present, business in the republic requires the improvement of management effectiveness. (Chase-Dunn 1999, Ayupov and Zhumatayeva 2006, Koychuyev 2006). Problems of functioning of business structures are caused by significant reduction of production, a range of difficulties related to reduction of purchasing ability of main importers of products, Russia and Kazakhstan, lack of highly-qualified personnel in management and systematic control for analysis of flexibility of demand, and negative influence of pricing of suppliers of intermediary product—China and Turkey. The existing entrepreneurial structures have some significant drawbacks which can be eliminated by development of conceptual peculiarities of management instrumentarium under conditions of globalization of the world market. More powerful use of instrumentarium is capable to increase living standards of modern society, strengthen the competitive positions of business structures, provide help in search of advantages and possibilities, and adapt to conditions of the market, dictated by globalization of the world economy.

## 2 Technique

Within the research, the main tasks are the following:

- analysis of scientific concepts which contributed most into formation of instrumentarium of business structures management;
- determination of conceptual peculiarities which stipulate well-balanced process of business structures management;
- determination of main sub-systems of algorithm of effectiveness of business structures functioning on the basis of perspective;
- substantiation and description of expected directions of business structures development on the basis of coordination of activities of informational, financial, logistic, and other structures.

In the process of the research, the authors came to the conclusion that up to this time, there has been no corresponding methodological basis in modern management. That's why, for further scientific research, it is necessary to use the basis that has been formed in other scientific directions. These scientific directions include philosophy, marketing, and scientific and methodological provisions, related to management of various systems. (Ireland 2003).

For completion of the set task during the conducted research, the authors used scientific instrumentarium which included calculation & analytical and statistical methods of research, methods of systemic analysis, comparison, factor, situational, and statistical analysis, methods of sociological research, direct and indirect marketing studies, graphical interpretation of information, etc.

Theoretical and methodological basis for the research includes works of foreign and Russian scientists in the sphere of business structures management, publications in scientific literature and periodicals, materials of scientific & practical conferences, data from Internet sources.

Thus, for the purpose of methodic and methodological provision of further scientific research in the sphere of business structures management under the conditions of globalization of the world market, it is necessary—together with improvement of instrumentarium basis of scientific approach—to focus during the conducted research on dialectical and systemic foundations of processes which take place in business structures.(Repin and Eliferov 2014).

## 3 Results

Results of analysis of various scientific provisions and concepts show that up to this time, it hasn't been possible to determine conceptual peculiarities of instrumentarium of business structures management under the conditions of globalization of the world market—despite all the attempts. As a conceptual component of instrumentarium of management, let us distinguish the developed algorithm of

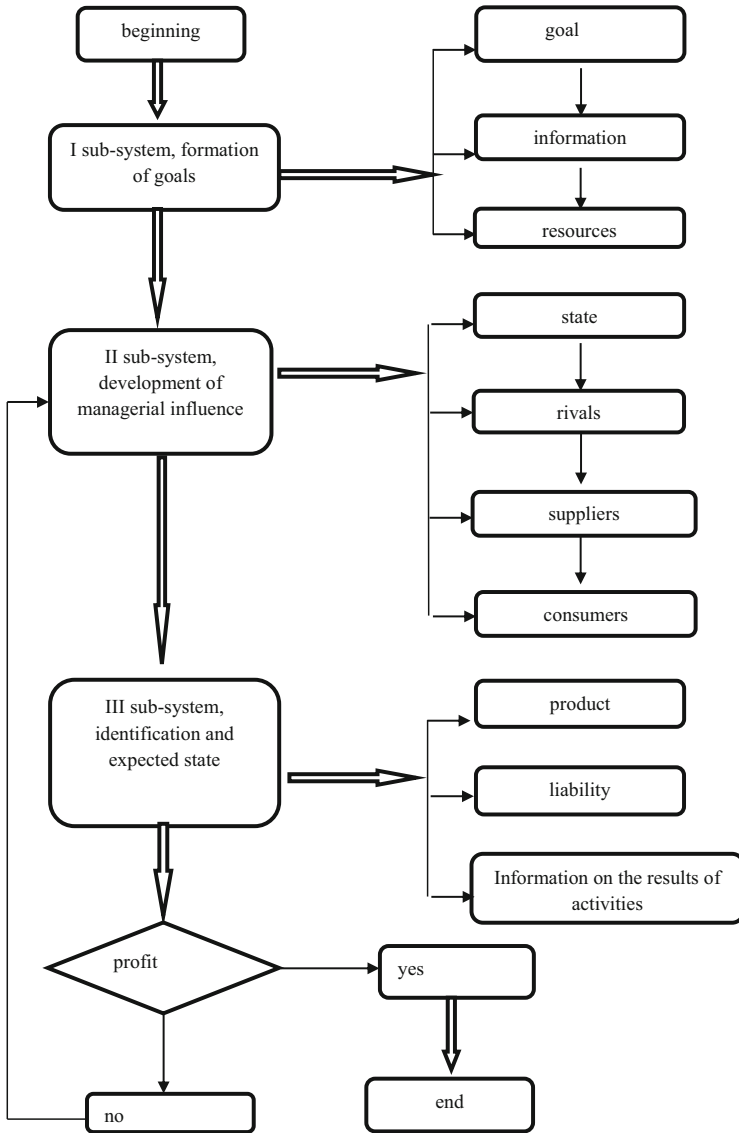


Fig. 1 Algorithm of effectiveness of business structure functioning

evaluation criteria of effectiveness of business structure functioning in the globalizing world (Merzlikina and Varfolomeyeva 2010) (Fig. 1). The algorithm includes three sub-systems. It is based on sub-system of goals formation which directs and regulates business activities of the structure. It is the new goal that is a stimulating factor. The sub-system determines the goal of maximization of possibilities of business structure for achievement of the complex of socio-economic needs of

the subject under conditions of uncertainty and specification under the influence of external environment, based on factors of internal environment and past events (Malt liquor 2005).

The second sub-system of development of managerial influence under the condition of managerial process divides into sub-processes, i.e., elements, the scale of which is the most optimal for the purposes of management and monitoring. Information enters sub-system in four categories: in the type of legislative acts which regulate activities of business structures; wishes of existing and potential rivals, suppliers, and consumers.

The result of sub-system's functioning is optimal and logically based managerial influence as to business structures in view of the factor of perspective. The resulting sub-system of identification and expected state has information as a result of activities and performance of responsibilities before intermediaries. The main result of business structure activities is the products manufactures for sale, the realization of which ensures receipt of profit. Also, it is necessary to perform obligations in order to receive profit.

In other words, current or long-term liabilities which are subject to return and which are taken up by business structure in regard to subjects of external environment during contacts building can be annulled due to other reasons, independent of entrepreneur. It should be noted that liabilities could emerge with a business structure in regard to elements of external environment and vice versa.

As a result of the work of the 3rd sub-system, we receive information on the results of functioning of main processes. If a business structure receives information at the output, as a result of economic activities, then the part of information goes to external environment and the main part of this information goes back to internal environment, in the form of profit into turnover, performing regulating influence on the process of functioning of business structure. If there is loss at the output, it is necessary to get back to the 2nd sub-system of algorithm and develop correcting actions.

Having conducted a range of research and analysis of key factors of influence on business structures of Kyrgyzstan, we consider it advisable to determine top-priority directions of development, as a conceptual peculiarity of instrumentarium of management under the conditions of globalization of the world market. As of early 2015, there were 9694 business structures, i.e., SME. Total quantity of the employed—282,100 people (without employed in peasant/farm husbandries). Over 2014, the growth of business subjects constituted 7 % (more than 14,000), and over the recent 5 years—7–8 %. Proportion of business structures in GDP constitutes more than 45 %. The volume of industrial products, manufactured by subjects of SME in the total volume of manufactured products constitutes 25.5 %. Main indicators of activity of business structures for 2010–2014 are shown in Table 1.

Over 2010–2014, the share of gross value added, produced by subjects of business structures, in GDP of the country increased from USD 1620.4 million to USD 2450 million. Over 2010–2014, the largest growth as to the number of the employed, volume of gross value added, and some other indicators, is observed in the sphere of individual entrepreneurship, where the number of the employed grew

**Table 1** Main indicators of business structures' activities for 2010–2014

Enterprises	2010	2011	2012	2013	2014
Number of business structures' subjects	526,832	538,090	553,736	588,172	624,479
Small enterprises	9002	11,103	11,374	11,338	11,371
Medium enterprises	850	885	847	825	840
Individual entrepreneurs	193,425	204,246	222,700	244,950	267,776
Peasant (farm) husbandries	323,555	321,856	318,815	331,059	344,492
Number of the employed (thousand people)	284.2	301	315.6	333.7	353.7
Small enterprises	47.8	52.9	51.8	50.2	45.9
Medium enterprises	43	43.9	41.1	38.6	40
Individual entrepreneurs	193.4	204.2	222.7	245	267.8
Volume of gross added value, \$ million	1620.4	2333.1	1995.7	1973.6	2450
Small enterprises	232.1	364.5	397.7	355	415.5
Medium enterprises	194.1	302.7	228.7	251.9	287.4
Individual entrepreneurs	647.3	897.2	878.9	812.7	1058.3
Peasant (farm) husbandries	546.9	768.7	490.4	554	688.8

from 193,000 to 267,800 people. In 2014, the inflow of direct foreign investments (without regard to outflow), aimed for development of business structures development, increased by 26.1 % as compared to 2013; but, as compared to 2011, their volume reduced by 37.8 %. The largest growth of incoming foreign investments (by 28.7 %), as compared to 2013, was observed with small enterprises, while investments into medium enterprises grew by 14 %. The share of business structures' subjects in the total volume of incoming direct foreign investments constituted 24 % (38 % in 2010). In 2014, financial state of business structures (without peasant (farm) husbandries and individual entrepreneurs) was characterized by receipt of new profit equal to USD 65,576.6 million. A significant part of it is provided by enterprises of trade, repairs of cars, household appliances, and personal appliances, operations with real estate, car rental and car services, and construction. Foreign trade turnover of business structures in 2014 constituted in current prices USD 3204.5 million, having increased by 28.1 % as compared to 2013, and by 2.1 times as compared to 2010. Export in 2014 was equal to \$ 626 million, having increased by 37.9 % as compared to 2013 (by 1.6 times as compared to 2010); import constituted \$ 2578.5 million, having grown by 25.9 % as compared to 2013, and by 2.3 times as compared to 2010. Export surplus was negative and equaled USD 1952.5 million. Analysis of development of business structures of Kyrgyzstan shows transition from the stage of emergence to stage of evolution and stable development. Analyzing what was done over these years, it is possible to notice that the conducted reforms for improvement of business structure allowed strengthening these positive tendencies.

Very important is the place which was achieved in rankings of the countries with the most favorable climate, which is prepared annually by the World Bank as a result of the state of investment environment of certain countries. Thus, in the

rankings of the most favorable countries for doing business for 2013, Kyrgyzstan was placed 41th. Generalizing the above information, let us determine the expected directions of development of the Kyrgyz business structures:

- improvement of climate for private investments;
- improvement of the system of risk management in financial sector;
- support for infrastructure;
- simplification of doing business for entrepreneurial structures in trade sphere.

## 4 Discussion

Entrepreneurial structure is viewed as a complex and contradictory phenomenon of post-industrial economy. Multiple-level system of this market subject supposes necessity for effective functioning, one of the tools of which is, in our opinion, the use of algorithm. The most important place in the algorithm is occupied by three sub-systems which influence effectiveness of entrepreneurial structure. In order to evaluate the influence of each sub-system on the level of business activities, it is offered to use the range of indicators of this sub-system. In order to preserve vitality and effectiveness of business structure, entrepreneur should set certain goals in the same way he did it before its creation. These goals may be various. The most typical of them are the following (Bezrukova 2014, Fernando et al. 2015):

Goals of development of business structure consist in change of quantitative parameters and quality of functioning of business structures for transition into desired, more favorable state, characterized by better values of targeted indicators. The goals of development may consist in determination of financed level of quality and effective production, entering a certain level of production and consumption, and satisfaction of consumers' needs.

Goals of preservation of business structures in the achieved state appear when it is necessary to fix this state—as it satisfies entrepreneur or is caused by danger of aggravation of this state which should be prevented.

Goal of leaving the undesired state or goals of further reduction and provision of crisis recovery are peculiar for situation when parameters and indicators of functioning of business structures are significantly lower than normative level, they do not correspond to targeted settings of entrepreneur and consumers' needs, and are much worse than the state of similar objects. The purpose of entrepreneur in this state is decline recovery and prevention of indicators of maximum allowable level, which consist in stabilization of socio-economic state and creation of preconditions for growth.

Entrepreneurs' goals depend on external environment, and external environment is selected by entrepreneur depending on goals. This, setting of goals is related to second category of first sub-system and information received from external environment (Bezrukova 2014).

This is information on changes in the state of the Kyrgyz and global economy and socio-cultural, political, and scientific & technical factors which can indirectly influence the activities of business structure (Rogoff 2001). Such information should be constantly monitored and analyzed.

If goals are not determined, their setting is one of the most important and difficult tasks of business structure management. In this case, formation of the goals of business activities is a primary goal of managing these activities, which is most vividly shown in planning of economic activities, investment and financial processes, and expenses management.

The main goal of business structure, which is predetermined by the very sense of entrepreneurship, consists in stimulation and satisfaction of society's demand for specific needs of its members. However, this is not the only goal of entrepreneurship, as there is a whole system of various goals, including private, which are no less important.

Goals and information predetermine the choice of resources: material, labor, and financial ones. Material resources include raw materials, spare parts and expendable materials—i.e., all materials, processed and used in production activities—and equipment and areas used in work of entrepreneurial structure. Labor resources are presented by personnel of entrepreneurial structure which most often is supplied by HR agencies and state which trains personnel at the expenses of state budget.

Thus, concluding the above, we consider that goals are a basic and systemic element. This conclusion is made on the basis of the following logical discussions. Goal is the desired and planned result, which members of entrepreneurial structure try to achieve, using their activity, for satisfaction of collective needs. This is a basis for existence of business organization—and, as a consequence, of business structure. At that, goals of management and each of employees may not coincide, but business structure exists because people whom it is comprised of realize it.

The main conceptual peculiarities of instrumentarium of business structures management under the conditions of world globalization allowed determining expected directions which, in their turn, stipulate:

- creation of favorable environment for development of business structures, including determination and elimination of various barriers and limitations in development;
- development of complex of measures for supporting the subjects of small and medium entrepreneurship;
- development of various infrastructural projects: creation of business incubators, provision of grants for supporting the activities of beginning entrepreneurial structures;
- provision of consultation, organizational & methodological, and informational support for entrepreneurial structures;
- creation of positive image of entrepreneurial structures as an economic entity.

The stated conceptual peculiarities, in the form of created algorithm of effectiveness of functioning of entrepreneurial structures on the basis of factor of

perspective under the conditions of free trade and determined expected directions of development, with determination of functional sub-systems, will allow quickening the development of entrepreneurship, making its competitive, and influencing positively the socio-economic development of the country on the whole.

## 5 Conclusion

It should be noted that under the conditions of transformation of economic relations in the Republic of Kyrgyzstan, special attention belongs to development of business structures in various sectors of economy. Small and medium business creates favorable conditions for reduction of unemployment, increase of manufacture of goods and services, and growth of population's well-being. Effectiveness of modernization of modern economy of Kyrgyzstan largely depends on the level of development of business structures and business organizations, which, in its turn, is determined by the quality of management of these subjects of market relations (Smith and Anthony 1998). At this stage, Kyrgyzstan conducts the policy aimed at macro-economic and political stability and continuation of the course of liberal and democratic reforms. Over the recent years, the republic supports the regime of support for investment activities by means of strict observance of the WTO rules, participation in international investment agreements, and adoption of non-discrimination and liberal laws.

The determined conceptual peculiarities of instrumentarium of business structures management, together with state support, influence their stable development and increase of competitiveness. In particular, algorithm of effective functioning of business structures on the basis of factor of perspective ensures: optimal distribution of resources for processes' work; analysis of information on potential and existing consumers, level of their satisfaction, requirements, expectations, and possibilities; building the assortment policy for the purpose of maximization of financial result.

The expected directions of development of business structures are formed, which will allow quickening the development of business as to means of coordination of activities of informational, financial, logistics, and other structures and optimizing succession of actions and resources required for that.

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# Measures to Improve the Investment Attractiveness of Enterprises in the Modern Context

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**Abstract** The article is devoted to increasing the investment attractiveness of Russian enterprises during the crisis. The authors identified and proved the main directions of the enterprises investment attractiveness improvement, based on the maximum use of all resources available. The introduction of financial and management accounting systems, automation of information flows and fair valuation of companies are specified as the leading procedures. For this purpose, accounting information was precisely analyzed, depending on types of accounting existing in company. The fair valuation of a company was considered in detail as one of the most investor-attracting events. The article identifies peculiarities of fair value and presents the recommendations for the use of fair value standard at the enterprise. It also explains the basic differences between the fair value standard and the market value standard. Then it considers a hierarchy of fair value measurements. Indicators of the fair value measurements are recommended to be determined on the basis of the relevant information, i.e., on input data and recommendations on their use. The article also specifies three levels of the input data reliability to classify by, to estimate more accurate the fair value of assets and liabilities. The proposed activities, according to the authors, would allow investors to receive more complete and accurate information for effective management and investment decision-making.

## 1 Introduction

In crisis and investment activity decrease, all possible resources should be used to attract investments to the Russian economy.

Investment climate improvement in the country is impossible without improving the investment attractiveness of enterprises. Activities as introduction of financial and management accounting systems, automation of information flows, and fair

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valuation of enterprises should have a positive impact on the investment activity of foreign and Russian investors.

During the crisis, the need for investments into business increases, as if you do not constantly invest in development, the business value decreases quickly, and therefore, you may lose all the strategic advantages.

The need for development of financial accounting at Russian enterprises increases in proportion to the growing need for integration of Russian business into global economy in order to extend the volume of investment. This is primarily due to the introduction of International Financial Reporting Standards (IFRS) at Russian enterprises (Chernikova and Pytkin 2013).

## 2 Materials and Methods of the Research

We propose to consider fair valuation of a company as one of the most interesting activities from investor's viewpoint.

The recent unification of views of US GAAP (Generally Accepted Accounting Principles) and IFRS is based on the recognition of mandatory application of measurements on the basis of fair value (FV—Fair Value) by both accounting systems.

Financial Accounting Standards Board (FASB) adopted Regulation SFAS № 157, according to which the fair value measurements permeate the entire American accounting system. The regulation arranges the rules for determining the fair value of assets and liabilities (and equity capital) of enterprise, thus provides guidance on the use of information concerning assets and liabilities markets for calculation. This regulation on fair value measurement is extremely important, since depending on the nature of the market information, the Regulation establishes a hierarchy of fair value measurement levels (levels 1, 2, 3).

In turn, IFRS establishes the fair value application in a number of its standards.

Recommendations on the use of the fair value standard are also described in International Valuation Standards (IVS), as revised in 2007.

The features of fair value shall be considered more detailed.

## 3 Results and Discussion

A company daily receives a large flow of internal and external information to be processed in a short period of time: short-term and medium-term outlooks, indicators of financial and commercial activities, and others. To combine it and obtain a broad picture, accounting system of enterprise is required to be automated (Chernikova 2014).

The introduction of financial and managerial accounting systems should assist in cost control, resource consumption and unplanned losses reduction, and automation

of management accounting system is important to provide timely reliable information to managers who make decisions.

All account and not account (current) information serves the goals of management system, depending on the existing types of accounting. The accounting system is primarily a system of provision the enterprise management with accounting information required. This holistic view to accounting management is exactly what corresponds to a system of integral information space of enterprise (Chernikova and Zvyagina 2014).

The focus of Russian specialists on the fair value standard will improve the level of business valuation rationale, as an opportunity to express a reasonable solution of separate issues related to the functioning of Russian total share capital, with the possibility of attracting foreign investors, is based exactly on the fair value. Accounting information on the cost of business in modern context is particularly relevant, as organization and implementation of financial and management accounting systems allow using internal and external flows of information extremely effective to verify the measurements of business value (Isakov and Palkina 2013).

Regulation SFAS № 157 defines fair value as follows:

*Fair value is a price that would be obtained, on a day of measurement, from the sale of an asset or paid when transferring liabilities in a normal transaction between market participants.*

Until recently, business appraisers didn't make much difference between market value standards and fair value standards, since fair value was a category of financial reporting (US GAAP and IFRS). But when it comes to a forced transaction, the definition given in the Regulation SFAS № 157, clearly, can not be used, since this standard defines the conditions of value formation in terms of equality of parties of a transaction. Therefore, it is necessary to clarify the conditions of formation of initial transaction characteristics; a clarification of this kind is particularly important in relation to forced redemption by majority shareholders of the shares held by minority shareholders (Chernikova and Isakov 2014).

Without specific protection measures for minority shareholders we can not attract free funds of population and small investors, in the form of savings, to cumulative equities funding. And it reveals the value of minority shareholders protection, as specifically public interest in development of the national economy enables solving the issue of protection of minority shareholder at the legislative level (Chernikova 2013a).

The real actions of a number of major Russian corporations serve the interests of the majority shareholders. These very interests are respected by suppressing the interests of minority shareholders. This became particularly clear in H1 2008, when shares of minority shareholders were intensively and mandatory redeemed by individual joint stock companies, considering discounts for the lack of control and low liquidity.

Application of the fair value standard as a standard specifying stock value fixation, excluding any increase or decrease in value (i.e., no bonuses and

**Table 1** The features of the fair value standard and the market value standard

Market value standard	Fair value standard
Buyer—voluntary buyer	Voluntary buyer—not always
Seller—willing seller	Willing seller—not always
Parties are not under pressure	The seller and the buyer are not always subjected to pressure
The hypothetical buyer and seller are regarded as typical participants in the transaction	Understanding of justice for the seller may be considered separately; Collisions (failures) of potential transaction is not considered
For both parties—price equation	The concept of justice in relation to a seller is considered as its inability to maintain its stake in company's equity
The same conditions awareness for both parties of a transaction, i.e. for buyer and seller	No such assumption
Both sides possess accessible information	
It applies to majority and minority stakes	It applies only to minority stakes
It applies to any state tax valuations	The most used valuation standard for the shares of disadvantaged and minority shareholders

discounts) on the eve of corporate actions, and in case when these exceptions are unfair, will protect the interests of minority shareholders (Isakov 2010).

The differences between the fair value standard and the market value standard should be noted as well (Table 1).

The differences between the standards of fair value and market value is extremely important to consider when assessing a business value and possibility to provide financial information in the management system to the people concerned, namely investors. There are a number of measurements, when the use of the market value standard violates the interests of minority shareholders (Chernikova 2013b). A good example is orientation of market value to the following conditions of a transaction:

- both parties are not under any pressure;
- both parties possess all information on conditions of the transaction.

In this case, market value standard is preferable. The conditions above can not be applied towards the fair value, since fair value doesn't reflect the impact of active and open market. This implies that such estimates in the absence of open and active market, e.g. in mandatory redemption of shares, should be formed on a proportional basis, i.e. excluding the impact of bonuses and discounts. There are other areas of assessment activities which require the use of fair value standards, for example, measuring the value of goods crossing the customs border of the Russian Federation in export–import operations.

Indicators for measuring the fair value are determined by applying the recommendations on the use the relevant information for this purpose, i.e. input information. This information is distributed across three levels of reliability of the final

results of assessment of fair value of assets and liabilities. This builds a hierarchy of fair value measurements. The initial categorization criteria for input data (information) is their division into two groups—observable and unobservable data.

Observable data are used only at level 1 or mainly at level 2. Unobservable input data are a source of information to determine the fair value at level 3. Based on allocation of levels used to evaluate the information, the hierarchy of the fair value is defined as follows:

*Level 1:* Input data are the observable market data reflecting the registered (quoted) prices for identical assets or liabilities in active markets, which reporting economic unit has an access to, on a measurement date.

*Level 2:* Input data are observable market data that are not registered (quoted) prices for identical assets or liabilities in active markets, which reporting economic unit has an access to, on a measurement date. Input data of the level 2 include:

- registered (quoted) prices of similar assets or liabilities in active markets;
- registered (quoted) prices for identical or similar assets or liabilities in markets that are not active; this means the markets where transactions with assets or liabilities are quite rare and prices may be outdated, thus derived indicators can be used; and prices and derived indicators may significantly vary either in time or in space between different market makers (for example, in relation to a number of brokerage markets). It can also be markets, a little information on transactions of which is made public (e.g., direct transactions between the owners of companies);
- directly observable market data, which are not registered (quoted) prices relating to the asset or liability (observed interest rates, yield curves, volatility factors, default probability assessment) with reference to generally accepted periods of time;
- market data which can not be directly observed with respect to considered assets or liabilities, but which are derivatives, or supported by other observable market data using correlation methods or by any other means (inputs, supported by the market); they are data obtained, for example, by extrapolation or interpolation methods supported by other observable market data.

*Level 3:* Input data are unobservable market data obtained, for example, by extrapolation or interpolation, but not supported by observable market data. Unobservable market input data can be used to measure fair value when observable market data are not available, thus solving an informational challenge where little or no necessary market activity exists towards considered market assets or liabilities. However, the objective of fair value measurements remains the same, namely to obtain characteristics of the market (of the seller). Therefore, the measurement of fair value using unobservable market inputs shall, within Level 3, take into account the assumptions that market participants will apply when generating asset or liability price. They should include assumptions about the amount of money that a market participant (buyer) will ask in compensation for some risk associated with the use of unobservable input data

to measure fair value. The in-house data of a reporting unit, used for input data calculation, should be adjusted to eliminate the factors specific to a company, if information indicating that market participants may come from divergent proposals is available (Valuation for Financial Reporting, 2010).

## 4 Conclusion

Thus, all three levels of formation of initial data for the fair value estimation are based on the market value. The market value plays the most significant role in the formation of fair value at level 1. The reason is that the fair value is defined using market prices, established by the parties for identical assets or liabilities in basic active markets.

In the absence of prices agreed (established) by the parties for identical assets or liabilities, the fair value should be determined by market prices agreed by the parties for similar assets or liabilities in active markets. But this information can not be used literally and must be adjusted with available differences in cash flows and other factors related to the relevant asset or liability.

Level 3 is referred to, if there are no prices agreed between the parties for identical and similar assets or liabilities in the market.

Since the determination of fair value requires the establishment of market value indicators, the experts need to use profitable, comparative and cost approaches to assessment (Valuation for Financial Reporting 2010).

Currently, most Russian enterprises are not attractive for investors, however, when activities required to increase their investment attractiveness are made, the situation will significantly change.

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# Adaptation of Macro-Economic Models to Solving the Problem of Countries Differentiation in Global Economy

Olga Oreshina, Elena V. Povorina, and Marina V. Vinogradova

**Abstract** The purpose of the article is to verify the offered hypothesis and determine possibilities and perspectives of adaptation of macro-economic models to solving to problem of countries differentiation in the global economy. In this work, the authors use systemic approach, method of problem analysis, formalization, and economic modeling. During conduct of the research, the authors view main approaches and offer a new proprietary approach to classification of countries in the global economy, determine a problem of countries differentiation in the global economy, determine perspectives of solving it, and offer recommendations for solving the problem of countries differentiation in the global economy through adaptation of macro-economic models. As a result of the research, the authors come to the conclusion that the problem of differentiation of countries in the global economy cannot be solved with the help of current methods and tools, which causes necessity for search for new ways for solving it, one of which is adaptation of macro-economic models.

## 1 Introduction

Actuality of the problem of countries differentiation in the global economy and importance of solving it are caused by the fact that in the globalizing world, there is a close connection between all economic systems of the global economy. This means that crisis phenomena in economy of one country inevitable and quickly expand to other countries of the world, which leads to the global recession and the following stagnation of the global economy.

This contradicts the idea of maximization of rates of the global economic growth. That's why prevention or reduction of their depth require reduction of countries differentiation in the global economy. Besides, there is escalation of

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political tension in the global economy, caused by high level of countries differentiation in the global economic system. Reduction of this differentiation is necessary for elimination of military threat in the world—which will bring economic benefits neither for developing nor for developed countries.

At present, solving the problem of countries differentiation in the global economy includes supporting measures aimed at stimulation of economic development of underdeveloped countries: provision of investments, loans, and subsidies for countries which show the smallest rates of economic development.

Following the example of successful developed countries, underdeveloped economies conduct the same reforms and adapt legislature for international standards, thus realizing a so called strategy of overtaking development. That is, instead of search for their own ways of development, they try to follow the example of leaders of the global economy.

However, due to significant differences in initial socio-economic conditions and situation, at which this strategy is realized, the effect almost always differs from expectations. This reminds expansion of European culture in African tribes, which possessed their own unique culture and were unable of complete change of their world view and way of life, which led to their extinction.

Consequently, imposing or voluntary copying of another experience and strategy of development may lead to negative effectiveness. Probably, in a certain sense, the most economically developed countries are interested in preservation of their leading position in the global economy.

It is also possible that the long-term aim of the global program for support for developing countries is—unofficially—their bankruptcy and subjection to interests of developed countries, as it was in colonial age. In any case, this contradicts the announced ideals and purpose of maximization of general economic effectiveness of the global economic system. That's why there is a need for new efficient ways of solving the problem of countries differentiation in the global economy.

The authors offer a hypothesis that the problem of countries differentiation in the global economy cannot be solved with the help of current methods and tools, which causes necessity for search for new ways of solving it—one of which is adaptation of macro-economic models. The purpose of the article is verification of this hypothesis and determination of possibilities and perspectives of adaptation of macro-economic models to solving the problem of countries differentiation in the global economy.

## **2 Approaches to Classification of Countries in the Global Economy**

There are several approaches to classification of countries in the global economy. The main and the most widespread of them are shown in Table 1.

As is seen from Table 1, the main classification attributes, which allow classifying and differentiating countries of the global economy, are the following:

**Table 1** Approaches to classification of countries in the global economy

Source of classification	Criterion of classification	Groups of countries
UN	Level of development of regional peculiarities	<ul style="list-style-type: none"> <li>– African and Asian countries;</li> <li>– Industrially developed countries;</li> <li>– Latin American countries;</li> <li>– Countries with centralized planned economy.</li> </ul>
UNCTAD	Type of economy	<ul style="list-style-type: none"> <li>– Countries with developed market economy;</li> <li>– Countries of Eastern Europe;</li> <li>– Socialist countries of Asia;</li> <li>– Developing countries (rest).</li> </ul>
IMF	Type of economy	<ul style="list-style-type: none"> <li>– Industrial countries;</li> <li>– All other countries.</li> </ul>
The World Bank	Income per capita	<ul style="list-style-type: none"> <li>– Countries with low level of income;</li> <li>– Countries with income lower than average level;</li> <li>– Countries with income above average;</li> <li>– Countries with high level of income.</li> </ul>
	Level of economy openness	<ul style="list-style-type: none"> <li>– Countries with relatively closed economy;</li> <li>– Countries with relatively open economy;</li> <li>– Countries between I and II groups.</li> </ul>
UNECOSOC	Type of economy and peculiarities of its development	<ul style="list-style-type: none"> <li>– Developed countries (open market post-industrial economy);</li> <li>– Countries with transitional economy (liberalization, privatization, orientation of development of market economy);</li> <li>– Developing countries (mixed economy with low production level);</li> <li>– Countries with administrative and command economy</li> </ul>

- type of economy (market, transitional, administrative and command, and planned);
- level of openness of economy (open, closed, partially open);
- level of GDP and GDP per capita;
- rate of economic growth;
- structure of economy and stage of its development (pre-industrial, industrial, post-industrial).

Based on the above principles, this research distinguished the following groups of countries:

- Leading countries, characterized by the higher level of GDP, GDP per capita, developed and open post-industrial market economy. The rate of economic growth of such countries can be high and low—in case of depletion of potential of their development. Such countries are in minority. They occupy leading positions in the modern global economy and are a locomotive of its development. An example of such countries is the USA;

**Table 2** Offered proprietary classification of countries in the global economy

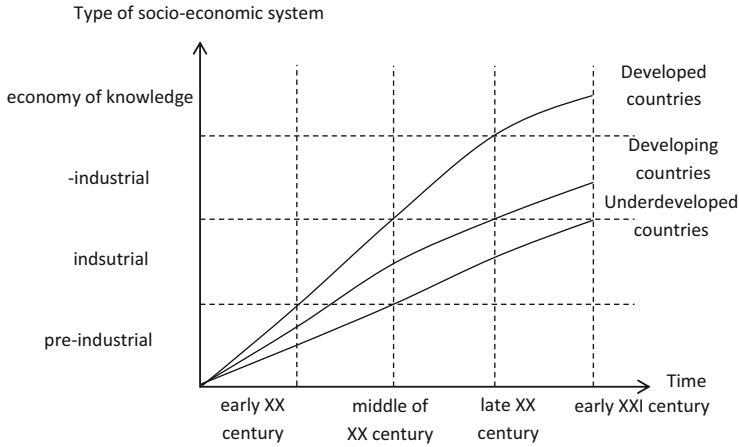
Categories of countries	Type of economy	Level of openness of economy	Level of GDP	GDP per capita	Rate of growth of GDP	Stage of development of economy
Leading countries	Market	Open	High	High	Any	Post-industrial
Developed countries by GDP	Any	Any	High	High	Any	Industrial
Developed countries by stage of economy	Any	Any	High	High	Any	Post-industrial
Quickly developing countries	Any	Any	Medium	Medium	High	Any
Slowly developing countries	Any	Any	Low	Low	Low	Any

- Developed countries by GDP, characterized by high level of GDP and GDP per capita. Economy of these countries is industrial, it can be of any type and level of openness. Economic growth of such countries can have any rate. An example of such countries is China;
- Developed countries by stage of economy, characterized by post-industrial stage of development of economy. At that, type and level of openness of economy of such countries can be any. Level of GDP and GDP per capita is rather high. Rate of economic growth can be any. An example of such countries is Russia;
- Quickly developing countries, which demonstrate high rates of economic growth but characterized by average level of GDP and GDP per capita. Their economy can be of any type and level of openness. Such countries are at the stage of industrial development of economy. An example of such countries is India.
- slowly developing countries—all other countries which has low level of GDP and GDP per capita and show low rates of economic growth. Type, level of openness, and stage of development of their economy could be any. An example of such countries is Lybia.

The developed proprietary classification of countries is given in Table 2.

### 3 Problem of Countries Differentiation in the Global Economy

Issues of countries differentiation in the global economy are studied by many modern scientists, among which are (Aslam and Azhar 2013), (Jahfer and Inoue 2014), (Savic et al. 2014), (Popkova et al. 2015), (Md. Al and Sohag 2015), (Eltejaei 2015), (Suvorov 2015), (Gualdi et al. 2015), (Novotná and Varyšová 2015), (Gstöhl 2015), (Nadtochey 2014), etc.



**Fig. 1** Graphical expression of countries differentiation by time of transition to new types of socio-economic systems

From the point of view of systemic approach, global economy is a system, and availability of certain structure is an important feature of any system. That’s why differences between economic systems of the global economy are a regular result of its development. However, current structure of the global economy hinders its further development, as it is unstable and is a reason for imbalance of purposes and priorities of various countries.

Instead of solving common problems with joint efforts—development of new technologies, research of space, protection of environment, diseases, famine, etc.—countries of the world fight for leadership and possibility for promotion of their ideas in the global scale. Therefore, differentiation of countries in the global economy is a problem. Graphical expression of generalized countries differentiation by the time of transition to new types of socio-economic systems, according to current paradigm, is shown in Fig. 1.

As is seen from Fig. 1, evolution of types of socio-economic systems supposes distinguishing of pre-industrial, industrial, and post-industrial economies, and knowledge economy as the highest form of economic development. Developed countries have gone through these stages quicker than others, building industrial economy at the beginning of twentieth century, passing to post-industrial economy, and beginning to form the knowledge economy at the end of twentieth century.

In developing countries, the process of transition to the stated stages is slower. At present, they are at the way to formation of post-industrial economy. Underdeveloped countries are characterized by industrial type of economy. It should be noted that the graph shows average information, which supposes specification of generalized time intervals and trajectories of curves of economic development of various groups of countries.

Based on the above graph, it is possible to see differences in trajectories of economic development of various groups of countries, which may seem safe at the

first glance. However, deeper analysis of sense of these differences shows that they are characterized more by social and cultural nature than economic one.

That's why simple reduction of the gap between levels and rates of economic growth of various countries cannot ensure solving the problem of their differentiation. This requires establishment of ideological integrity and cultural oneness in the global scale—which is impossible at current stage of development of the global economic system.

Probably, existing situation of opposition between various civilizations is an inseparable stage of process of cultural globalization—but this does not mean impossibility for management of this process and minimization of its negative consequences. Surely, the largest effectiveness in this case belongs to socio-cultural methods of solving the studied problem.

For example, the Soviet Union's refusal from communistic ideology and transition to market type of economy became a serious step towards unification of the global ideology. Here it should be noted that change of cultural values should be voluntary—not under enforcement and under the conditions of dictate. If significant part of countries in the global economy refuses to accept the leading ideology, this is a reason for changing it.

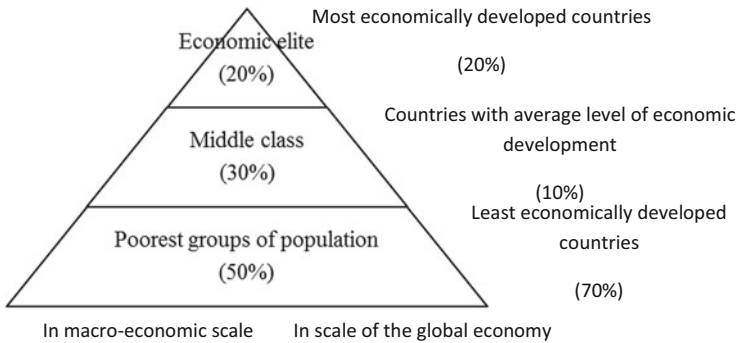
On the whole, process of cultural globalization is rather complex. Nevertheless, economic methods are not completely useless—they could be successfully used for reduction of urgency of the studied problem.

#### **4 Perspectives and Recommendations for Solving the Problem of Countries Differentiation in the Global Economy Through Adaptation of Macro-Economic Models**

As a perspective direction for solving the problem of countries differentiation in the global economy, this work offers adaptation of macro-economic model of differentiation of population's income in the country. Differences in the level of well-being of various groups of population in macro-economic scale are viewed as objective satiation. In the scale of the global economy, it is possible to use the same rule (Fig. 2).

As is seen from Fig. 2, macro-economic model of differentiation of population's income in the country is usually expressed in the form of pyramid with stable foundation from the poorest social groups, which consist 50% of population, middle class (30%), and economic elite (20%).

In scale of the global economy, three corresponding categories of countries could be distinguished: the least economically developed countries, the share of which constitutes 70%, countries with average level of economic development (10%), and the most economically developed countries (20%).



**Fig. 2** Adaptation of macro-economic model of management of differentiation of population’s income in countries to solving the problem of countries differentiation in the global economy

Violation of proportion of groups of countries in the global scale is obvious. That’s why it is advisable to direct efforts for solving the problem of countries differentiation in the global economy to transition of several least economically developed countries to the category of countries with average level of economic development. This will allow setting a balance in the global economy.

Another perspective direction of solving the problem of countries differentiation in the global economy is adaptation of macro-economic model of labor division in society. In the global economy, principles of labor division are used—but not in full. The least economically developed countries strive for repeating success of leading countries with the method of copying, without implementation of necessary changes.

That’s why they abstract from their own and developed countries’ absolute and relative competitive advantages and strive for establishment of model type and structure of economy—instead of finding their own optimal stage of development of economy.

Thus, many countries, which include modern Russia, instead of development of industry—in which they have reached the largest success—have maximized the share of service sphere in economic system, for it to correspond to formal criteria of post-industrial economy. As a result, foundations of economic development were ruined, which led to reduction of their global competitiveness.

If all countries of the world are concentrated on search and development of their own optimal economic system—firstly, they will be distracted from socio-cultural differences, and, secondly, they will be able to overcome the gap, which will allow reducing the urgency of their differentiation.

Also, a certain interest for solving the problem of countries differentiation in the global economy is posed by adaptation of macro-economic model of free competition in the market. In the scale of national economy, anti-monopoly regulation is a highly effective tool. That’s why it is advisable to use this successful experience for regulation of countries competition in the global scale.

At that, it is necessary to take into account certain peculiarities of functioning of the global economy. Unlike macro-economics, in global economy the role of state, as a mega-regulator, is performed by international organizations (for example, the UN). That's why function of competition regulation should be put on them.

At present, there is a tendency for monopolization in the global economy, related to enlargement of subjects of international economic relations. Provision of free competition of countries in the global economy requires stimulation of disintegration processes, which are heavily suppressed nowadays.

Probably, disintegration may be a force which is necessary for achievement of relative equality of market power of various countries, which increases effectiveness of their cooperation and may eliminate the necessity for cultural unification due to the use of economic methods.

## 5 Conclusions

Thus, as a result of the research, it is possible to conclude that without significant changes in approach to solving the problem of countries differentiation in the global economy, it will not be solved in near future due to domination of socio-cultural reasons over econometric and reasons, unprecedented scale, complexity, and depth.

The offered hypothesis was proved, and the authors showed that the problem of countries differentiation in the global economy cannot be solved with the help of current methods and tools. For that, the authors offer adaptation of the most perspective macro-economic models: models of differentiation of population's income in country, models of labor division in society, and models of free competition in market.

Based on the conducted analysis of existing approaches to classification of countries in the global economy, the authors offer their own new approach, which supposes distinguishing leading countries, developed countries by GDP, developed countries by stage of economy, quickly developing countries, and slowly developing countries.

It should be noted that the problem consists not in differentiation as to the level of economic development of countries as such, but existing disproportion in the global economy, which violates balance of economic systems which are parts of it. That's why, while solving the problem of countries differentiation in the global economy, it is necessary to strive not for full aligning of the level of development and unification of types of economic systems, but for searching for structure of the global economy which would ensure its sustainable development.

A limitation of the conducted research is generalized and theoretical nature of the developed recommendations for solving the problem of countries differentiation in the global economy, through adaptation of macro-economic models. Perspective directions of further research in this sphere are detalization and practical realization of the developed recommendations.



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# Problems of Sustainable Development of Depressive Region in Crisis

Marzhanat Isalova, Umugani Gadzhieva, Hellas Gereyhanova, Saida Buttaeva, and Indira Bogdanova

**Abstract** The purpose of the article is to verify the hypothesis and study the problems of provision of sustainable development of a depressive region under the conditions of crisis by the example of modern Russia. For that, the work uses the method of systemic, comparative, horizontal, trend, and problem analysis. The authors determine and analyze specifics of crisis in depressive regions by the example of Orel, Kostroma, and Pskov Oblasts of Russia in 2008–2015. The authors determine the most important problems related to unstable development of a depressive region under the influence of crisis and develop recommendations and offer a proprietary model for provision of sustainable development of a depressive region under the conditions of crisis. As a result of the research, the authors specify the notion of stability as to depressive region and improve classification of region in the context of their capability to opposing and overcoming the crisis. The authors have come to the conclusion that specifics of crisis in depressive region consists in the fact that unlike other regions, they are not capable to exist independently and overcome consequences of crisis, being in deep recession.

## 1 Introduction

Disproportions of economic development are one of the most important global problems as of now. In the system of global economy at the level of separate countries, high level of differentiation of their socio-economic development is largely predetermined by geographical, geo-political, and cultural peculiarities which make the task of global unification and leveling of economic development very difficult and almost unachievable—which predetermines its scientific character.

At the level of regions, within national economic system, influence of these factors is much weaker, so overcoming the gap in the level of socio-economic development of various regions is an achievable task that requires systemic efforts

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in the right direction. Therefore, the problem of development of depressive regions and reduction their underrun is very current.

The article offers a hypothesis that depressive regions not only are characterized by lower level of socio-economic development, as compared to other regions, but also develop unstably, as they are unable to oppose the crisis, staying in deep recession. The authors seek the goal of verification of this hypothesis and study the problems of provision of sustainable development of a depressive region under the conditions of crisis by the example of modern Russia. To achieve this goal, the work solves the following tasks:

- determining and analyzing specifics of crisis in depressive regions;
- determining the most important problems related to unsustainable development of depressive region under the influence of crisis;
- developing recommendations for provision of sustainable development of depressive region under the conditions of crisis.

## 2 Materials and Method

The problem of disproportions in development of regional economy and existence of leading and underdeveloped regions at theoretical and empirical levels is paid a lot of attention from modern economists, among whom are (Skiter et al. 2015), (Kravets et al. 2014), and (Dzhandzhugazova et al. 2015). According to existing scientific paradigm, the following types of regions are distinguished according to the level of socio-economic development:

- progressive regions that demonstrate superior level of socio-economic development (exceeding average statistic indicators for the country by more than 10 %);
- normal regions that are characterized by average level of socio-economic development (variation from average statistic indicators for the country by no more than 10 %);
- depressive regions that show slow level of socio-economic development (underrun from average statistic indicators for the country by more than 10 %).

At the methodological level, with the offer and approbation of the methodology of calculation of “underdevelopment whirlpools” that allow determining the level of differentiation of regions within the economic system and evaluating the level of underrun of certain regions from the others, this problem is studied in the papers by (Popkova et al. 2013), (Popkova and Tinyakova 2013a, b), etc.

Conceptual provisions of sustainable economic growth and development, including at the level of the region, are represented in the works by Isalova (2009, 2010a, b, 2011, 2012, 2015), (Isalova and Platova 2009a, b), (Isalova and Ismailov 2009a, b), (Isalova et al. 2014a, b, 2015), (Isalova and Dullueva 2014a, b), (Gadzhieva and Gadzhiev 2012a, b), (Buttaeva and Gadzhieva 2015), (Buttaeva 2009) etc. Fundamental and applied issues of development of economy under the

conditions of crisis are studied in multiple works by such modern authors as (Kovalin and Moiseev 2015), (Ryazanov 2015), (Grinberg 2014), etc.

The performed overview of research and publications on the topic allows concluding that it is studied only fragmentarily. Most of scientists do not study the reasons for emergence of depressive regions and stop at substantiation of their existence, i.e., at a consequence. Accumulation of scientific data is not enough for determining the reasons for unsustainable development of depressive regions and development of a system of measures for their elimination, which pre-determines necessity for further research in this sphere.

For verification of the offered hypothesis, this work uses the method of systemic, comparative, horizontal, and trend analysis, with the help of which specifics of the crisis in depressive regions is studied. The authors of the article determine and study the state and dynamics of development of depressive regions in the common national economic system with the help of the following distinguished criteria (indicators):

GRP (free of inflation), including per capita;  
level of employment of population;  
number of enterprises (indicators of development of business);  
index of consumer prices (indicator of inflation level);  
investments in fixed capital of region's enterprises;  
developed leading production technologies (LPT);  
leading production technologies used by region's enterprises;  
budget deficit (ratio of revenue to expenses).

As a modern period, this work studies 2008–2015—for the authors' attention is concentrated on the recent global financial crisis that began in 2008 and on its peculiarities in depressive regions. In order to determine the problems related to unstable development of depressive region under the influence of the crisis, the authors use the method of problem analysis.

### 3 Results

Let us study the character of crisis in depressive regions with the help of study of dynamics of changes of the stated indicators of socio-economic development. Based on the data of the official statistics of the Federal State Statistics Service, the objects of the research are Orel, Kostroma, and Pskov Oblasts. The results of horizontal and trend analysis of indicators of socio-economic development of Orel Oblast are shown in Table 1.

As is seen from Table 1, in 2008–2010 there was a positive dynamics of GRP: in 2009—by 23.1 %, in 2010—by 56.4 %; GRP per capita in 2009—by 44.2 %, in 2010—by 67.1 %; number of enterprises of the region—by 2.4 % in 2009, by 5.7 % in 2010; investments—by 18.3 % in 2009, by 58.6 % in 2010; number of developed LPT—by 6.7 % in 2009, by 12.4 % in 2010. At that, there was steady growth of the

**Table 1** Dynamics of changes of indicators of socio-economic development of Orel Oblast in 2008–2015

Indicators	Values of indicators for the periods, %							
	2009/ 2008	2010/ 2009	2011/ 2010	2012/ 2011	2013/ 2012	2014/ 2013	2015/ 2014	2015/ 2008
GRP	123.1	156.4	97.3	97.1	96.9	96.8	95.6	72.5
GRP per capita	144.2	167.1	99.4	98.7	97.6	96.5	95.2	51.0
Employment level	89.2	90.1	89.6	89.1	88.7	88.4	87.6	98.4
Number of enterprises	102.4	105.7	94.3	93.5	92.6	91.7	90.9	88.5
Index of consumer prices	105.8	106.9	107.4	109.1	111.3	112.7	114.9	109.1
Investments into fixed capital	118.3	158.6	96.3	95.4	93.2	92.1	91.8	73.5
Developed LPT	200.0	301.5	98.6	97.5	95.4	93.2	91.1	0.0
Used LPT	106.7	112.4	96.5	95.4	94.7	93.8	92.9	86.2
Budget deficit	99.0	98.8	101.4	102.5	106.3	107.2	108.3	109.3

Source: Federal State Statistics Service (2015)

index of consumer prices in the region in 2009 by 5.8 %, in 2010—by 6.9 %; negative dynamics of regional budget deficit constituted 1 % in 2009, 2.2 % in 2010; negative dynamics of population employment level constituted 10.8 % in 2009 and 9.9 % in 2010.

After that, under the influence of the financial crisis, the situation changed in direct ratio. Until 2015, there was aggravation of all indicators of socio-economic situation. Thus, GRP reduced in 2015 by 27.5 %, as compared to 2008; GRP per capita—by 49 %, employment level—by 1.6 %, number of enterprises—by 11.5 %; consumer prices index grew by 9.1 %; investments into the fixed capital reduced by 26.5 %, number of developed LPT—by 100 %, and the number of used LPT—by 13.8 %; budget deficit grew by 9.3 %.

The results of horizontal and trend analysis of indicators of socio-economic development of Kostroma Oblast are presented in Table 2.

As is seen from Table 2, in 2008–2010 there was a positive dynamics of GRP: in 2009—by 12.4 %, in 2010—by 13.7 %; GRP per capita in 2009—by 21.3 %, in 2010—by 2.3 %; number of enterprises of the region—by 1.6 % in 2009, by 3.7 % in 2010; investments—by 12.7 % in 2009, by 14.8 % in 2010; number of developed LPT—by 156.1 % in 2009, by 201.2 % in 2010; number of used LPT—by 8.9 % in 2009 and by 1.5 % in 2010. At that, there was steady growth of the index of consumer prices in the region in 2009 by 4.3 %, in 2010—by 3.2 %; negative dynamics of regional budget deficit grew by 0.8 % in 2009, by 1.3 % in 2010.

After that, under the influence of the financial crisis, the situation changed in direct ratio. Until 2015, there was aggravation of all indicators of socio-economic situation. Thus, GRP reduced in 2015 by 16.6 %, as compared to 2008; GRP per capita—by 23.7 %, employment level—by 8 %, number of enterprises—by 6.4 %; consumer prices index grew by 4.9 %; investments into the fixed capital reduced by

**Table 2** Dynamics of change of indicators of socio-economic development of Kostroma Oblast in 2008–2015

Indicators	Values of indicators for the periods, %							
	2009/ 2008	2010/ 2009	2011/ 2010	2012/ 2011	2013/ 2012	2014/ 2013	2015/ 2014	2015/ 2008
GRP	112.4	113.7	98.5	97.4	97.1	96.9	95.8	83.4
GRP per capita	121.3	128.5	99.3	99.1	98.7	98.5	97.6	76.3
Employment level	101.2	102.3	97.6	95.4	95.1	94.3	93.2	92.0
Number of enterprises	101.6	103.7	99.4	98.7	97.5	96.3	95.2	93.6
Index of consumer prices	104.3	103.2	104.6	107.2	108.1	108.6	109.2	104.9
Investments into fixed capital	112.7	114.8	98.6	97.5	96.4	95.5	94.3	81.6
Developed LPT	256.1	301.2	90.1	88.6	87.5	84.3	82.1	–74.0
Used LPT	108.9	110.5	99.4	98.3	97.6	95.4	93.2	84.3
Budget deficit	99.2	98.7	101.2	102.4	103.6	104.8	105.7	106.5

Source: Federal State Statistics Service (2015)

**Table 3** Dynamics of changes of indicators of socio-economic development of Pskov Oblast in 2008–2015

Indicators	Values of indicators for the periods, %							
	2009/ 2008	2010/ 2009	2011/ 2010	2012/ 2011	2013/ 2012	2014/ 2013	2015/ 2014	2015/ 2008
GRP	108.6	109.5	99.4	99.3	99.1	98.7	98.6	90.0
GRP per capita	112.5	113.7	98.5	97.4	96.3	95.1	94.9	82.4
Employment level	102.3	106.3	99.3	98.7	96.5	94.3	92.1	89.8
Number of enterprises	104.5	105.1	99.6	98.7	97.6	96.4	95.3	90.8
Index of consumer prices	105.9	103.8	104.5	105.7	106.8	107.2	109.3	103.4
Investments into fixed capital	113.5	114.6	98.5	97.3	96.4	95.1	94.2	80.7
Developed LPT	198.7	201.5	99.1	98.6	97.4	96.3	95.1	–3.6
Used LPT	104.2	106.7	99.3	98.1	97.4	96.2	95.0	90.8
Budget deficit	99.1	98.3	101.2	102.5	103.4	104.6	105.9	106.8

Source: Federal State Statistics Service (2015)

18.4 %, number of developed LPT—by 174 %, and the number of used LPT—by 15.7 %; budget deficit grew by 6.5 %.

The results of horizontal and trend analysis of indicators of socio-economic development of Pskov Oblast are presented in Table 3.

As is seen from Table 3, in 2008–2010 there was a positive dynamics of GRP: in 2009—by 8.6 %, in 2010—by 9.5 %; GRP per capita in 2009—by 12.5 %, in 2010—by 13.7 %; number of enterprises of the region—by 4.5 % in 2009, by

5.1 % in 2010; investments—by 13.5 % in 2009, by 14.6 % in 2010; number of developed LPT—by 98.7 % in 2009, by 101.5 % in 2010; number of used LPT—by 4.2 % in 2009 and by 6.7 % in 2010. At that, there was steady growth of the index of consumer prices in the region in 2009 by 5.9 %, in 2010—by 3.8 %; negative dynamics of regional budget deficit grew by 0.9 % in 2009, by 1.7 % in 2010.

After that, under the influence of the financial crisis, the situation changed in direct ratio. Until 2015, there was aggravation of all indicators of socio-economic situation. Thus, GRP reduced in 2015 by 10 %, as compared to 2008; GRP per capita—by 17.8 %, employment level—by 10.2 %, number of enterprises—by 9.2 %; consumer prices index grew by 3.4 %; investments into the fixed capital reduced by 19.3 %, number of developed LPT—by 103.6 %, and the number of used LPT—by 9.2 %; budget deficit grew by 6.8 %.

It should be noted that all these regions have industrial specialization—as of 2015, the share of industry in the structure of GRP of Orel Oblast constituted 50.1 %, Kostroma Oblast—43.7 %, and Pskov Oblast—62.1 %. Also, the studied depressive regions feature significant excess of the volume of import over the volume of export. Export/import ratio in Orel Oblast constitutes 17.8, in Kostroma Oblast—61.1 %, and in Pskov Oblast—5.9 %.

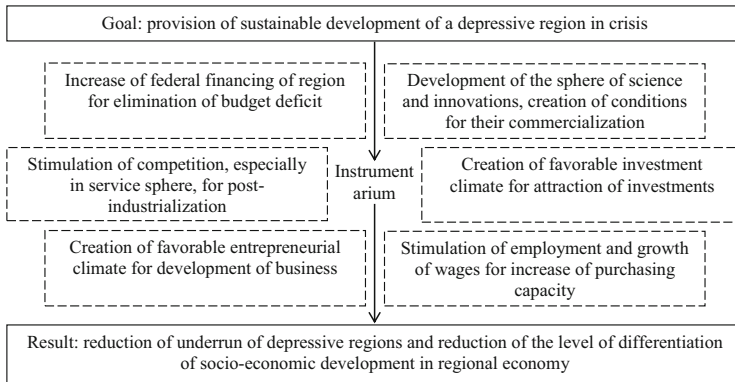
The conducted analysis showed that specifics of crisis in depressive regions consists in the fact that unlike other regions, they are not capable to exist independently and overcome the consequences of the crisis, being in deep recession. So as for depressive regions, sustainability is not traditional well-balanced development of economic, social, and ecological spheres, but the ability to oppose negative influence of external factors and show stable economic growth.

In depressive regions, economic problems come to the foreground, as they determine social and ecological components. Thus, within provision of economic growth, improvement of social indicators of the region is achieved—reduction of unemployment, increase of the population's incomes, etc. At that, weak development of economy pre-determines insignificant damage done to the environment and less serious character of ecological problems than in actively developing regions.

Bases in this, the existing classification of regions should be specified in the context of their capability for opposing and overcoming the crisis. We offer to supplement statistical indicators of socio-economic development of the region with dynamic indicators and evaluated economic state of a region not only in comparison to other regions but also as compared to its previous state in previous studied periods.

That is, progressive regions should include only those that are not only characterized by higher level of socio-economic development, as compared to other regions, but overcome economic recession and start economic growth quicker. Also, it is expedient to distinguish two categories of normal regions: slowly and quickly developing ones.

Quickly developing normal regions are capable of quicker overcoming of the crisis than on the average for the country, but preserve their position in the structure of regional economy. Slowly developing normal regions overcome recession with the rate that is similar to average statistical level. They might be characterized by



**Fig. 1** Model of sustainable development of depressive region under the conditions of crisis

normal or higher level of socio-economic development. Depressive regions are characterized by socio-economic underrun and incapability for overcoming of the crisis.

The most important problems that are the reasons for unsustainable development of a depressive region under the influence of crisis include the following:

- lack of financial resources for development of a region, caused by deficit of region’s budget and financing of depressive regions with whatever funds remain;
- low competitiveness of region’s products at national and global levels;
- unfavorable conditions for conduct of entrepreneurial activities in the region;
- low innovational activity of region’s enterprises;
- lack of internal and external investments for development of the region;
- low incomes of the population (low purchasing capacity which hinders development of business).

For the purpose of sustainable development of a depressive region under the conditions of crisis, this work offers the following model (Fig. 1).

As is seen from Fig. 1, for the purpose of provision of sustainable development of a depressive region under the conditions of crisis, this work offers the following recommendations aimed at solving the determined problems of this region: increase of federal financing of the region for elimination of budget’s deficit, stimulation of competition, especially in service sphere for post-industrialization of a depressive region, and creation of favorable entrepreneurial climate for development of business (reduction of inflation and taxed).

Also, it is necessary to develop the sphere of science and innovations, create conditions for their commercialization, create favorable investment climate for attraction of investments, and stimulate employment and growth of wages for increase of purchasing capacity. As a result, it is possible to expect reduction of underrun of depressive regions and reduction of the level of differentiation of socio-economic development in regional economy.



## 4 Discussion

As a result of the research, it is possible to conclude that the offered hypothesis is proved—depressive regions are really characterized by lower level of socio-economic development, as compared to other regions, and develop in an unstable manner, as they are unable to fight the crisis, being in deep recession.

Depressive character of development of these regions is caused not so much by objective exogenous factors as by specific endogenous peculiarities. That's why under the condition of interest from federal and regional authorities, the task of overcoming their underrun and progressive sustainable socio-economic development could be achieved in the mid-term.

## 5 Conclusion

The conducted research contributes into development of the concept of sustainable development, the concept of regional economy, and the concept of economic cycles, as the authors specify the notion of sustainability as to depressive regions and improve classification of regions in the context of their ability for opposing and overcoming the crisis. This predetermines high scientific and theoretical significance of this article.

The largest empirical value and practical significance in this work are presented by the offered proprietary model of sustainable development of a depressive region under the conditions of crisis and the developed recommendations which should be taken into account in the process of management of depressive regions. The results of the conducted research are limited by selection of depressive regions. However, the fact that they are located in different federal districts of Russia predetermines sufficient representation of the data and a possibility of distribution of the received conclusions to other depressive regions of Russia and the world.

Further perspectives of parallel development of the concept of sustainable development, the concept of regional economy, and the concept of economic cycles are related to practical realization of the offered recommendations and determination of possibilities and perspectives of provision of sustainable development of depressive region under the conditions of crisis in the long-term on a constant basis.

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# Improvement of Methods of Analysis of Effectiveness of Stock Management at Industrial Enterprises

Tatiana Tereshkina, Svetlana Tereshchenko, Tatiana Bezrukova, Ekaterina Drevaeva, and Olga Pecherskaya

**Abstract** The article views methods of analysis of effectiveness of functioning of a stock management system and determines differences in approaches to management of stock of particular departments of industrial enterprises. Various methodologies of stock analysis are studied which are used at present. Main stages of conduct of analysis of effectiveness of stock management are determined. Based on this, analysis of effectiveness of the system of stock management at industrial enterprises is performed (by the example of enterprises of cellulose and paper industry). For the purpose of evaluation of influence of stock management at assets profitability, a three-factor model is offered which allows assessing the influence of effectiveness of stock management on the results of activities of an industrial enterprise on the whole.

## 1 Introduction

Reduction of demand for paper products in the EU countries, growth of the volume of imported goods, and increase of production capacities in Asian countries, together with relatively low prices for realization increase negative consequences of the global economic crisis, which leads to quick growth of expenditures of cellulose and paper enterprises as compared to growth of their revenues, reduction of income, and, as a consequence, of investment activity. These negative tendencies actualize the issue of search for possible ways for reduction of costs of current financing of business. Due to that, provision of competitiveness, reduction of costs,

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and increase of quality of products manufactured at cellulose and paper enterprises (CPE) require effective use of their turnover assets. A significant role in the structure of turnover assets and reduction of costs of enterprises of CPE belongs to stock. A significant volume of assets invested into stock makes the issues of managing them of the top-priority.

The situation at CPE causes necessity for formation of new approaches to improvement of methods of analysis of efficiency of stock management, as one of the most important conditions for increase of efficiency of business on the whole.

## **2 Methods of Analysis of Efficiency of Stock Management at Industrial Enterprise**

The issue of stock management has many aspects and is topical for a large number of departments of any enterprise. Thus, the purchase department influences the volume of stock of raw materials, production should regulate the stock of semi-finished products, and sales departments should regulate stock of final products. The main part of stock is kept in storage, but there is another category of stock—en route. Financial departments of an enterprise regulate financial possibilities for purchase of stock and economic departments ensure the processes of planning and norming of stock.

At that, departments of an enterprise formulate the main goals and tasks of stock management differently. For production department and sales branch, the main goal is provision of reliable work, expressed in continuity of production process and satisfaction of buyers' needs—thus, they are interested in increase of stock, i.e., they act according to the principle, “store is no sore”. This policy is observed with the purchase department, the main goal of which is reduction of expenses for purchase by means of discounts for large shipments of purchased materials. Financial and planning departments strive for reduction of stock to a minimal level, as they seek reduction of total expenses and acceleration of turn-round of current assets. Opposite goals of various departments of enterprise as to the stock lead to conflicts, leveling of which is one of the key tasks of stock management. Contradictions in the goals are reflected in the results and lead to reduction of efficiency of stock management. Various departments form their own list of indicators which characterize quality of stock management. Moreover, very often, even the same indicators are calculated with the use of different methods, analyzed and interpreted differently, which leads to significant distortion of the idea of reality. The system of indicators of stock management and methods of their analysis are studied in various sources which describe solution of these issues in two aspects: financial (O.V. Efimova, V.V. Kovalev, E.S. Stoyanova, A.V. Zimovets) and logistical (M.R. Linders, Y.I. Ryzhikov, A.N. Sterlingova, et al.).

The tasks of analysis of stock and criteria of their satisfactory solution within the financial and logistical methods are presented in Table 1. Table 1 shows that even with equal target settings, the approaches differ as to the level of solved tasks.

**Table 1** Tasks of analysis of formation of stock and results of their solution

Financial approach	Logistical approach
Improvement of financial state by means of: – Maintenance of liquidity and payment capacity; – Maintenance of turnover assets in the most liquid state; – Reduction of needs for sources of financing; – Reduction of expenses related to financing of stock.	Improvement of servicing buyers and customers and maintenances of reputation by means of: – Optimization of stock (improvement of structure and reduction of stock by means of determination of excessive stock, illiquid assets, and deficit stock).
Reduction of production costs by means of: – Elimination of work time losses, caused by lack of raw materials; – Reduction of equipment downtime due to lack of spare parts; – Provision of more rational production process.	Reduction of expenses related to formation and maintenance of stock: – Maintenance of the most economic ratio of expenses for preservation to expenses for purchase of stock; – Calculation of optimal volume of stock.
Provision of necessary control over stock	
– Reduction of losses related to unsatisfactory system of control over the quantity and quality of incoming material resources.	– Prevention of possible losses, damage, and uncontrolled use of resources.
Maintenance of competitiveness of	
– Rational proportion of existing final products.	– Reduction of losses related to lost profit due to refusal from urgent order or offer.

Some researchers (M. Christopher, D. Schreibfeder, A.M. Zevakov, et al.) view the problem in complex, considering the main goal of effective stock management to be satisfaction or excess of consumers' expectations with maximization of profit for the invested capital. Contradictory goals in stock management lead to the use of various methods of their analysis. Table 2 generalizes and present the stages of conduct of analysis of stock recommended by the scientists.

Thus, having viewed existing approaches to stock analysis, it is possible to conclude that they include the following stages:

- evaluation of current state of stock;
- analysis of dynamics and structure of stock (vertical and horizontal analysis);
- analysis of stock turn-round;
- factor analysis of stock;
- analysis of needs for stock;
- analysis of efficiency of use of stock, etc.

However, existing methods of analysis do not allow for evaluation of the result of stock management—its contribution into increase of efficiency of enterprise's efficiency on the whole.

**Table 2** Stages of stock analysis

Author	Stages of analysis
D.A. Endovistkiy	(1) Analysis of structure and dynamics of stock changes. (2) Analysis of needs for stock. (3) Analysis of efficiency of stock use.
V.G. Kogdenko	(1) Analysis of stock structure. (2) Analysis dynamics of stock changes. (3) Analysis of direction of keeping stock in storage. (4) Analysis of correspondence of factual volume of stock to their optimal volume.
V.A. Chernov	(1) Analysis of state of commodity stock. (2) Analysis of efficiency of commodity stock. (3) Factorial analysis of commodity stock. (4) Quick and comparative analysis of commodity stock. (5) Imitation analysis of quick movement of goods. (6) Determination of optimal purchases.
L.F. Berdnikova, O. Y. Trushkina	(1) Evaluation of dynamics and structure of state of stock. (2) Evaluation of stock turn-round. (3) Evaluation of mutual correspondence of dynamics of stock elements. (4) Factorial analysis of stock of final products, commodity products, and raw materials. (5) Analysis of suppliers, schemes of supply of raw materials and commodities, etc.
G.V. Savitskaya	(1) Analysis of provision of enterprise with materials (2) Analysis of material use. (3) Analysis of revenue per RUB 1 of material expenses.
N.V. Voytolovskiy, A.P. Kalinina, I.I. Mazurova	(1) Analysis of organization's provision with materials (2) Analysis of efficiency of materials' use. (3) Analysis of efficiency of management of stock and expenses.

### 3 Analysis of Influence of Efficiency of Stock Management on the Result of Activities of CPE

During analysis of stock of industrial enterprises, it is necessary to take into account the following factors: type of activities, specifics of production and goods, policy of suppliers, requirements of buyers, admissible limits of stock changes, possibilities of change of supplies during increase of prices or deficit, risks related to aging or damaging of stock, volume of illiquid products, and total expenses for logistics. Expediency of conduct of full analysis of stock is based by necessity for minimization of expenses for stock. The purpose of analysis of stock is provision to the organization's employees of full and ordered information on the state of stock for decision making regarding stock management. At the first stage, it is necessary to determine significance of stock in the structure of assets turnover and analyze dynamics of stock. An important characteristic of the policy of stock management is effectiveness of the use of turnover assets and stock at CPE. For this purpose,

**Table 3** Main indicators characterizing stock management at CPE, %

Indicators	Group Ilim OJSC	Kamenskaya BKF OJSC	BF Komunar OJSC
Share of turnover assets in assets, %	29.0	30.0	42.0
Share of stock in turnover assets, %	28.0	34.0	22.0
Turn-round of turnover assets, days	34	132	114
Turn-rounds of stock, days	25	39	26
Average growth rates			
Assets	123.5	153.2	110.8
Turnover assets	115.8	164.4	138.8
Stock	137.2	203.9	109.1
Revenues from sales	109.9	121.1	107.1
Profit from sales	130.1	162.85	78.4
Elasticity of change			
Stock for change of revenues from sales	1.25	1.68	1.02
Profit from sales for change of stock	0.95	0.79	0.72

calculation of indicators of turn-round was conducted. Analysis of the share of stock and turn-round of stock for separate enterprises of the sphere and their dynamics, conducted on the basis of average indicators for 2008–2013, is shown in Table 3.

Analyzing the structure of assets of CPE, it is possible to conclude that at least 25 % of turnover assets is stock, which predetermines necessity for their rational management. More than 50 % of the stock accounts for stock of raw materials. Analysis of dynamics of stock of CPE showed that growth rate of stock for all enterprises exceeds the growth rate of organization's assets. This shows that the share of stock in assets of CPE grows. The data of Table 3 shows that effectiveness of stock management of CPE grew substantially over the recent years. Thus, while before 2008 turn-round of stock varied from 35 to 60 days (Tereshkina 2011), which showed significant “death” of capital in stock, over the recent 5 years this indicator did not exceed 40 days.

In order to evaluate interconnection between the indicators, it is expedient to calculate the indicator of elasticity of change of stock according to the change of sales revenues. The average value of this indicator equals 1.2 and allows concluding that for each per cent of growth of sales revenues accounts for 1.2 % of growth of enterprise's stock. This shows that increase of volumes of products issue takes place due to extensive factors related to growth of investments into organizations' stock. At that, elasticity of change of sales profit according to change of stock for CPE constituted 0.82—i.e., 1 % of increase of stock accounted for 0.82 % of growth of profit from main activities. This is due to the fact that increase of stock allows increasing the volume of enterprises' income, but financial result of such activities



is not satisfactory, as increase of stock leads to additional expenses, caused by the maintenance.

For evaluation of influence of efficiency of stock management on the results of activities of enterprise on the whole, the profitability of assets (PA) indicator is used which determines capability of assets to bring profit. Let us perform calculation of profitability of assets with the use of factor model that allows determining by means of which factors the indicators of assets profitability has changed. In the offered factor model, the evaluation of influence on profitability of assets of the following assets is performed:

1. Profitability of stock.
2. Resource efficiency.
3. Sum of assets invested into stock per RUB 1 of sales revenues.

The offered factor model will be formed in the following way:

$$PA = \frac{SP}{S} * \frac{S}{SR} * \frac{Bp}{A} = R_s * A_{is} * RE,$$

Where SP	прибыль от продаж
SR	sales revenues
A	annual average cost of assets
R <sub>з</sub>	profitability of stock
A <sub>is</sub>	assets invested into stock per RUB 1 of sales revenues
RE	resource efficiency
S	annual average cost of stock.

The formula shows that change of assets profitability could be influenced by profitability of stock, volume of assets invested into stock per RUB 1 of sales revenues, and resource efficiency.

Table 4 shows calculation of influence of change of the viewed factors on the change of profitability of assets of Group Ilim OJSC in 2014, as compared to 2013 ([Annual report of Group Ilim OJSC](#)).

**Table 4** Analysis of influence of change of factors on change of profitability of assets of Group Ilim OJSC

Indicator	2013	2014	Change
Profitability of stock, calculated on the basis of sales profit, coef.	0.239	1.226	0.987
Resource efficiency, RUB/RUB	0.641	0.702	0.061
Assets invested in stock per RUB 1 of sales revenues, RUB/RUB	0.137	0.119	-0.018
Profitability of assets calculated on the basis of sales profit, coef.	0.021	0.102	0.081
Change of profitability of assets by means of change of			
Profitability of stock			0.0866
Resource efficiency			0.0102
Assets invested in stock per RUB 1 of sales revenues			-0.0155

The performed calculations show that increase of assets profitability grew due to growth of profitability of stock. This allows confirming dependence of results of activities of CPE on efficiency of the policy of stock management.

## 4 Conclusions

Based on the results of the research, it is possible to conclude that there is no unified methodology of analysis of stock. The analysis performed at enterprises takes into account goals and tasks of various departments, but it should have a systemic character, as deviation from the systemic approach might lead to significant errors in managerial decision making regarding stock. It is necessary to evaluate the influence of stock on the result of activities of enterprise and determine how the implementation of the effective system of stock management would allow reducing expenses and increasing revenues of owners, thus creating a competitive advantage as compared to other companies.

The performed research confirmed the conclusion on dependence of results of activities of CPE on efficiency of existing system of stock management. Based on analysis of indicators that characterize stock management at CPE, it is possible to conclude that increase of assets profitability is influenced by stock profitability: with the growth of stock profitability, assets profitability also grows, which stimulates growth of efficiency of activities of enterprise on the whole.

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# Modeling of Cluster Processes in the Sphere of Manufacture of ECO-Products: Issues of Ecological and Food Security of Russia

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**Abstract** The purpose of the article is to model cluster processes in the sphere of manufacture of ECO-products as a perspective direction for ecological and food security of Russia. For that, the work uses the method of horizontal analysis and analysis of causal connections, as well as proprietary method of evaluation of national ecological security, traditional method of evaluation of national food security, and method of modeling of socio-economic processes. The authors determine the level and evaluate dynamics of development of situation in the sphere of ecological and food security of Russia, conduct analysis of current state and problems of development of the sphere of manufacture of ECO-products in Russia and cluster processes in this sphere, and develop cluster model of import-substitution in the sphere of manufacture of ECO-products as a perspective direction of provision of ecological and food security of Russia. As a result, the authors come to the conclusion that modern Russia is characterized by low level of ecological and food security. Its increase requires the usage of cluster instrumentarium. Modeling of cluster processes in the sphere of manufacture of ECO-products showed that clustering allows solving all the main problems of development of this sphere, which pre-determines its high effectiveness.

## 1 Introduction

Modern stage of development of the global economic system is characterized by strengthening of negative tendencies in socio-economic and ecological sphere. On the one hand, complication of international relations leads to violation of

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previous agreements and implementation of sanctions, including in the food sphere. On the other hand, development of production is accompanied by aggravation of the state of the environment.

Thus, topicality of study of issues related to provision of ecological and food security of Russia grows. The working hypothesis of this research consists in the fact that modern Russia has a problem of low level of ecological and food security, caused by weak development of national manufacture of food products and unfavorable geo-political situation. Clustering in the sphere of manufacture of ECO-products is a perspective direction for solving this problem in the long-term.

The purpose of the article is to verify the formulated hypothesis and to model cluster processes in the sphere of manufacture of ECO products as a perspective direction of provision of ecological and food security of Russia. To achieve this goal, the following tasks should be solved:

1. Determination of the level and dynamics of development of situation in the sphere of ecological and food security of Russia;
2. Analysis of current state and problems of development of the sphere of manufacture of ECO products in Russia and cluster processes that take place in this sphere;
3. Development of cluster model of import substitution in the sphere of manufacture of ECO products as a perspective direction of provision of ecological and food security of Russia.

## 2 Materials and Method

Ecological security is the environment's capability for restoration and correspondence to the criteria of favorable conditions of people's living. Various aspects of provision of ecological security are studied in the works by (Antão et al. 2016), (Zajdlik 2016), (Dzonzi-Undi and Li 2016), (Cheng 2016), (Skiter 2014; 2015), et al.

Food security is a national economy's capability for independent satisfaction of internal needs for food. The issues of provision of food security are studied in detail in the works by (Borch and Kjærnes 2016), (Ben Slimane et al. 2016), (Kravets et al. 2014), (Dzhandzhugazova et al. 2015), et al.

ECO products are food products manufactured without any damage to the environment; it is produced in ecologically clean areas and does not contain artificial components. Conceptual provisions of formation, development, and regulation of the sphere of manufacture and consumption of ECO products are defined in the works by (Popkova et al. 2014), (Volosatova et al. 2014), (Rashid et al. 2014), et al. Theoretical & methodological and applied foundations of economic clustering are set in the studies of such authors as (Zorin et al. 2016), (Popkova et al. 2014), et al.

For determination of the level and dynamics of development of situation in the sphere of ecological and food security of Russia, this work uses the method of horizontal analysis and method of analysis of causal connections. Also, the developed proprietary method of evaluation of national ecological security is used, which supposes the usage of the following formula:

$$NES_n = [(VME_n/VME_{n-1}) * (CEI_n/CEI_{n-1}) * (IPE_n/IPE_{n-1})] / (VPC_n/VPC_{n-1}) \quad (1)$$

where NES	indicator of the level of national ecological security, share from 1
VME	volume of national market of ECO products, RUB million
CEI	volume of costs of development and implementation of ECO innovations in the country, RUB million
IPE	volume of national investments into protection of environment, RUB million
VPC <sub>n</sub>	volume of waste of production and consumption, million tons
n	time period (year).

As is seen from formula (1), for evaluation of the level of national ecological security, this work offers to compare the product of annual growth of national market of ECO products (indicator of current care for ecological issues), annual growth of the number of implemented ECO innovations in the country, and annual growth of the volume of national investments into protection of the environment (indicators of perspectives of solving ecological problems in the future) to annual growth of the volume of waste of production and consumption.

The larger the NES, the higher the level of national ecological security. If the value of this indicator is below 0, this proves the critical state of national ecological security. If the value of this indicator equals 0, this proves low level of national ecological security.

Apart from that, the work uses the traditional method of assessment of national food security, which is described in detail in the works (Figueiredo et al. 2016; Custodio et al. 2016) and which supposes the usage of the following formula:

$$NFS_n = VPF_n / ICF_n \quad (2)$$

where NFS	indicator of the level of national food security, shares from 1
VPF	volume of national production of food, million tons
ICF	volume of internal consumption of food, million tons
n	time period (year).

The higher the value of NFS, the higher the level of national food security. If the value of this indicator is below 0.9, this proves a low level of national food security. If the indicator of NFS is below 0.7, this shows a critical state of national food security.

For analysis of the current state and problems of development of the sphere of production of ECO products in Russia and cluster processes in this sphere, the authors use the method of systemic and problem analysis. The authors also use the method of modeling of socio-economic processes for development of a cluster model of import substitution in the sphere of manufacture of ECO products.

### 3 Results

Let us determine the level of ecological security of Russia in 2015 and dynamics of its changes for the recent 5 years with the help of the developed methodology. Statistical and estimate data for the evaluation are given in Table 1.

Based on the data of Table 1, let us calculate the values of the indicator of the level of ecological security for the years:

$$\text{NES}_{2011} = (1.43 * 1.81 * 1.09) / 1.07 = 2.64;$$

$$\text{NES}_{2012} = (1.40 * 1.10 * 1.07) / 1.15 = 1.43;$$

$$\text{NES}_{2013} = (1.43 * 0.54 * 1.22) / 1.16 = 0.81;$$

$$\text{NES}_{2014} = (1.20 * 0.88 * 1.06) / 1.03 = 1.08;$$

$$\text{NES}_{2015} = (1.29 * 0.84 * 1.28) / 1.00 = 1.38.$$

The obtained values of the indicator of NES show that in 2011 the level of national ecological of Russia was rather high (2.64). After that, in 2012, it decreased to 1.43, showing negative tendency, but staying at acceptable level. Then, in 2013, the level of national ecological security of Russia became critically low (0.81) due to significant reduction of expenses for development and implementation of ecological innovations.

Then, in 2014, the level of national ecological security of Russia continued to be low, but it grew as compared to the previous level, constituting 1.08. As of year-end 2015, the level of national ecological security of Russia constitutes 1.38. The conducted analysis showed that national ecological security of Russia is under a threat, as its level is characterized by high volatility, and there is a negative tendency of its change in dynamics for the recent 5 years.

Let us determine the level of food security of Russia in 2015 and dynamics of its change for the recent 5 years with the help of the described traditional methodology. Statistical and estimate data for conduct of evaluation is given in Table 2.

As is seen from Table 2, in 2010–2015 there was observed a negative tendency in the sphere of national food security of Russia. Thus, in the sphere of planting, domestic needs for food in 2010 were satisfied by 67 %, in 2011—by 66 %, in 2012—by 62 %, in 2013—by 60 %, in 2014—by 57 %, and in 2015—by 54 %. In the sphere of cattle breeding, domestic needs for food in 2010 were satisfied by

**Table 1** Statistical and estimate data for evaluation of ecological security of Russia for 2010–2015

Indicators	Time periods (n)										Horizontal analysis (n/(n – 1))				
	2010	2011	2012	2013	2014	2015	2011/2010	2012/2011	2013/2012	2014/2013	2015/2014				
VME	2625	3750	5250	7500	9000	11,625	1.43	1.40	1.43	1.20	1.29				
CEI	13,986	25,318	27,768	15,098	13,214	11,065	1.81	1.10	0.54	0.88	0.84				
IPE	81,914	89,094	95,662	116,543	12,3748	158,589	1.09	1.07	1.22	1.06	1.28				
VPC	3505	3735	4303	5008	5153	5168	1.07	1.15	1.16	1.03	1.00				

Source: Dvornikova and Co (2015), Federal State Statistics Service (2015)

**Table 2** Statistical and estimate data for evaluation of food security of Russia for 2010–2015

Indicators	Time periods (n)										Horizontal analysis (n/(n – 1))				
	2010	2011	2012	2013	2014	2015	2010/2010	2012/2011	2013/2012	2014/2013	2015/2014				
VPC <sub>grow</sub>	1191.5	1703.5	1636.4	1918.8	2155.7	2269.1	1.43	0.96	1.17	1.12	1.05				
IPC <sub>grow</sub>	1785.2	2599.3	2659.1	3189.6	3767.4	4186.2	1.46	1.02	1.20	1.18	1.11				
NES <sub>grow</sub>	0.67	0.66	0.62	0.60	0.57	0.54	0.98	0.94	0.98	0.95	0.95				
VP <sub>cliv</sub>	1396.3	1558.2	1702.8	1768.3	2069.9	2137.2	1.12	1.09	1.04	1.17	1.03				
VPC <sub>cliv</sub>	1865.3	2168.1	2457.6	2594.3	3186.7	3345.2	1.16	1.13	1.06	1.23	1.05				
NES <sub>liv</sub>	0.75	0.72	0.69	0.68	0.65	0.64	0.96	0.96	0.98	0.95	0.98				
VPC <sub>agr</sub>	2587.8	3261.7	3339.2	3687.1	4225.6	4406.3	1.26	1.02	1.10	1.15	1.04				
VPC <sub>agr</sub>	3650.5	4767.4	5116.7	5783.9	6954.1	7531.4	1.31	1.07	1.13	1.20	1.08				
NES <sub>agr</sub>	0.71	0.68	0.65	0.64	0.61	0.59	0.97	0.95	0.98	0.95	0.96				

Source: Federal State Statistics Service (2015)



75 %, in 2011—by 72 %, in 2012—by 69 %, in 2013—by 68 %, in 2014—by 65 %, and in 2015—by 64 %.

As for agriculture on the whole, in 2010 domestic needs for food were satisfied by 71 %, in 2011—by 68 %, in 2012—by 65 %, in 2013—by 64 %, in 2014—by 61 %, and in 2015—by 59 %. That is, despite the growth of domestic agricultural production, it is incapable of satisfying domestic needs for food products, in order to provide food independence of the country.

That's why as of now, there is a strong dependence on import of food products in Russia. Thus, provision of import substitution in food sphere becomes very topical. Development of manufacture of ECO products allows solving the problem of provision of ecological and food security in Russia.

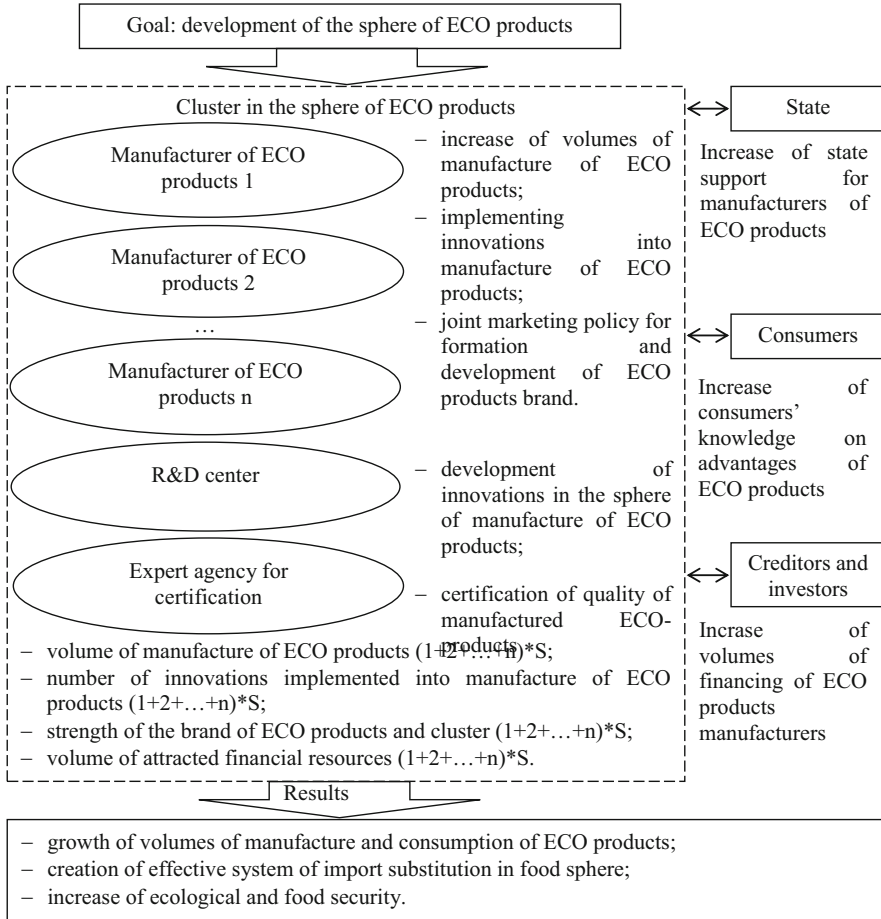
Analysis of current state of the sphere of manufacture of ECO products showed that this sphere develops dynamically over the recent 10 years. Over this period, the volume of Russian market of ECO products grew by 5 times. However, complexity of production processes pre-determines limited possibilities for manufacture of ECO products in growing production capacities. Among the most important problems of development of the sphere of manufacture of ECO products in Russia are the following:

- lack of the system of quality certification—consumers are not ready to purchase expensive ECO products without a guarantee of its higher quality, while there are cheaper substitutes;
- underdevelopment and weakness of brand—many consumers do not know of existence and advantages of ECO products, so they prefer to purchase cheaper regular products;
- lack of financing—innovational character of this sphere requires attraction of a large volume of investments which are inaccessible for small and medium enterprises that manufacture ECO-products.

Cluster processes are not peculiar for the sphere of manufacture of ECO products in Russia. As of 2016, there are four clusters in the sphere of environment protection and waste processing in Russia: cluster of water supply and water removal in St. Petersburg, St. Petersburg cluster of clean technologies for urban environment, Cluster for complex processing of coal and anthropogenic waste in Kemerovo, and territorial & sectorial cluster AGROPOLIS “ALKIAGROBIOOPROM” in Kazan (Russian Cluster Observatory 2016).

As of 2016, there are three clusters in the Russian agricultural sphere: agro-industrial cluster in Novgorod Oblast, dairy cluster in Vologda Oblast, and cluster for manufacture and processing of dairy products “Don Dairy Products” in Rostov-on-Don”. That is, as of 2016, Russia has no clusters in the sphere of manufacture of ECO products (Russian Cluster Observatory 2016).

Nevertheless, clustering would allow developing this sphere. Due to enlargement of business, under the conditions of preservation of full economic independence of cluster's participants, their total investment attractiveness grows and there appear additional possibilities for development and implementation of ECO



**Fig. 1** Cluster model of import substitution in production sphere

innovations and development of ECO products and start of the system of its certification.

That’s why a perspective direction for provision of ecological and food security of Russia is a cluster model of import substitution in the sphere of ECO products, presented in Fig. 1.

As is seen from Fig. 1, creation of a corresponding cluster is offered as a means for achievement of the goal of development of manufacture of ECO products. Its participants are manufacturers of ECO products (quantity – n) who deal with increase of production of ECO products, implementation of innovations into manufacture of ECO products, and conduct of joint marketing policy for formation and development of the brand of ECO products.

Cluster also includes R&D center that performs development of innovations in the sphere of manufacture of ECO products and expert agency for certification that

deals with certification of quality of manufactured ECO products. Cluster has synergetic effect (S). That's why the volume of manufacture of ECO products, quantity of innovations implemented into manufacture of ECO products, strength of brand of ECO products and cluster, and volume of attracted financial resources is larger than the sum of values of these indicators of cluster participants, i.e.,  $(1 + 2 + \dots + n) * S$ .

Due to ECO products manufacturers' unification into a cluster, their state support grows, as they become a large player in market relations. Also, clustering leads to increase of consumers' knowledge on advantages of ECO products and increase of volumes of financing of ECO products manufacturers by creditors and investors. As a result, it is possible to expect the growth of volumes of production and consumption of ECO products, creation of effective system of import substitution in the food sphere, and increase of national ecological and food security.

## 4 Discussion

The result of the conducted research proved the offered hypothesis and showed that modern Russia is peculiar for low level of ecological and food security. To solve this problem, it is expedient to use cluster instrumentarium. Modeling cluster processes in the sphere of manufacture of ECO products showed that clustering allows solving all the main problems of development of this sphere, which pre-determines it high effectiveness.

## 5 Conclusion

The performed research has a fundamental meaning for development of the concept of ecological and food security and for the concept of economic clustering, as the authors have specified methodology of evaluation of national ecological security and expanded instrumentarium of solving the issues in the sphere of provision of ecological and food security.

Practical significance of the authors' conclusions and recommendations is determined by possibility and expediency for realization of cluster model of import substitution in the sphere of manufacture of ECO products for solving the problems in the sphere of provision of ecological and food security in modern Russia.

The results of the research are limited by study of Russian experience of manufacture of ECO products and practice of provision of ecological and food security. That's why the determined problems of development of the sphere of manufacture of ECO products cannot be distributed to other countries, and it is impossible to be sure in high effectiveness of the offered cluster instrumentarium for solving them in any economic system.

Based in this, as a perspective direction for further research and development of the concept of clustering and concept of ecological and food security, it is possible to offer studying the experience of a range of countries and determination of general regularities of development of the sphere of ECO products and development of universal instrumentarium for solving the problem of provision of national ecological and food security.

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# Development Efficiency Analysis of Public Administration Informatization

Alla Kalinina, Anna Borisova, and Anna Barakova

**Abstract** The article presents the development efficiency analysis in the countries with the Western and Eastern information society development models. The main development factors of public administration informatization are given for the EU, the USA, Japan and South Korea. The Russian Federation informatization is analyzed and the main issues and development directions are defined.

Many countries of the world are facing transition to the socio-economic formation and global information society, which will be the total of national information structures. Information technologies in public administering (“E-Government”) are a new trend in using the Internet and can probably become the key point for spreading information technologies and integrating the information society ideas. Taking into account this topic’s relevance, which covers the society’s massive information transformation, it is necessary to analyze the foreign and Russian public administration informatization practice and define the efficiency factors for implementing it.

Generally, two main information society’s development models are distinguished: the Western and the Eastern models. Thereby, it’s essential to define the European model, which differs from the American model within their common Western model and to define the model, chosen by Japan, within the Eastern model.

The main feature of the EU countries’ macroeconomic policy searches for a certain balance between the total state control and market laws, i.e. the balance of governmental and market forces, taking into account that each force’s role can change with the changing situation. Such approach to the state’s role in developing the information society was first introduced by the EU resolution in 1993, where the essential role of the balance was pointed out. The approach was first reflected in the Danish Government’s Report “Information society 2000”. The stress was put on the fact that the market cannot be let take control over elaborating the strategy of developing information magistrals—however, this strategy must take into account the market forces’ abilities. Another urgent problem is deciding what should be

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developed first: the network or the service. In general, the EU approach implies that the service sector should be elaborated first. Countries with an opposite point of view are Great Britain and France. These countries emphasize that building the networks is the moving force for developing the service sphere in the information society. Besides, it is worth mentioning that practically all programs set the goal to develop “universal service”. The reason for this is a strong concern about the information society inequity, when most of the population tends to be uncovered. National cultural features are also of great importance when elaborating the information society development model. Very often these features determine the country’s demand for some sort of information technologies. As a result, each country is characterized with its peculiarities of using the Internet, e-mail and their audiences, using information-telecommunication technologies.

In 2000, the EU leaders adopted the Lisbon strategy for making the EU the most dynamic and competitive economy in the world based on expertise. Information-communicational technologies became the key component in achieving this goal. A special program “eEurope” was elaborated in order to implement the Lisbon in ICT. This program became the continuation of a wide range of initiatives in ICT, adopted by the European Commission in 1984.

The first initiative implied carrying out a set of research programs. The ESPRIT program, promoting the research of the ICT sector, was launched in 1984; the first phase of the program, called RACE, which promoted the study of telecommunication was launched a year later. Both these programs suggested supporting the so-called “precompetitive research”. The RACE program’s nucleus was to elaborate the technologies for providing broadband network in Europe. The program’s important goal was to create an international forum for providing discussion and collaboration between European telecommunication companies, to create a general view of European telenetworks and thus integration of the market, fragmented along national borders. The RACE program was expanded and followed by a set of other telematic research programs.

Another EU direction was connected with the market reform of the whole telecommunications sector. The reform began with the Green Paper, published in 1987 and was further continued by a set of directives, which have been reconsidered several times. The main goal of the reform was to launch a more dynamic telecommunications sector development by totally reconstructing and taking down the barriers, which existed in the former public structure.

The “eEurope” program was launched in 2000 as an initiative for the special European Council of Lisbon. It was further continued by the “eEurope” program in 2005, which in turn was continued by its successor the “i2010” program.

The “eEurope” plan of 2000–2002 had three main goals: cheaper, faster, and more secure Internet, investments into people’s skills and increasing the Internet use. These goals were changed in the “eEurope” plan of 2005 and implied providing state services online, dynamic e-commerce environment, overall integration of the broadband access to Internet and secure information infrastructure (Some key issues in Europe’s competitiveness—Towards an integrated approach 2015). Both these plans include measures on stimulating the network and developing the content.

Building information society is one of the five EU fundamental priorities in creating the “common information zone”, based on information-communication technologies and telematic infrastructure. E-Government was the key element of such significant public programs as IDA (Interchange of Data between Administrations) and TEN-TELECOM (eTen since 2002).

Informatization development in European countries is implemented in three main directions (Amoretti 2008):

1. Economic globalization and taking into account world competitors’ problems.
2. Creating European identity (expanding, establishing diverse models for European development and the EU democratic deficit issues).
3. ICT technologies and Internet use exponential growth.

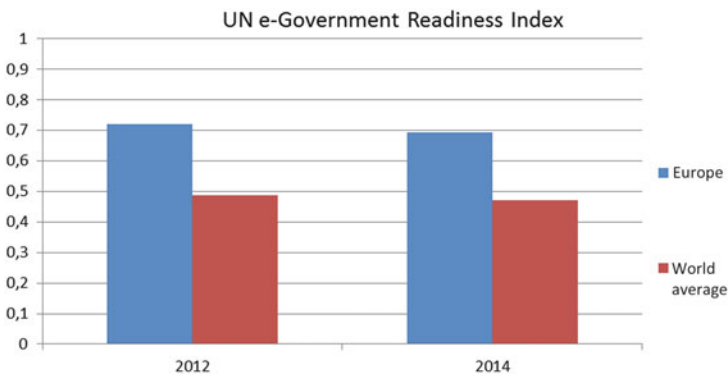
The E-Government is the main question in these spheres (i.e., the effective implementation should be carried out by means of the ICT integrated use and lead to economic advantages for the public and private sectors and a more “European system” integration along with the organized changing.

Essential documents in this sphere also include “The Role of E-Government for the Future of Europe” (The Role of eGovernment for Europe’s Future 2003) and “E-Government in Europe: The State of Affairs” (Leitner 2003), introduced in Cernobbio, Italy.

European E-Government is characterized by the following elements:

1. Special attention is paid to the technological and infrastructural calculations.
2. An important factor is the ability to interact.
3. The states, regions, and municipalities’ great role.
4. The preference is given to the publicly available software, rather than patented software brands.

Currently there are several indicators of ranking the countries by their readiness to integrating the e-Government conception. The most influential among these indicators is the UN e-Government Readiness Index (See Fig. 1).



**Fig. 1** The UN e-Government Readiness Index in Europe



According to the UN research, Europe has always been a step ahead of the world UN e-Government Readiness Index worldwide average and has always been the leader in state authorities' informatization development efficiency.

In addition to the EU initiatives, most of the EU heads of state defined their own national strategies as parts of the "eEurope" program. In early 1990s, European countries competed in their ICT development levels (Henten et al. 1996). Sweden had special programs for subsidizing the broadband networks and Denmark had a broadband access to the Internet subsidized from the tax budget, because the companies were allowed to make broadband connections with their employees as a tax-free additional benefit (Falch 2008). Belgium was one of the first countries to implement an Internet voting procedure (Delwit 2008).

According to the 2014 UN review "«United Nations E-Government Survey 2014: E-Government for the Future We Want", 14 EU countries entered the top-25 leading countries with the UN index from 0.75 to 1—in particular France, the Netherlands, Great Britain, Finland, Spain, Sweden, Estonia, Denmark, Austria, Germany, Ireland, Italy, Luxemburg, Belgium.

The American path in forming the information society is characterized with a general socio-economic development model, in which the state's functions are reduced to minimum, whereas the individual's functions are increased to maximum. The essence of this approach is full ICT market liberalization. A lot of attention is paid to developing information super magistrals, their social orientation, and universal service issues.

One of the top priorities in development of the information society in the USA is creating the e-Government, which will provide the nation with any necessary information. Creating the e-Government is conducted under the principles of openness and accountability to the citizens. The accountability is not just providing people with information, it is provided by an open specification of specific state authority bodies' work index's complexes and by creating available ways of monitoring these indexes.

The legislative base of the e-Government in the USA was first formulated by B. Clinton and Al. Gore in 1995, when the Paperwork Reduction Act was introduced. In 1996, the Freedom of Information Act was extensively revised, as well as the Information Technology Management Reform Act by Clinger-Cohen. The other Government Paperwork Elimination Act was signed in 1998. In 1999, B. Clinton signed two memorandums—the Memorandum on Electronic Government (Memorandum on Electronic Government 1999) and the Memorandum on the Use of Informational Technology to Improve Our Society. This all was the beginning to a massive project on integrating the e-Government technologies into the American public structures activities. One of the main problems noted was that a person had to address to a certain state office but not to the government in general. E-technologies were to eradicate this problem. According to the Office of Management and Budget (OMB) Memorandum on E-Government Strategy, there are three targets in modernizing the government: make it easier for the citizens to get services and communicate with the federal government; increase the government effectiveness; improve the government's response to citizens' inquiries.

In June 2000, by the initiative of President Clinton, a special integrated online service system was created. It was packed with federal government's online resources on the website (<http://www.firstgov.gov>).

George Bush's government continued reorganizing the state authority structures' activity with the help of ICT. In summer 2001, in his address to the USA Congress, George Bush suggested a new program of extended management reforms. In 2002, a special working group prepared the "E-Government strategy". The group surveyed 150 workers of the 70 state offices and after that generated around 200 proposals.

On December 17, 2002, George Bush signed the E-Government Act of 2002. The law was to increase the citizens, officials, state agencies, and institutions' access to governmental information.

The E-Government working group further introduced 23 interagency initiatives, elaborated for uniting the institutions' processes and ICT investments. These initiatives, sometimes called "the Quicksilver projects", have been distributed into five categories: government to citizens, government to government, government to business, internal effectiveness and productivity a one more category, implying the reduction of barriers between the governmental agencies in order to develop the e-Government (Seifert and Relyea 2008).

The examples of such initiatives are as follows:

1. The "E-Authentication" project, guided by the General Services Administration, aimed at increasing the use of digital signatures. The initiative's essence is to build and promote the confidence level, needed for spreading the electronic interaction between the public and the government and between various levels governments by fixing the "identity" fact. This makes sense for authenticating the security and property protection and integrating the digital signature in all e-Governments initiatives.
2. The "E-Government Architecture" has two main targets. The first is to elaborate special architecture, which should be treated as a federal enterprise's architecture and should be applied in any E-Government initiative, thus being the nucleus of concrete technological decisions standardized models. The second target is to accumulate and analyze diverse pieces of information on the business and data architecture and structure, used by the federal government and to develop e-Government initiatives and reduce the existing superfluity. These efforts are primarily focused on 4 main spheres, including national security, economic stimulation, social service and governmental bodies' activity maintenance.
3. The "Eligibility assistance online" project (the so-called GovBenefits. gov), guided by the Department of Labor, targeted at creating information hotspots on government incentives, available to the citizens;
4. The "Small Business Administration's One-Stop Business Compliance" (later titled Business Gateway) elaborated in accordance with the regulatory and legal requirements in order to assist enterprises.

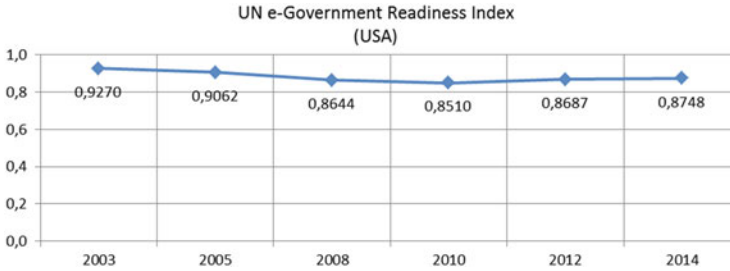


Fig. 2 UN e-Government Readiness Index (USA)

The components of the USA E-Government are state online services. The most demanded is registering the income tax, hunting and fishing licenses inquiries, professional licenses renewal, transferring the information on employment, registering complaints about institutions, and government loans inquiries (Chen and Davis 2008; Welber 2001).

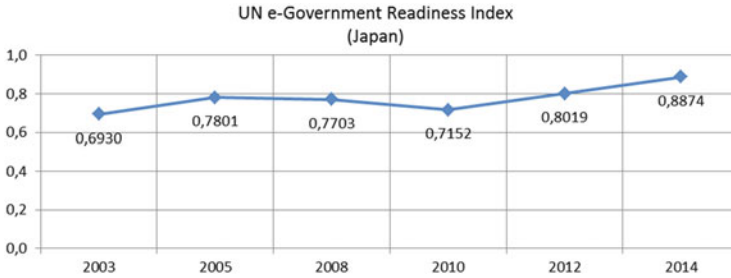
The USA informatization's development efficiency is proved by its high rank in the UN e-Government Readiness Index (See Fig. 2).

Thereby, a system of controlling the e-Government's development and implementing the gradual e-services' integration as part of the administrative reforms been formed in the USA. At the same time, a very important success factor is incorporating state management informatization and interactive governmental services' quality into the system of general governmental agencies' efficiency assessments, which is supported by the adequate budgetary and extra budgetary financing.

The countries with the Eastern information society development model strive at elaborating an alternative approach to the Western one. The Eastern approach is based on confirming the countries' values regarding industrialization, informatization, and social development. The approach's essence is the cooperation between the state and market, an attempt to combine Confucian values and social changes. The Eastern model is typical of Japan, the Four Asian Tigers, China, and India.

The notion "Japanese post-war economic miracle" became paradigmatic. One of the main Japanese success factors in developing the information society (Fig. 3) are big subsidies spent on R&D and high information-communication technologies' priority in solving the country's socio-economic development problems.

Creating as many interconnected telecommunication networks as possible, developing information devices, technologies, software and services, and qualified information personnel became Japanese informatization goals after the 1950s. Setting and implementing these goals turned out to be a great stimulus for Japan's rapid informatization development. Following the example of the West European countries and the USA, Japan has managed to achieve outstanding results in adapting imported technologies; nowadays, its top-priority is advancement of knowledge, technologies and products.



**Fig. 3** UN e-Government Readiness Index (Japan)

The Japanese e-Government implementation had the following scenario. The first attempt to conduct the management reform was made in late 1950s. The first computer was purchased specially for the Meteorological Agency in 1958. The Interministerial Committee on using computers in a more coordinated way was established in 1968.

From 1960s to 1980s, the number of computers in the government had significantly increased. At first, they were used in research and statistics, then—in late 1970s—they entered other spheres, like issuing licenses, social insuring and so on (Kaneko 2001, 2004). Databases began being used a little later—in 1980s. In 1994, the Japanese Cabinet adopted the Master Plan for Promoting Government-Wide Use of ICT in order to enhance management efficiency by using ICT in governmental affairs (Kaneko 2008).

In November 2000, Japan adopted the Basic Law on the Formation of an Advanced Information and Telecommunications Network Society in compliance with the Basic IT Strategy (Kubo 2008). A special stress was put on the Japanese Formation, as a country with highly developed ICT (Ministry of Public Management, Home Affairs, Posts and Telecommunication 2005). One of such country's essential features was supposed to be the e-Government.

The “e-Japan” strategy was announced a national strategy on January 22, 2001. E-Japan was expected to become the Japanese society's basis, where each citizen could use IT and get profits and advantages. The government's role was to establish a working environment, where the private sector would be able to implement its potential and make Japan the most developed country in IT in the world in five years.

“E-Japan” specific directions:

- constructing high-speed Internet and providing its availability everywhere;
- elaborating e-commerce rules;
- implementing the e-Government conception;
- training highly qualified personnel, able to work in the modern digital era.

After developing these strategic directions, Japan decided to elaborate corresponding mechanisms. One of such mechanisms was the “eJapan Priority Policy Program”, which was adopted on March 29, 2001 and was being put into practice until 2006. Special attention was paid to the private sector.

The “eJapan Priority Policy Program” included five directions for action, according to the above-mentioned national strategy vectors:

- creating the most perfect information and telecommunication networks;
- training the personnel by supporting the education and further training;
- promoting e-commerce;
- making administrative services more intelligent and hi-tech communications services more available;
- providing security and verification of information, transmitted by means of governmental telecommunication networks.

Japan has a well-organized “Program for Building E-Government”, which is an action plan on implementing the e-Government program, which is included in the “e-Japan” strategy (Government of Japan 2003).

Building e-Government in Japan had two goals: providing user-oriented management services and state management effective budgetary output. The following diverse initiatives based on these goals have been completed. Significant progress in providing the citizens and companies with an opportunity to register for any kinds of national administrative procedures was achieved (Government of Japan 2005). Since March 2005, 96 % of such national administrative procedures as registering taxes or the social insurance system inquiries has had online access.

The “e-Gov” government platform was launched in 2001. It makes the information on the government and administrative procedures available to citizens and is, besides, a powerful search engine. Since January 2004, the citizens are able to make strategic proposals on developing the country by using its e-Gov platform.

The Four Asian Tigers’ (South Korea, Taiwan, Singapore, and Hong Kong) key to success is the so-called state and market economic collaboration model. This model’s essence consists in the state’s participation in making private sector investments and in creating the national information infrastructure. The information society problems deserving special treatment include the increasing production competitiveness and introducing brand new ICT competitiveness, and consequently the potential loss of a market share or work places and the problem of providing equal access to IT resources.

The first steps to building e-Government in South Korea involved transferring the key administrative information into the electronic database.

In 1990s, South Korea’s focus in the e-Government field was enhancing the administrative issues’ efficiency. In 2000s, a special stress was put on the citizens’ satisfaction with the e-Government services. Since 2003, with the rapid development of the IT industry, South Korea began increasing the public participation in state affairs. Developing the e-Government now plays an important role in modernizing the contemporary democratic society and enhancing national competitiveness.

South Korea’s e-Government concept implements the “Government for Community” Program (G4C), which is aimed at simplifying the relations between the state authority bodies and organizations. The program is intended for minimizing direct contacts between state officials and citizens or organizations. This is provided

be the electronic document circulation including the documents in the taxation documents. In particular, the organizations’ and individuals’ tax payments can be made via an the electronic document circulation system through the Internet; the organizations’ accountancy and tax declarations are submitted to taxing authorities in an electronic form—at the same time, taxing bodies consult taxpayers online. Currently, many integration services are provided online, including the “One window” principle: you can pay the taxes and hand in your accountancy via the Internet.

The South Korean Customs Service, “UNI-PASS”, occupies the 1st place in the world in carrying out 100 % of export-import procedures online. The “KONEPS” (Korea Online E-Procurement System) electronic procurement system won the UN Public Service Award and Global IT Excellence Award at the World Congress on Information Technologies (WCIT). The “Home Tax Service” or the Internet taxation system has been chosen by the Organization for Economic Cooperation and Development (OECD) as the best electronic taxation system. The “e-People” service, created for increasing the Koreans’ participation in the country’s affairs, has entered the ten best electronic services according to the World e-Government Forum.

In June 2006, the Ministry of state Administration and security introduced the Next Generation e-Government Plan, which reflected the changes occurring in the social, administrative, and technological fields. The main principles of the Next Generation e-Government Plan comprised the changes, occurring in the social and technological fields, the citizens’ online participation in state affairs and changes, occurring in the state management system.

The efficiency of all the measures aimed at developing the state management informatization is proved by the fact that since 2010 South Korea has been an absolute leader in the UN e-Government Readiness Index (see Fig. 4).

Russia is currently actively working on integrating the e-Government concept. In order to reduce the gap in expanding, producing, and enhancing the IT products between Russia and the developed countries, a set of fundamental documents have been adopted and a number of programs have been launched namely:

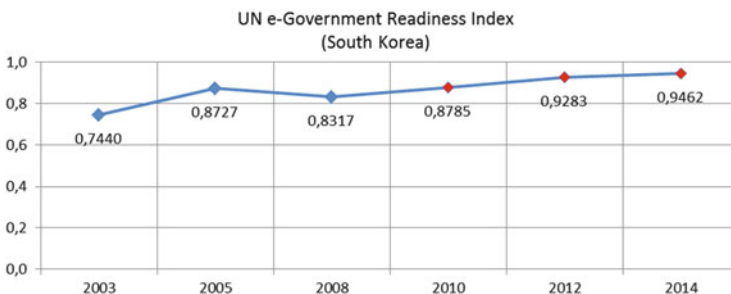


Fig. 4 UN e-Government Readiness Index (South Korea)

- State Information Policy Conception (1998),
- Russian Information Society Formation Conception (1999),
- Russian Federation Information Security Doctrine (2000),
- Okinawa Charter on Global Information Society (2000),
- “Electronic Russia” Federal Target Program (2002–2010),
- The Information Society development Strategy (2009–2015),
- The “Information Society” State Program (2011–2020).

The federal executive bodies’ transition to providing electronic services is an integral part of implementing the e-Government concept (Kalinina and Sokolov 2013). Such electronic services provided to Russians may include submission of tax declarations, voting, copying various documents and licenses, public utility services payments, registering vehicles and getting driving licenses, job search, etc. The electronic services provided to the business may include a company registration, renewing licenses, corporate taxes payments, submission of data to statistical bodies, submission of customs declarations, payments to social insurance funds, state procurements, etc.

This process should be carried out with help of Russian Federation state services portal and its regional analogs. The state services portal should be a unified information support center, which can assist citizens in their interaction with the state authority bodies. Providing all services is concentrated in one place, beginning with submitting an application and ending with getting executive or any other body’s resolution. This is possible due to the “one window” technology. At the same time, the interagency information exchange is hidden from an applicant and he/she no longer has to submit their personal information from one state agency to another. An applicant has to submit a minimal set of documents in one place, in a certain form, to a certain office, and a certain specialist only once, and after that, the service fulfills all coordination and formation procedures on its own.

According to the Russian Federation E-Government Formation Concept, it was expected that by 2010, all federal and regional authority bodies would be equipped with a system of Internet portals, corresponding to unified requirements. Besides, it was also expected that more than ten most essential state service would be provided online, such as filling in electronic forms for getting personal documents (passports, driving licenses), various child allowances, filling in fine receipts.

However, by September 2010, only one Russian Federation region had managed to implement the e-Government system, mentioned in the E-Government Formation Conception, which is the Republic of Tatarstan.

The reasons of such poor e-Government conception implementation are the problems that hinder the e-Government development in Russia.

The state service portal ([www.gosuslugi.ru](http://www.gosuslugi.ru)) simply contains information on state services, forms’ filling in samples necessary for getting some kind of state service in a traditional way. Thus, queues in state service agencies still exist and citizens have to prepare paper documents and take them from one agency to another, whereas the portal just gives information on the service, which particular documents is needed and where they should be submitted.

However, the main e-Government problem is that it has been launched without any standards, which caused each region to conduct the e-Government administrative reform in their own ways. That is why the so-called “spot automation” appeared, when some functions (business processes) are automated by means of a set of incompatible systems, working independently. Regional e-Government portals have not been connected with the Russian Federation federal state services portal, due to their closed nature.

There wasn't any general structure, i.e., one and the same section could be called differently on different portals and their overall design differed a lot. It is worth noting that one and the same service could be described differently: there wasn't any unified list of services, besides, on some portal a service could be described briefly, and on another—in detail. There was no universal mode of interacting with a consumer. In order to use the state services portal in different Russian regions, a consumer should possess different background knowledge about their structure and client services. It is worth saying that some portals demanded user identification whereas others did not. And finally, the portals are more like information resources and are weak at interacting with an applicant, who needs some kind of a state service. It is very common that getting a state service remotely is in fact impossible. Some remote state services have electronic forms and documents, available just for download. Needless to say that normal electronic interaction between the state authority bodies and citizens is impossible.

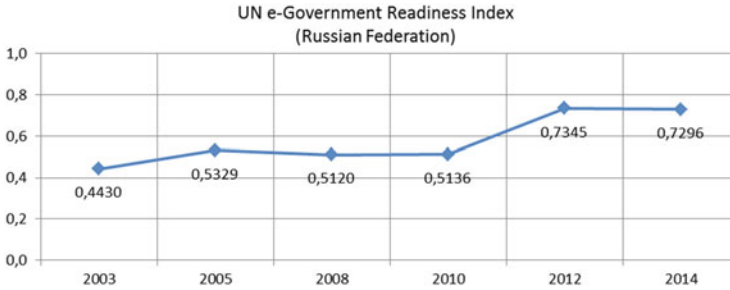
The way out of such situation is to introduce a national scale corporate information system, which can be available to users from all corners of the country and which contains regional and municipal branching (Kalinina and Borisova 2013).

Each state agency should unify business processes, having unified compatible and transparent standards of an information system. The first step on the way to achieving it is to list each state agency's functions and regulations with their possible optimization. The ways of solving these tasks can be borrowed from the corporate automation based on ERP technologies. Building state management business processes unified chain in order to increase these processes efficiency and transparency is one of the key tasks on the way to elaborating the e-Government.

The other problems arising while elaborating the e-Government include insufficient interagency coordination, unrealized regulatory support and out-of-date e-Government conceptual understanding. The state executive bodies have formed most of the existing information systems in the absence of a unified legal-regulatory base and works' general coordination. These information systems' data is more often unavailable to other state bodies, which causes time delays following the information exchange on the interagency level, its multiple collection, and reduplication in certain systems.

Furthermore, one of the meaningful problems is the nation's computer illiteracy. According to the Russian Public Opinion Research Centre, around 97 million people (69%) do not use Internet electronic services (as of April 2010). The nation's disbelief is one of the reasons for it. People hesitate that such services can provide full protection for the information filled in. Personal information, used





**Fig. 5** UN e-Government Readiness Index (Russian Federation)

by various organizations (the State Inspection’s for Road Traffic Safety databases, mobile phones), is easily available.

The level of state management informatization development in the Russian Federation is shown on the graph below (Fig. 5).

The graph shows Russia’s e-Government readiness increase after 2010. According to the 2012 UN review, Russia’s rating in IT sphere has significantly risen: in 2012, Russia occupied the 27th place by the e-Government development index in comparison to the 59th place in 2010. The results of implementing the “Electronic Russia” federal target program proved the necessity to adopt a new “Information Society (2011–2020)” State Program. One of this state program’s priority directions is to develop the e-Government concept and solve the following tasks: to develop and widely implement the modern ICT in the state bodies’ activities, create an interagency interaction system, and help federal executive bodies start providing state services in an electronic form.

The Russian Federation’s sustainable development and its integration into the information society are determined by the information infrastructure. After hitting the e-Government implementation tasks, we will be able to speak of the transition from “electronic information directory”, deprived of automatic territorial management functions, based on up-to-date IT, to the e-Government, which will be beneficial to citizens, society, and the state.

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# Formation of a Complex System of Indicators for Evaluation of Smooth Production Flow

Larisa A. Ilyina, Maksim A. Brazhnikov, and Irina V. Khorina

**Abstract** The article views the issues of provision of smooth production flow as the most important task of rational organization of a production system. The authors note that evaluation of the level of smoothness of production flow is determined by the system of operative managerial accounting, and solving the task is brought down to formation of indicators system. The key parameters that should be a foundation of the accounting system are labor, natural, cost, and time indicators.

The principle of rhythm is one of the most important characteristics of organization of production. The sense of smooth production flow consist in continuous restoration of the process of start-issue of labor items—removal of certain number of final products from the production should be compensated by proportional volumes of nomenclature positions (or initial resources) in a certain period of time. Production rhythm reflects the frequency of the issue of the set number of labor items and equality of execution of works for all technological divisions. A time interval between the start or issue of two adjacent items (series of items or performed works) determines the rhythm.

Observation of the principle of rhythm is a many-aspect problem that requires a complex approach to solving a whole range of interconnected directions:

- thorough development of the production technology for all divisions, including on an alternative basis in view of optimization of transport flows;
- implementation of modern methods of organization of production and increase of the level of scientific substantiation of calendar and planned normatives;
- optimization of material and production stock, including turnover assets, interconnected in incomplete production.

The basis of production rhythm management is determined by the process of development of operative and calendar plans and precision of execution of production plan for items issue strictly within the set terms (aimed at satisfaction of needs

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and wants of targeted markets) on the basis of effective usage of necessary economic resources (Brazhnikov and Khorina 2014a, p. 107).

Contradictions in the system of managerial accounting sometimes create an impregnable barrier (Brazhnikov and Khorina 2014b, p. 137) on the path of perfection of the process of production organization, methods of operative management, and, therefore, of observation of the principle of rhythm. If the plan of issue of final products is executed, “everything is great”. In this case, conduct of analysis of the real use of material, production, financial, and labor resources is difficult—so, problems in evaluation of real effectiveness of the production process appear.

Due to the fact that development of operative and calendar plans requires formalization of production process in two variants (building a general factory and department plans), the complex of tasks of operative accounting should be given in two interconnected forms.

The first of them is organization of inter-departmental accounting. The control object here is provision of timeliness of execution of works and technological interdependence of operations, as well as determination of optimal succession of production tasks. Firstly, control over the set volumes of production items (unfinished production) with final technological divisions—assembly. Secondly, verification of the level of execution of the plan in various departments and control of transferring the labor items to the storage or to the adjacent production.

The second form is organization of intra-department system of accounting in which the control object is presented a little wider. Firstly, control over the set terms of items production in view of separate work places groups. Secondly, verification of presence of materials in stock and accounting of their supplies. Thirdly, control over provision of workplaces with technological documentation and necessary tools. Fourthly, determination of defects and evaluation of effectiveness of the use of equipment and work period. Fifthly, analysis of execution of shift tasks.

The system of operative accounting in volume and calendar planning has to correspond to a certain totality of principles (Brazhnikov and Khorina 2013, p. 151) which reflect the efficiency of information provision and ensure optimality of the production process (Griffin 1990, p. 644):

- completeness—development of a clear and transparent complex of parameters that ensure completeness of accounting factors that determine a real state of the department’s production (integrity of criteria in methods of planned and organization of accounting);
- authenticity—increase of the level of information’s reliability, which allows avoiding possible mistakes and allows for evaluation of the real picture of production as opposed to distortion of the structure of items issue and changes of market’s needs;
- timeliness—determination of various deviations of production system (appearance of defects), localization deletion of the factors causing the violation of the planned course of production (as a necessary condition for development of corresponding solutions);

- relevance—frequency (according to the goals of accounting and control) in the usage of the received data—in the opposite case, the planned and dispatch service will be buried under tons of meaningless papers.

It should be noted that the leading role belongs to the process of development of a complex system of evaluating criteria which are to reflect the character of smooth production flow. As the key parameters that constitute the basis of the accounting system, labor, natural, cost, and time indicators should be selected. They include the following characteristics which determine the production rhythm (Brazhnikov 2013, pp. 55–56): issue tact; term of the order or series of items execution; volume of storage; advance of the issue (start) of final products; normative of resources’ spending; coefficient of equipment load; volume of the assets interconnected in the turnover.

For the purpose of evaluation of smooth production flow and issue of products, it is possible to distinguish two groups of indicators—direct and indirect.

The first group includes a limited list of direct indicators that characterize proportion of nomenclature items production and equality of load of interchanged workplaces according to the set plan of the issue.

1. Coefficient rhythm is a key parameter that should reflect:

- level of correspondence of the planned volume of works in labor expression to the rhythmic issue in view of proportional load of existing production capacities (for each technological division or groups of interconnected work places);
- the level of possible restarts of the issue plan in the studied planned and accounting period—if there’s a need for additional works performed for the purpose of compensation of deviations from rhythmic issue that emerged in previous time periods;
- limitation of excessive over-fulfilment of the plan on the basis of control over the growing total in volumes of non-fulfilment (preceding disuses) of the planned issue, beginning from the very first to the studied planned and accounting period.

Calculation of the coefficient of rhythm is performed for each planned and accounting period (decade or week) and for horizon of planning (month, quarter, or 6 months) on the whole (Brazhnikov and Safronov 2012, pp. 13–14)

$$R_k = \frac{\overline{T}_k}{T_k} + \min \left\{ \frac{T_k^\Pi - \overline{T}_k}{\sum_{k=1}^k T_k}; \frac{\sum_{k=1}^k (T_k - \overline{T}_k)}{\sum_{k=1}^k T_k} \right\} \tag{1}$$

where

$R_k$  coefficient rhythm

$k$  number of the studied planned and accounting period within the whole planning horizon ( $k = 1, 2 \dots D$ )

$T_k$  the planned issue of rhythmic issue on average for the planned and accounting period ( $k$ ) in labor expression, norm-hours  
 $T_k^{\Pi}$  volume of issue within the limits of the analyzed period ( $k$ ), norm-hours  
 $\overline{T_k^k}$  required volume in view of the analyzed planned and accounting period ( $k = 1, 2 \dots k$ ) within the average planned volume, norm-hours.

Values of average volumes (according to the plan of rhythmic issue) in view of each planned and accounting period  $T_k$  should be calculated with running total for all classification groups and all the massive of items series subject to distribution:

$$T_k = \frac{\sum_{m=1}^m \sum_{k=1}^k \sum_{j=1}^j \sum_{v=1}^v t_j n_{vj}}{D}, \tag{2}$$

where

$D$  total number of planned and accounting period in the planned period  
 $m$  counting number of the group of homogeneous series of items ( $m = 1, 2 \dots M$ )  
 $k$  counting number of the planned and accounting period in the planned period ( $k = 1, 2 \dots D$ )  
 $j$  counting number of the object subject to distribution ( $j = 1, 2 \dots N$ )  
 $v$  counting number of the analyzed series of items ( $v = 1, 2 \dots V$ )  
 $n_{vj}$  normative size of the series ( $v$ ) for the item ( $j$ )  
 $t_j$  time norm for item processing ( $j$ ), norm-hours

The value of required volumes of  $T_k^{\Pi}$  is determined on the basis of the fixed program of issue with the corresponding planned and accounting period in view of each classification group ( $m$ ) of homogeneous items ( $j$ ):

$$T_k^{\Pi} = \sum_{m=1}^m \sum_{k=1}^k \sum_{j=1}^j \sum_{v=1}^v t_j n_{vj}. \tag{3}$$

The value of the planned (required) volumes for the planned and accounting period  $\overline{T_k}$  within the average planned volume is characterized with the ratio

$$\overline{T_k} = \frac{\sum_{k=1}^k T_k}{k} \tag{4}$$

The first part of the formula (1)  $\frac{\overline{T_k}}{T_k}$  is the value of coefficient of plan execution in view of each planned and accounting period, that shows the level of correspondence of the planned works to the value of existing resources (rhythmic issue).

The second component  $\frac{T_k^{\text{pl}} - \bar{T}_k}{\sum_{k=1} T_k}$  reflects the share of reload of the planned task

(necessary and possible) in the studied interval for the purpose of execution of limit-exceeding works which compensate for losses of smooth production flow in preceding planned and accounting periods.

The value of coefficient of overachievement of target is related to the first characteristics—coefficient of the plan execution. The lesser (worse) the value of coefficient of plan execution, the more over-plan works are requires for the purpose of liquidation of violations.

The third characteristic  $\frac{\sum_{k=1}^k (T_k - \bar{T}_k)}{\sum_{k=1}^k T_k}$  limits the level of overfulfilment of a

rhythmic plan (the second coefficient) by means of determination of growing horizon of planning of the volume of non-fulfilled works. The purpose of the expression is to limit the management's wish to solve all contradictions at once with the help of unexpected emergency works—which would ensure rational use of existing resources in case of deviations in previous periods.

Violation of the production rhythm and “chasing” after the way for overcoming them accelerate the development of negative tendencies in the economic practice. Firstly, such approach will lead to unreasoned growth of additional need for turnover assets (with serious deviations from average values in certain time periods) and to increase of duration of the production cycle, which negatively influences competitiveness of the production system and stability of money flows. Secondly, due to increase of the risk of violation of contractual liabilities, which is directly related to payment of various fines and lost profit from potential possibilities in satisfaction of needs of the targeted markets, contradictions in solving the targeted financial tasks grow.

Monitoring of the production rhythm supposes systemic comparison of the planned values and the achieved factual results within the set succession of planned and accounting periods for the purpose of localization of uncertainty factors (non-compliance with the supply plan, defects, absence of personnel). The volumes of the issues determined by the plan are to regulate observation of the planned indicators in view of rational use of equipment and production areas and equal load of employees.

It should be noted that calculation of the coefficient of rhythm for planned and accounting period should be performed at the stage of development of operative and calendar plan for the purpose of increase of its precision and substantiation.

In addition to the coefficient of rhythm, it is necessary to determine coefficient of coefficient of arrhythmia  $y$  and coefficient of variation.

2. Coefficient of arrhythmia  $y$  is the total result of positive and negative deviations from the planned volumes of issue of products, determined for a certain period

of the calendar term (shift or 24-h issue, volume for the planned and accounting period).

$$A_k = \sum_{k=1}^k |T_k - \bar{T}_k| \quad (5)$$

The higher the value of arrhythmia, the less rhythmic the production system is. The main goal of the indicator analysis consists in determination of real causes of the determined deviations (non-fulfilment or overfulfilment) of the production plan and load of workplaces in view of separate planned and accounting periods, as well as evaluation of the level of their influence on the indicator of arrhythmia. The possible reasons may be of internal or external character. Internal reasons include lack of turnover assets, weak level of organization of production and operative planning, mistakes in material and technical provision, and stock management. External reasons include violation of the plans of supplies of components and raw materials and lack of energy resources (not due to the enterprise's actions).

Analysis of coefficient of arrhythmia should be conducted with the running total from the first to the last planned and accounting period, which will allow focusing on the most clearly expressed deviations of volumes from rhythmic issue. During the analysis, it is necessary to determine lost possibilities of the production system for issue of products due to arrhythmic work as a difference between factual issue and possible issue that is calculated on the basis of the maximal volume in the studied interval (average on the planned and accounting period).

3. Coefficient of variation is the ratio of mean square deviations from the tasks for the studied period set by the plan (day, decade, month, or quarter) to average values of the planned volumes of work for the same period:

$$K_B = \frac{\sqrt{\frac{\sum_{k=1}^k \Delta T_k^2}{k}}}{T_k} \quad (6)$$

where  $\Delta T_k$ —deviation of volumes of production from the average value of rhythmic issue for the planned and accounting period ( $k$ ).

Coefficient of variation allows determining the level of correspondence of the performed works to the planned volume of the issue of products.

Direct indicators also include shares of production products, calculation for each planned and accounting period or in view of volumes for a month or quarter.

4. The share of a decade issue of products  $d_k$ , determined as a ratio of the volume of production items for each planned and accounting period (decade, week, day, or shift) to the total issue during a month:



$$d_k = \frac{T_k^\Phi}{\sum_{k=1}^k T_k^\Phi} \quad (7)$$

where  $T_k^\Phi$ —factual volume of production during the planned and accounting period ( $k = 1, 2, 3, 4, 5, 6, 7, 8, 9$ ).

The given indicator characterizes rhythm of production on the basis of comparison of factual volumes of products issue. Lack of the indicator of the relative share consists in the fact that factual quantity of the work days is not taken into account in view of each planned and accounting period, and neither is evaluation of correspondence of factual volumes of the issue to the value set by the plan (level of observation of the work performance plan).

5. Share of issue of products per month  $d_k^M$  determined by the ratio of the volume of issue in view of each month to the quarter issue:

$$d_k^M = \frac{\sum_k^{k+3} T_k^\Phi}{\sum_k^{k+9} T_k^\Phi} \quad (8)$$

6. Share of quarter issue of products  $d_k^K$ —volume of production for each quarter as to the yearly volume of issue:

$$d_k^K = \frac{\sum_k^{k+9} T_k^\Phi}{\sum_k^{k+36} T_k^\Phi} \quad (9)$$

7. Share of the issue of products for the adjacent planned and accounting periods  $d_{k-1}$ , calculated as a ratio of the volume of products manufactured in the first decade of the current month to the volume of issue in the last (third) decade of the previous month:

$$d_{k-1} = \frac{T_k}{T_{k-1}} \quad k = 4, 7, 10, 13, 16, 19 \dots \quad (10)$$

The group of indirect indicators of evaluation of the rhythm level reflects effectiveness of the production system on the whole and is related to determination of hidden reserves for provision of proportion of production, continuity of execution of works, and timeliness of the issue.

1. Mechanism of overtime payment.

Lack (for the purpose of satisfaction of market demand) of the volumes of products  $Q_t^{(-)}$  should be compensated by a certain fund of overtime works  $F_t^{(+)}$ . Factual volume of corresponding indicators is determined on the basis of expressions (Brazhnikov 2007, pp. 36–39):

$$Q_t^{(-)} = Z_t^H + Q_t - D_t - Z_t^P, \quad (11)$$

$$F_t^{(+)} = d_F F_t, \quad (12)$$

where

$Z_t^H$  stock of final products for the beginning of the period, items

$Q_t$  planned volume of products, items

$D_t$  forecasted value of demand, items

$Z_t^P$  volume of reserve stock of final products, items

$F_t$  current time fund, hours

$d_F$  share of the fund of overtime in existing time fund (according to existing laws), %.

Need for additional volume of products  $Q_t^{(+)}$  is determined on the basis of possible work fund for overtime  $F_t^{(+)}$  and in the basis of calculated  $Q_t^{(-)}$ .

$$Q_t^{(+)} = \frac{F_t^{(+)}}{t_j} \leq Q_t^{(-)}. \quad (13)$$

Direct costs for payment for labor and for additional work are calculated as

$$3_t^c = F_t^{(+)} \mathcal{U}_c, \quad (14)$$

where  $\mathcal{U}_c$ —hourly rate for execution of overtime works, RUB.

2. Payment of fines due to incomplete and untimely supply of products;

Costs which take into account losses due to the deficit of products (as a reduction of income due to non-compliance with the terms of execution of the order and reduction of the index of company's reputation) could be calculated in the following way:

$$3_t^{(-)} = \Delta Z_t C_{\Pi}, \quad (15)$$

where

$\Delta Z_t$  deficit (excess) of products, items

$C_{\Pi}$  marginal costs from deficit of products, RUB.

Marginal costs from deficit of products reflect the value of possible losses from non-fulfillment of the order within unexpected changes of market demand (Chase

et al. 2001, p. 448): production costs and expenses for order servicing, loss of company's reputation, lost profit (reduction of revenues as a result of supply failure). Determination of the level of costs within the given group of expenses is a rather serious problem. Marginal costs or losses that accompany emergence of deficit of products are usually hard to measure.

3. The value of conventional need for turnover assets connected in incomplete production could be calculated for each lot in the following way

$$S = \frac{\left[ \frac{(C_j + C_j^M) T_{vj}^n}{2} + (k_{vj} - k) C_j \right] n_{vj}}{T_{vj}^n + k}, \quad (16)$$

where

$k$  numerical order of the analyzed planned and accounting period in the planned period ( $k = 1, 2 \dots D$ )

$k_{vj}$  deadline of the lot issue ( $v$ ) of the item ( $j$ )

$C_j$  production cost ( $j$ ), RUB

$C_j^M$  material costs ( $j$ ), RUB.

$n_{vj}$  normative size of the lot ( $v$ ) of item ( $j$ )

$T_{vj}^n$  duration of production of the lot cycle ( $v$ ), planned and accounting periods.

It is necessary to distinguish necessity for conduct of account of limit-exceeding remnants of incomplete production and final products in storage. Costs of storing the material reserves (Gavrilov 2002, p. 102) include the turnover assets invested into stock and interest payment for credits, costs for insurance for stock and taxation of main funds, losses from aging and stealing, labor payment for storage personnel, organization of security, amortization of main production funds, etc.

Cost of storage could be precisely calculated and accounted. However, it should be noted that costs of storage of stock could be expressed with the help of linear dependence in rather wide limits, but with a certain level of convention. The costs reflecting the process of storage could change quickly, depending on changes of the system's structural parameters. For example, due to emergence of need for new storage areas or implementation of information system of stock management.

4. Idle charges.

The volume of direct expenses for labor payment is determined on the basis of conditions of normal work regime as

$$3_t^o = \frac{2}{3} F_{\Pi} \mathcal{Q}_h, \quad (17)$$

where

$F_{\Pi}$  idle time, hours

$\mathcal{Q}_h$  hour tariff rate with observation of normal (usual) labor conditions, RUB.

It should be noted that the size of compensation depends on the character of causes of down time. If the break in work is due to administration's fault, the volume of payments constitutes not less than  $2/3$  of average wages. If the delay in work is due to reasons not related to the administration (natural hazard), the worker preserves not less than  $2/3$  of the tariff rate (official rate of pay).

#### 5. Losses from defects.

Depending on the character of defects, it is necessary to distinguish repairable and irreparable defects. If the labor objects (items) and results of the performed works could be used for the direct purpose in case of defects elimination, the defects are considered to be repairable. At that, conduct of works related to correction of defects should be technically possible and economically expedient. In the opposite case, if the items cannot be used for the direct purpose or their correction is technically impossible and inexpedient, the defects are deemed final (irreparable).

Generalization of information on losses from defects in production is conducted with the help of account 28 "Defects in production". Analysis of reflected losses should be performed for the types of products, expenditures articles, reasons, separate structural departments, and those responsible for the defects.

Content of the processes of control over rhythm and organization of operative accounting depends on dominating type of production. Separate production includes observation of terms of performance of works with the highest level of priority in view of each separate order. Under the conditions of serial production, initial object is terms of start-issue of lots and the volume of various backups and level of completion guarantee. Within the mass production, control is aimed at support for the set rhythm (tact) and minimal necessary level of backups for each operation (stage) of the process.

Analysis of the received information during operative accounting seeks the aim of preservation of normal (planned) course of the production process. Effectiveness of dispatch service in a narrow sense (from the position of "cleanliness" of production) is related to:

- with minimal losses and deviations from the rhythmic issue;
- with liquidation of consequences and elimination of causes of violation of normal course of production.

With market-oriented position (expanded concept of control) and production rhythm depends on the character and structure of demand. That's why the process of regulation of normal course of production consists in provision of timely (according to stable orders and forecasted results) and full (according to the structure and volumes) execution of production programs, the task of which consists in satisfaction of needs and demands of the market. Due to this the process of control should be solved with solution of a whole complex of tasks:

- study of character and structure of market demand for the purpose of determination of needs, and on this basis—development of forecast of manufacture of particular types of products;

- selection of the strategy of management of production according to the dynamics of the market and development of the program of change (or stabilization) of production;
- development of operative and calendar plans of production and formation of the program of sales of final products;
- development of detailed calendar plans for the purpose of fixing the nomenclature of issue and performed works for specific production departments;
- operative accounting of factual course of execution of the planned schedule in execution of works and determination of deviations from the set line of behavior of production object;
- analysis and prevention of causes that lead to deviation from the set plan and localization of deviations (correction of normal course of production);
- coordination of current work of production of departments and functional services of enterprises in solving operative tasks.

Node characteristics that determine complexity in solving the tasks and mobility of methods of operative and calendar planning caused by circumstances that development of production of tasks to departments and areas which is combined in time with their realization (1982, p. 452).

The given system of indicators should play an important role in provision of smooth production flow and realization of economic programs, stimulating achievement (improvement) of main technical and economic indicators. Modeling on the basis of complex evaluation of production rhythm participates in formation of initial basic parameters of functioning of production system. The system of managerial accounting ensures strict control over observation of planned course of production on the basis of analytical interconnected indicators and increase of the level of flexibility and reliability of production system.

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# Building a Strategy of Development of Hospitality Industry on the Basis of Improvement of the System of Personnel Training

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**Abstract** Topicality of the studied problem is predetermined by the fact that the issue of personnel training is a restraining factor of development of hotel industry. The purpose of the article is to determine directions for improvement of personnel training for hotel industry on the basis of professional standards.

Within the scientific work “Formation of organizational and economic mechanism of creation of the national system of professional qualifications in the hospitality industry”, the authors develop the algorithm of the procedure of independent evaluation of professional qualifications. The authors of the article substantiate that creation of national and sectorial systems of professional qualification is a necessary condition of not only improvement of personnel training but of increase of labor efficiency and goods and services’ quality. The results of the research could be used in hospitality industry and in other sectors of economy of Russia and other countries.

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## 1 Introduction

In the rankings of the global export spheres, tourism is ranked 3rd, after the fuel and chemical industries, behind ahead of manufacture of food products and car building. Tourism shows larger growth than international trade for the fourth year in a row.

According to the World Tourist Organization (UNWTO), tourism continues growing with quick rates: the number of international arrivals grew by 4.4 % in 2015, expenses of international tourists grew by 3.6 %, and the share of tourism in international export of services grew by 7 %, total global volumes of export of tourist services constituted \$1.4 trillion (Rosturizm 2016a, b).

The global tendency is most vividly expressed in Russia, where the number of incoming tourist trips grew by 5.3 %—to 26.9 million, and the share of tourism (part “Trips”) in the structure of export of services in January-September 2015, according to the Central Bank of the Russian Federation, constituted more than 18 %.

At present, tourism is one of the main directions that influence the growth of economy, including for development of such spheres of economic activities as tourist companies’ services, collective accommodation means, transport, communications, trade, production of souvenir and other items, food, and other spheres, this being an accelerator of socio-economic development of regions of the Russian Federation.

Hotels have similar resources, assortment, and services provided, so the decisive role belongs to personnel, its knowledge and experience, ideas and novelties, skill in communications, and interactions of employees (Ivanov and Volov 2010). Human capital of business includes existing knowledge, experience, and technologies that have to constantly improve in order to stay in demand, correspond to requirements of time, create first-class product, and be able to realize the strategy of growth (Úbeda-García et al. 2014).

Changes in consumer preferences and high competition between enterprises of all spheres of economy lead to consumer preferences’ changing under the influence of many factors (Pochinok and Vinogradova 2015). The consequence of this is the fact that enterprises have to adapt to changes of external environment and change the system of personnel preparation at the level of their enterprises and form social demand for the system of education (Baum 2015). In its turn, educational organizations should stay ahead in order to ensure their competitiveness—i.e., they must train specialists with competences necessary in future (Hafeez et al. 2002). That’s why it is very important to understand which specialists are available and which will be in demand in 5–10 years; which specialists will be effective under the conditions of relatively stable environment, and which—under the conditions of a crisis (Zaitseva et al. 2015).



## 2 Methodology

Specifics of goals and tasks of research, as well as its topical direction, pre-determined the use of desk methods of research.

In the process of the study of issues of development of the strategy of development of hotel business on the basis of improvement of the system of personnel training, the authors used official statistical data of the Federal State Statistics Service, the Federal Tourism Agency, scientific works on issue of personnel training for the tourist industry (Pollock and Ritchie 1990; Mayakaa and Akama 2007; Soukalová and Gottlichová 2015), as well as their own research (Zaitseva and Ushanov 2016), which allows making a conclusion that huge work is being performed in Russia for creation of effective national system of qualifications (Leybovich et al. 2014), which conforms not only to present needs but takes into account the changes which contours could be seen now. The normative and legal basis is created, and practical steps in this direction are made on the basis of integration of efforts of public authorities, employers, unions, and educational system.

## 3 Results

### 3.1 *Development of Tourism and Hotel Business*

According to the preliminary estimates, the volume of internal tourist flow in the RF constituted 50 million trips in 2015, showing a significant growth, as in 2014 there was appr. 41 million trips (Rosturizm 2016a, b). The sphere develops actively and various types of tourism are in huge demand—seaside resorts at the Black Sea Coast, Caucasus, and Krasnodar Krai, which were visited by 14 million people. Representatives of hotel business and residents of Krasnodar Krai distinguish that it is one of the most successful tourist years in a long time. Growth is observed in other tourist destinations: Moscow, St. Petersburg, Kazan, Ekaterinburg, Volga Region, Siberia, and Altai Krai. Tourist flow grew by 25 % in the Far East and Kamchatka, with more than 60,000 people visiting this region. Growth of indicators is observed for the incoming tourism as well. Nine months of 2015 featured a growth by 8 % for the foreign citizens arriving in the country—as compared to 2014. The structure of incoming tourist flow changes—while in the past, tourist from Germany and other European countries played the main role, now tourists from China and Asian-Pacific region dominate.

Every eleventh job belongs to the tourism industry in the world—at that, it is the only sphere in the world where the number of jobs grows regardless of anything—either crises or stock market changes.

Development of mass tourism and increase of business activity and communications stimulated creation of modern industry of hospitality oriented at different

segments of consumers. Over the recent several decades, the hotel services market became the key one in the system of sectorial markets of a wide service sphere.

The Russia hotel services market continues to develop to the side of provision of better hotel products (Dzhandzhugazova et al. 2015), but one of the main obstacles in this direction is still the problem of personnel training.

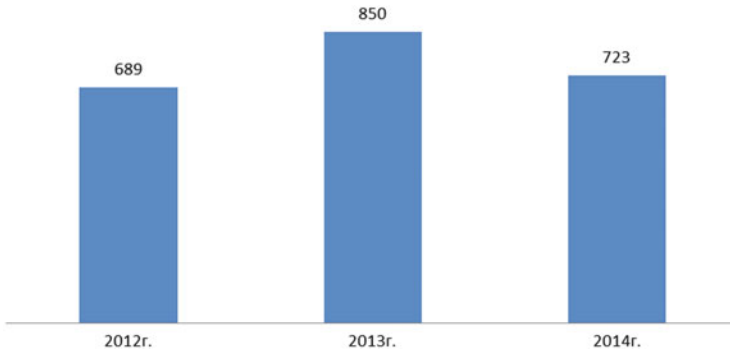
### ***3.2 Problems of Personnel Training in Hotel Business***

Despite the changes in requirements to training quality, increase of the role of practice-oriented approach in the system of secondary professional and higher education, there is still a “gap” in employers’ requirements to graduates and factual competences that they possess. Increase of control over the activities of educational organizations from the Ministry of Education and Science and professional society, as well as continuing negative demographic dynamics of applicants, led to the fact that the number of higher educational establishments began decreasing significantly (Table 1).

Analysis of the number of educational establishments and the number of students shows growth of the number of professional educational organizations that conduct training of middle-link specialists and the number of students in state and private organizations.

**Table 1** Educational organizations and number of students (Federal State Statistics Service 2015)

Indicators	2013/2014	2014/2015	Dev.	Growth rate, %
Number of professional educational organizations that perform training of specialists of middle link, including	2709	2909	200	107.4
State and municipal	2494	2665	171	106.9
Private	215	244	29	113.5
Number of students studying for the programs of middle specialists training, thousand people, including	1984.3	2103.1	118.8	106.0
in state and municipal	1858.4	1963.3	104.9	105.6
in private	126	139.8	13.8	111.0
Number of educational organizations of higher education, including	969	950	−19	98.0
State and municipal	578	548	−30	94.8
Private	391	402	11	102.8
Number of students in educational organizations of higher education, thousand people, including	5646.7	5209	−437.7	92.2
in state and municipal	4762	4405.5	−356.5	92.5
in private	884.7	803.5	−81.2	90.8



**Fig. 1** Dynamics of the number of educational establishments that realize educational programs for the sphere of tourism and hospitality for 2012–2014 (Rosturizm 2016a, b)

**Table 2** Comparative characteristics of the systems of personnel training for food industry

Personnel training in the system of secondary professional education	Around 4500 students graduate each year in Moscow on specialties in food industry (ones which education was paid for by the state). Only 500 of them start jobs. The others leave for other spheres of activities or continue studying in universities
Personnel training at jobs ( <i>experience of Coffemania network of cafes</i> )	New employees are trained in the Training Center: 150 cooks and 60 waiters. There are also bartenders (including barista), but they usually train at jobs (around 200 new employees per year). Not only new employees are trained but current employees, as well (regular re-training). The Training Center has 1,200 cooks per year (120 training sessions, 10 people in the group on average) and 10,440 waiters (870 training sessions, 12 people in the group)

Every fifth organization of higher and secondary professional education realizes educational programs for the tourism and hospitality sphere (Fig. 1).

High level of interest to personnel training in the sphere of tourism and hospitality with educational organizations is related to low material intensity of such specialists—the Federal educational standards for specialties “Service and tourism” do not suppose a large number of expensive equipment or expendable materials. On the other hand, this specialty is attractive for applicants and their parents who see significant growth of internal tourism, which leads to quick growth of hotel industry.

At that, analysis of the system of training of employees and highly-qualified personnel shows that it is not effective for a lot of spheres. Thus, the results of comparative analysis of personnel training for food industry (Table 2) show that training in corporate centers of study and at jobs not only allows training a larger number of employees but also ensures their stay at current jobs.

As a result of the conducted research, the authors of the article proved that problems of personnel training are related to changes of the whole system of personnel training for the hotel business—from short-term programs to educational programs of colleges and universities. The basis for these activities is professional standards, developed by the professional society (Leybovich et al. 2013). Over the recent 10–15, the Russian Federation had a lot of decisions at various levels on the necessity for development and use of professional standards in business, and sectorial Councils for professional qualifications were formed (CPQ). There are a lot of scientific studies and dissertations on this subject (Esenina 2013; Niță and Goga 2014). However, business remained aside.

Unfortunately, despite all “progress”, business and education are not together: education prepares personnel according to the Federal state educational standards (FSES), and employers wait until students finish their studies and come to them, trained according to their requirements, not requirements of a certain FSES, which none of the employers has ever seen.

In order to evaluate the level of professional qualification of a graduate or employee, there will be independent assessment of professional qualification (Blinov et al. 2013), during which graduate are evaluated according to the requirements of specific employers in a certain region of Russia and according to sectorial requirements, developed by national associations of employers in each specific type of professional activities, including in hospitality.

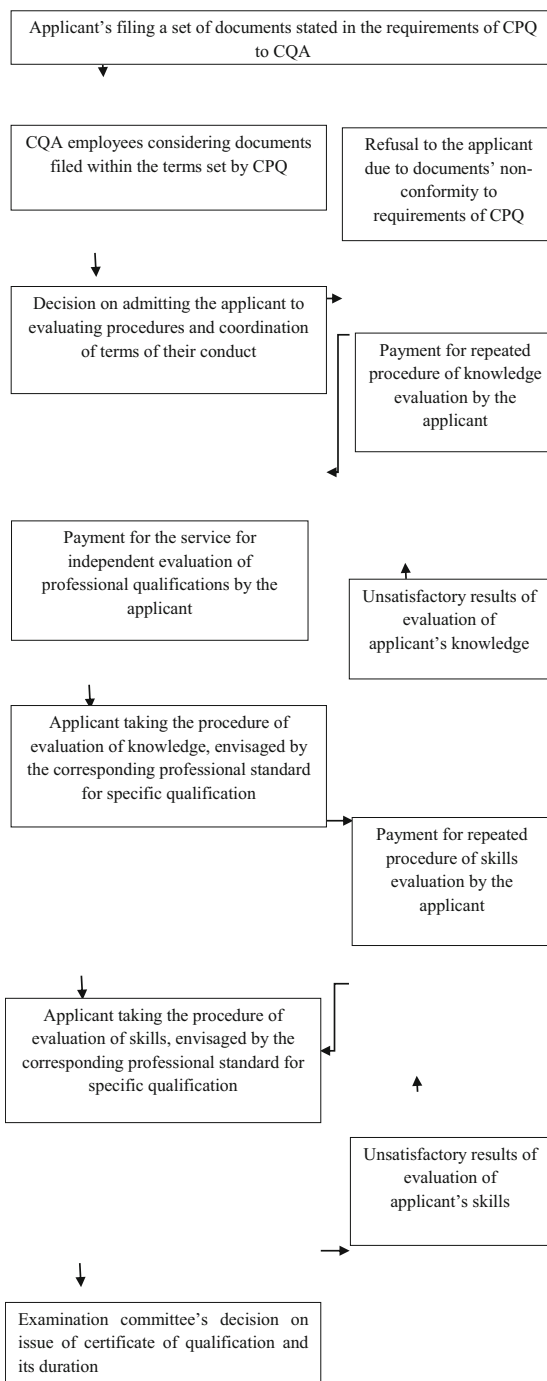
### ***3.3 Independent Evaluation of Qualifications***

The issues of creation of the national system of professional qualifications began to be developed systemically in 2012. Study of existing system of qualifications assessment allows concluding that such system is already created in Russia, but is organized not according to the sectorial but to the regional principle—a regional center for qualifications assessment (CQA) is created, which conducts such evaluation of qualification on the basis of previously set sectorial standards or own developments (this evaluation was called certification of qualifications, now it is called an independent evaluation of qualifications (IEQ). It is voluntary, and anyone can take it in order to receive the corresponding certificate—from a graduate of educational organization to specialist with a large work experience. Another thing is that this document doesn't tell the employer a lot, so it is not trusted yet—therefore, its owner doesn't receive any special advantages.

Based on the analysis of international and Russian experience of evaluation of professional qualifications in the hospitality industry, the authors of the article developed the algorithm for evaluating procedures for applicants (Fig. 2).

Realization of the scheme offered in Fig. 1 will allow ensuring objective character and quality of evaluation of professional qualifications of employees of hospitality industry, which will stimulate formation of personnel potential

**Fig. 2** General scheme of applicants' taking evaluating procedures



**Table 3** Advantages of personnel's taking a procedure of independent qualifications assessment

Interested parties	What does it give?	What is the profit?
For employers	Hiring employees with a certificate of the independent qualifications assessment, the employer performed requirements of the Federal Law No. 122 dated May 2, 2015	Absence of fines and penalties from bodies of state power, according to the Article 5.27 of the Administrative Code.
	When hiring employees with a certificate of the independent qualifications assessment, there's a possibility to change the level of wages on the basis of objective characteristics (level of qualifications stated in the certificate)	Optimization of the wages fund, economy due to reduction of expenses for compensation of losses from low quality of work of personnel who didn't take the procedure of independent qualifications assessment. For the offices that require the procedure of selection with the use of raw materials (e.g., products for dishes, when hiring a cook)—economy on purchase of raw materials.
For applicants candidate for vacancies and employees of enterprises	Certificate on independent qualifications assessment ensures successfulness of the procedure of applicants selection and further employment, as well as the level of wages	Wider opportunities for selection of employer, increase of own competitiveness—and, therefore, mobility

corresponding to ambitious goals of development of the Russian industry of hospitality.

## 4 Discussion

Thus, the results of the research show that an important direction of development and realization of the strategy of development of the hospitality industry on the basis of improvement of the system of personnel training is conduct of independent evaluation of professional qualifications of employees of hotels and other means of accommodation, food enterprises, tourist companies, and other enterprises which provide the whole complex of hospitality services.

For the purpose of organization of the national system of independent evaluation of professional qualifications, it is planned to create the network of centers of qualifications assessment in the sphere of hospitality industry. At that, this evaluation is still voluntary. Who is interested in such evaluation? A graduate, who paid for the studies and passed the state exam, thus confirming his qualification? And now he has to pay for the qualifications assessment? Or the employee who is going to have a choice in perspective—hire an applicant with a certificate or without it?

According to Table 3, each member of this process has his own interests—both employer and employee of the hospitality industry. Also, there is a certain pressure from the state and requirements of the Administrative Code of the RF, which should stimulate employers for more attentive attitude towards observation of the Labor Code in part of employees' correspondence to the requirements of the professional standards, which is proved by an employee's having a certificate confirming a certain qualification.

With the flow of time, this national system of professional qualifications will improve. The situation will have employees' being interested in taking such assessment—probably, on mandatory and voluntary basis. For example, representatives of large business have a lot of examples of inspections which put fines for the employees having the diploma that does not correspond to the specialty stated in the professional standard for this job. In the hotel business (work in this direction is already done), during conduct of qualification of hotels and other means of accommodation and during evaluation of presence of professional education, the education specified in the professional standard will be taken into account (Ushanov 2015).

For example, in the set standard “Manager/administrator of hotel complex/network of hotels”, the hotel manager's education should be at least master's degree for “Hotel business”. That's why under the modern conditions, those who do not yet have profile education should take master's program for Hotel business—it is quicker (2 years instead of 4 at bachelor's program), and, as a rule, the studies take place in the evening or by modules, like with extramural studies, which is convenient for those who have a job.

Thus, employee's receiving a certificate for one or another qualification will stimulate the increase of his competitiveness. At that, employers won't be afraid that it will turn into the issue of certificated in exchange of bribes from the applicants, as the profile CPQ is responsible for the quality of qualifications assessment. For employers, this system will created conditions for choice, for no one limits them in the terms of who they are to hire—a candidate with a certificate or without it. But, as hotel managers who have already got acquainted with the system of personnel evaluation say, presence of a certificate of qualification, recognized in the sphere, will allow setting different levels of wages for employees with a certificate and for employees without it.

## 5 Conclusions

It is obvious that the system of independent qualifications assessment will work only when a mandatory condition for professional society's acknowledging the results of qualifications assessment of employees is observed—objectivity of evaluation procedures.

On the whole, it is possible to conclude that development of the strategy of development of hospitality industry on the basis of improvement of the system of

personnel training at the national level is possible only on the basis of integration of efforts of all professional society members who are interested in development of the Russian industry of hospitality. Creation of effective system of highly-qualified personnel training for hospitality industry is one of the most important and necessary condition for the formation of sustainable competitive advantage of the hotel industry—both at the level of particular regions and of the whole country.

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# Complementary Approach to Functioning of Entrepreneurial Structures Under the Conditions of Economic Instability of Region

Yulia N. Stepanova, Irina S. Zinovieva, and Yulia V. Busarina

**Abstract** A precondition for the research was the authors' idea that methods and tools of sustainable development are the most important methodological foundation for self-regulation of activities of entrepreneurial structures under the conditions of region' unstable situation, which supposes transition from struggle with prevention of influence of separate negative factors and negative phenomena to complex management of sustainable development of entrepreneurial structures with complementary approach. Necessity for provision of activities of entrepreneurial structures under the conditions of economically unstable situation in the region on the basis of complementary approach determines theoretical and practical topicality of the subject. The authors determine and analyze peculiarities of functioning of entrepreneurial structures with complementary approach, study the sense and peculiarity of commodity markets' economy, and offer the proprietary classification of conditions and factors of functioning of entrepreneurial structures under the conditions of economic instability of the region with distinguishing political, economy, socio-organizational, and technological factors and conditions. As a result of analysis of influence of various factors, the authors distinguish the most significant ones: development of technological progress, modernization and reconstruction of production, innovations in the process of production, and creation of new type of products. As a result of the research, the authors came to the conclusion that entrepreneurial structures' subjects' applying the above classification will lead to general balance which will ensure the state of finished coordination of demand and offer, at various stages of development of the global market (in the short-term and in the long-term).

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## 1 Introduction

Theory of micro-economic analysis with peculiar statics and setting of preconditions does not always allow reflecting the multitude of market structures which are peculiar for the real economy. This circumstance requires thorough study and generalization of factors which actively influence the formation of market structures and behavior of economic subjects. That's why this sphere of economic analysis became an intensively developing direction of economic theory, sectorial and intersectorial business-practice.

Preferences of manufacturers and consumers are taken into account by the market, and the result of their solutions creates a system of prices for goods and resources. These prices are landmarks, which the owners of resources, entrepreneurs, and consumers use and correct their free choice that ensures personal interest. Competition is a regulating mechanism, and system of markets and prices performs the role of main organizing power.

The market system is a complex system of communications through which innumerable individual, freely selected decisions are taken into account, summarized, and leveled. Those who follow the dictate of the market system are given a bonus, and those who ignore it are punished by the system. Through these systems of communications, the society makes its decisions on what the economy should manufacture, how to organize production, and how to distribute the results of efficient labor between economic entities.

The market system is not only a mechanism through which the society makes decisions regarding distribution of resources and of products, but these decisions are implemented in life with its help. Under the modern conditions, the market system functions as a mechanism of accounting of numberless decisions of free individuals and enterprises and as a mechanism for practical execution of these decisions.

## 2 Materials and Method

Let us view the notion of "market". As a matter of fact, it is a component of the global economy that represents the sphere of demand and offer, as well as commercial exchange of goods and services; a system of sustainable commodity and money relations between the states, entrepreneurs, and commercial enterprises of various states, connected by participation in international division of labor (Plotnitskiy 2013). Each commodity markets has its trade centers—"main markets" the prices of which are considered to be basic in trading the corresponding products, so it is necessary to specify the notion of commodity markets.

Commodity market in the economic theory is a sphere of sales of homogeneous products and its close substitutes. At that, the level of interchangeability of the product is predetermined by price elasticity of demand.

R.N. Garbuzov gives the following definition of commodity markets: commodity markets are a system of economic subjects that form their relations for the purpose of rational turnover of final consumption products and items of production and technical purpose with the complex of services that accompany them and supplement their rational use (Garbuzov and Belyaev 2015).

Reference literature provides the following definition of the commodity market: "Commodity market is a market in which production means or consumer products are offered". Such markets may cover a product or group of products, connected by certain features of production character or aimed for satisfaction of the same need. They could be distinguished by the principle of sectorial belonging of the determined product.

Thus, we share this approach to defining commodity market and consider it to be substantiated. In our opinion, commodity market is a sphere of sales of homogeneous products and its close substitutes, the system of economic subjects that form their relations for the purpose of rational turnover of products.

Continuing development of globalization processes, accompanied by larger openness of economic connections, strengthening of competitive struggle, and instability of the global economy make the provision of sustainable development of entrepreneurial structures one of the highest priorities of Russia.

The determining role of effective and efficient entrepreneurship in provision of successful socio-economic development of the whole country, its regions and spheres is generally recognized.

Modern tendencies of functioning and development of entrepreneurship are characterized by complex combination of factors of external environment and internal adapting changes which are reflected in diversity of organizational and legal forms, types of ownership, directions and goals of activities, methods of decision-making, etc. This pre-determined expediency of consideration of sustainable development of entrepreneurial structures as a stimulating function that motivated entrepreneur to taking his activities at a whole new level.

Transition to the concept of sustainable development makes entrepreneur to cut costs of his activities, increase profit, and renew assets and capital on a new scientific & technological and organizational basis. Thus, methods and tools of sustainable development are the most important methodological basis for self-regulation of activities of entrepreneurial structures under the conditions of unstable situation in the region, which supposes transition from fighting the influence of separate negative factors and crisis phenomena to complex management of sustainable development of entrepreneurial structures with complementary approach.

Necessity for provision of activities of entrepreneurial structures under the conditions of economically unstable situation in the region on the basis of complementary approach to sustainable development pre-determines theoretical and practical topicality of the subject.

Based on the above, it is possible to conclude that the influence of production technology is the basic one in the process of emergence of commodity markets, where entrepreneurial structures conduct their activities. Let us also note that markets form not only on the basis of effective technologies of manufacture of

products but also by means of creation or improvement of technologies of goods exchange. In view of the above, it is fair to consider production and exchange technologies as a main reason of creation of commodity markets. Thus, the market should be considered as an institute of exchange of economic goods that provides profit for all members of exchange by means of use of production and sales technologies.

The issues related to study of specifics of functioning of entrepreneurial structures under the conditions of economic instability of the region are viewed in works of such modern authors as (Khokhlova et al. 2015), (Nurmagambetova et al. 2013), (Popkova et al. 2013), (Kravets et al. 2014), (Dzhandzhugazova et al. 2015), (Skiter et al. 2015), (Zinovyeva et al. 2016), et al.

Methodological basis of this research includes the method of systemic, problem, factor, and structural & functional analysis, method of synthesis, induction, deduction, and formalization. The study was performed within the concept of sustainable development, the concept of regional economics, the concept of economic cycles, and the concept of entrepreneurship.

### 3 Results

Peculiarities of functioning of entrepreneurial structures with complementary approach consist in the economic relations subjects' possibility to obtain a range of advantages, namely:

- provision of full satisfaction of manufacturers and consumers, as it interests the former in satisfying the needs of the latter;
- hindering the monopoly in production and turnover of products;
- fighting the commodity deficit in economy;
- expansion of possibilities for subjects of entrepreneurial activities;
- effective solution of economic problems for economic systems.

It should be noted that peculiarity of commodity markets economy consists in necessity for studying the sense of the notion "factor" and determine the main notions which determine an important role in functioning of commodity market.

In a short dictionary of foreign words, the notion "factor" has the following meaning: factor [Lat. factor—creating, producing]—a cause, driving force of the process or one of its main conditions (Krysin 2008).

In the B.A. Raizberg's interpretation, factor is a driving force of economic and production processes which influences the result of production and economic activities (Raizberg 2007).

That's why, in our opinion, classification of factor of commodity market functioning, could include, apart from pricing factors, also non-pricing factors, substantiated by economic theory: prices for substituting products, fashion, changes of population's income, number of buyers, consumers' expectations, prices for

resources, production technology, taxes and subsidies, and the number of sellers in the market.

Based on the analysis of the above, let us offer a proprietary view on classification of conditions and factors of functioning of entrepreneurial structures under the conditions of economic instability of the region. The level of influence of the conditions is shown by the order of significance of influence of each factor on entrepreneurial structures on the whole.

The classification shown in Fig. 1 is rather logical, in our opinion.

The main conditions include:

- political;
- economic;
- socio-organizational;
- technological.

1. Political conditions.

This category includes various conditions of legal and state character that influence the level of existing possibilities and threats in activities of entrepreneurial structures. For a range of entrepreneurs, national and foreign governments could be main regulators of their activities, sources of subsidies, employers, and buyers. This could mean that for these entrepreneurs, evaluation of political environment could be the most important aspect of analysis of external environment. Such evaluation is performed through detalization of political factors that influence the entrepreneurial structures.

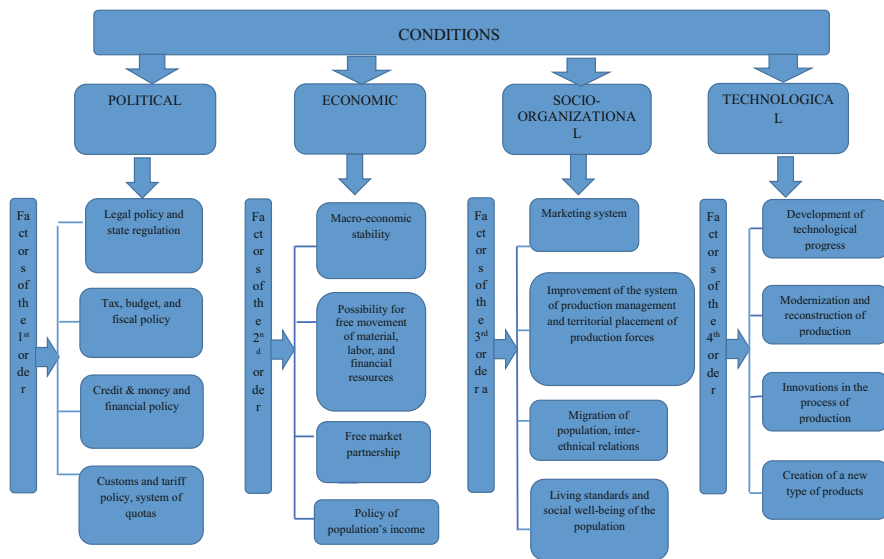


Fig. 1 Classification of factors and conditions of complementary approach to functioning of entrepreneurial structures

There are a lot of such factors, and there are a lot of their combinations – so we deem it expedient to distinguish and enumerate the most significant of them:

- legal policy and state regulation;
- tax and budget (fiscal) policy;
- money & credit and financial policy;
- tax & tariff policy, the system of quotas and patent law;
- To some extent, directly or indirectly, political conditions influence all entrepreneurial structures and are necessary for provision of protection of investors' interests, including in order to avoid double taxation.

## 2. Economic conditions.

This category includes the components that can influence entrepreneurial structures. For example, whether the credit is accessible, what influence is performed by currency exchange rates, how much taxes should be paid, and many others. Entrepreneur's capability to work with profit is directly influenced by general health and well-being of economy, as well as stages of development of economic cycle. Macro-economic climate will determine the level of possibilities of entrepreneurial structures' achieving their economic goals. Bad economic conditions reduce the demand for goods and services, and more favorable ones could provide preconditions for its growth.

During analysis of external environment, certain entrepreneurial structures should evaluate a range of economic factors. These include interest rate, currency exchange rate, rates of economic growth, inflation level, and some others. Let us view the most important of them.

Interest rate (level of interest) influences consumer demand a lot. In order to purchase goods, consumers often use loans. It is less probable that they would act the same way with high interest rates.

For example, entrepreneurial structures that consider expansion and are to be financed by means of loans would track the level of interest rate and its influence on the capital price. That's why interest rate directly influences potential attractiveness of various strategies.

Currency exchange rates determine the exchange rate of a specific currency as to other currencies. Changes in currency exchange rates influence competitiveness of products if it is exported to the global market.

Rate of economic growth influences possibilities and threats for entrepreneurial structures. When economy grows, expenditures of consumers increase, which leads to competitive pressure on entrepreneurial structures due to quick growth of their number in attractive sphere. Reduction of the rates of economic growth and reduction of consumer expenses lead to growth of competitive pressure, caused by entrepreneurial structures' striving to remain in the sphere under the threat of a crisis.

Governments of most countries of the world make a lot of effort to reduce the inflation rate. Usually, these efforts lead to reduction of interest rate and emergence of attributes of economic growth. In particular, entrepreneurial structures are worried by inflation because future economic situation under the influence of

high inflation (hundreds of per cent per year) is less predictable, thus complicating the planning.

Apart from the enumerated ones, there are other economic factors: structure of consumption and its dynamics; economic conditions in foreign states; indicators of trade balance; change of demand; tendencies in the securities market; level of labor efficiency in the sphere and rates of its growth; dynamics of GNP; rates of taxes.

Thus, systematizing the multitude of these factors, we receive the following list of the most significant ones:

- macro-economic stability;
- possibility for free movement of material, labor, and financial resources;
- free market partnership;
- policy of population's revenues.

### 3. Socio-organizational conditions.

They are caused by diversity of social factors that form the style of life, work, and consumption, and influence all entrepreneurial structures. New tendencies create a type of consumers, and, therefore, lead to need for other goods and services, determining new strategies.

In order to determine the most significant possibilities and threats to entrepreneurial structures from social factors, it is necessary to take into account new tendencies of modern life (e.g., such facts as more educated consumer, increased number of employed women, age and national structure of population, etc.).

It is possible to enumerate a lot of social factors which entrepreneurial structures face very often: birth rate; death rate; coefficients of intensity of immigration and emigration; coefficient of average duration of life; real income; life style; educational standards; consumer habits; attitude towards labor; attitude towards rest; attitude towards quality of goods and services; requirements of control over pollution of environment; saving the energy; attitude towards government; problems of inter-ethnic relations; social responsibility; social well-being.

Organizational factors are related to all factors in the system of labor, as organization of production includes prevention of unfavorable (dangerous and harmful) influence on human from equipment, unsatisfactory conditions of environment, unfavorable nature phenomena, and human's adaptation to production by increase of its professional training, provision of high level of his labor efficiency (sustainable psycho-physiological state) over the whole work time and employee's having moral qualities. Organization of labor presupposes provision of right combination of material and moral stimuli.

Organizational factors stimulate selection of organizational & legal and organizational & economic forms of activities of entrepreneurial structures.

They pre-determine the growth of labor efficiency by means of improvement of production management, due to which not only labor expenses of engineering and technical personnel reduce, but conditions for continuous rhythmic work of personnel are created.



Significant organizational factors of growth of labor efficiency that are manifested at national economic level are increase of balance and proportion of economy and of territorial placement of production forces, as well as improvement of foreign trade structures.

In our classification, let us distinguish the most significant socio-organizational factors:

- marketing system (study of demand, pricing, advertising);
- improvement of the system of production management and territorial placement of production forces, for improvement of trade structures;
- migration of population and inter-ethnic relations;
- living standards and social well-being of the population.

#### 4. Technological conditions.

Their influence on entrepreneurial structures is so obvious that they are considered to be the main driver of production progress. Revolutionary technological changes and inventions of the recent decades—for example, production with the help of robots—computers' entering everyday life, new means of communications, transport, weaponry, and many others, represent a lot of possibilities and serious threats, influence of which the managers have to understand and evaluate. Certain inventions can create new spheres of industry and close the old ones. Influence of technological factors can be evaluated as a process of creation of the new and destruction of the old. Quick technological changes reduce the average duration of life cycle of the product, so organizations should envisage what changes are brought with new technologies. These changes can influence not only production but also other functional spheres—e.g., personnel (selection and training of personnel for working with new technologies or the problem of firing the excessive work force that becomes unnecessary due to implementation of new, more efficient technological processes), or, for example, marketing services that are faced with the task of development of methods of sales of new types of products.

## 4 Discussion

Thus, having analyzed the influence of various factors, let us distinguish the most significant ones:

- development of technological progress;
- modernization and reconstruction of production;
- innovations in the production process;
- creation of a new type of products.

Application of the above classification by the subjects of entrepreneurial structures will lead to general balance that is going to provide the state of perfect

coordination of demand and offer at various stages of development of the global market (in the short-term and the long-term).

## 5 Conclusion

It should be concluded that theoretical significance of the conducted research consists in development of the concept of sustainable development, the concept of regional economy, the concept of economic cycles, and the concept of entrepreneurship.

This work has practical value and significance, as the offered proprietary complementary approach to functioning of entrepreneurial structures under the conditions of economic instability of the region could be used and is recommended for using in activities of modern enterprises for increasing their sustainability.

Taking into account the dominating fundamental character of this research, it is possible to state that leaving the collection and analysis of statistical data without attention is a certain drawback of this work. Thus, perspectives of further research in this sphere and development of the studied theory are related to conduct of empirical studies and comparing them with the received theoretical conclusions and recommendations.

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# Perspectives of Development of Small Business Within Modernization of Tax and Cluster Policy

Irina V. Gashenko and Yulia S. Zima

**Abstract** The purpose of the work is to study perspectives of development of small business within modernization of tax and cluster policy. For this purpose, the authors use such scientific methods as analysis of time series (horizontal, regression, and correlation), systemic, problem, structural & functional analysis, analysis of causal connections, synthesis, induction, deduction, formalization, etc. The authors determine the role of taxes and clusters in development of small business and analyze dynamics of its development, study the tax aspects of clustering of small business subjects, and develop recommendations for improvement of the system of taxation of small business within economic clusters in modern Russia. The most interesting part of the article is the proprietary model of Russian modernization of tax and cluster policy for improvement of taxation of small business. The results of the conducted research showed that realization of the combined measures within modernization of tax and cluster policy stimulates activation of small business in modern Russia. Development of small business within modernization of tax and cluster policy is based on establishment of a system of tax stimuli in the sphere of clustering of small business.

## 1 Introduction

Small business plays an important role in development of entrepreneurship and economy on the whole. Small business stimulates rationalization of economic relations in society, as it strives for maximal and full satisfaction of clients' needs with minimal expenses. Due to such advantages as flexibility, adaptability, and small influence on market processes, small business is motivated for implementation of innovations into its activities and is a driver of scientific progress and of the process of commercialization of innovations.

However, despite existence of various preferences, small business shows a rather low level and rate of development in Russian economy. Thus, topicality and

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necessity for search for new means of solving the problem of taxation of small business in modern Russia grow. A precondition for this research was the authors' hypothesis that realization of specific measures in separate spheres of state policy of Russia did not lead to activation of development of small business. Solving this problem requires a complex approach and realization of combined measures within modernization of tax and cluster policy.

The purpose of this work is to substantiate the offered hypothesis and to offer perspectives for development of small business within modernization of tax and cluster policy. The specified goal predetermined the tasks of this work. Firstly, it is necessary to determine the role of taxes and clusters in development of small business and to analyze the dynamics of its influence on economic growth. Secondly, it is necessary to study tax aspects of clustering of subjects of small Russian business. Thirdly, it is expedient to develop recommendations for improvement of taxation of small business in economic clusters.

## 2 Materials and Method

The notion, sense, and practical peculiarities of functioning and development of small business in the countries of the world are studied in works of such modern authors as (McDowell et al. 2016), (Borchers et al. 2016), (Hyder and Lussier 2016), (Andreeva et al. 2016), (Skiter et al. 2015), (Kravets et al. 2014), (Dzhandzhugazova et al. 2015), etc.

Fundamental basis for the theory of economic clusters that reflect their meaning for development of economic systems are set in the works of such scholars as (Yang et al. 2015), (Murzabekov et al. 2015), (Krenea et al. 2015), (Zakharova et al. 2015), (Palyvoda 2015), (Paraušić et al. 2014), (Korzhenevskaya 2014), (Popkova et al. 2013), etc.

Conceptual and applied aspects of taxation, as well as development and realization of tax policy in the countries of the world, are reflected in materials of research of such experts as (Mollan and Tennent 2015), (Cho 2014), (David et al. 2014), (Colacchio 2014), (Dindić 2013), (Adebisi and Gbegi 2013), (Schreiber 2013), etc.

Specifics of taxation of cluster entities of small business is determined in studies of such authors as (Veselovsky et al. 2015), (Gafurov et al. 2014), (Barycheva et al. 2014), (Huskinson and Lawson 2014), (Razvadovskaya et al. 2015), etc.

During the conduct of this research, the authors used such scientific methods as analysis of time series (horizontal, regression, and correlation), systemic, problem, structural & functional analysis, analysis of causal connections, induction, deduction, formalization, etc.

### 3 Results

Let us determine the role of taxes and clusters in development of small business. For that, let us determine dependence between the level of development of small business, reflected in the number of small enterprises per 1000 people, ( $y$ ), level of favorability of taxation according to the World Bank (in points—the lesser points the better) ( $x_1$ ), and intensity of economic clustering reflected in the number of clusters that include small business ( $x_2$ ).

The objects for research include countries with different level of socio-economic development and geo-political state: the USA, Great Britain, Germany, Japan, France, Italy, and Russia. Estimate data for conduct of correlation and regression analysis are presented in Table 1.

Based on the data of Table 1, we received the following models of pair linear regression:  $y = 43.62 - 46.44x_1$  and  $y = 15.73 + 15.19x_2$ . That is, with growth of the level of favorability of taxation by 1 point, the number of small enterprises per 1000 people grows by 46. With creation of each new cluster that includes small business, the number of small enterprises per 1000 people grows by 15.

Tax system and tax policy determine conditions for conduct of small business in the country. The more tax preferences small enterprises receive, the more actively this factor stimulates the development of economy. Clustering of small business stimulates strengthening of its positions in the market, creation of conditions (financial and infrastructural) for practical realization of innovational initiatives, as well as strengthening of brand and promotion of products.

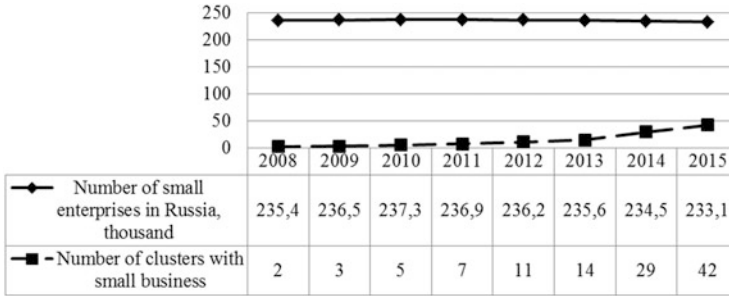
Let us analyze dynamics of development of small business in Russian economy and its involvement in the process of economic clustering. For that, let us use Fig. 1.

As is seen from Fig. 1, before the financial crisis of 2008–2009, Russia had positive dynamics of creation and development of small business—but under the conditions of crisis, small enterprises are influenced the most, which is also

**Table 1** Level of development of small business, level of favorability of taxation, and intensity of clustering in countries of the world in 2015

Countries	Number of small enterprises per 1,000 people, ( $y$ )	Level of favorability of taxation, points ( $x_1$ )	Number of clusters with small business, ( $x_2$ )
USA	74.2	53	450
Great Britain	46.0	15	230
Hungary	80.0	95	195
Germany	37.0	72	167
Japan	50.0	121	155
France	35.0	87	124
Italy	16.3	137	56
Russia	5.65	47	38

Source: (DIW ECON 2016; The World Bank Group 2016; Center of Cluster Development 2016)



**Fig. 1** Dynamics of the number of small enterprises and number of clusters which include small business, Russia, 2008–2015. Source: (Federal State Statistics Service 2015; Russian Cluster Observatory 2016)

observed in Russia. Thus, by 2015, the number of small enterprises in Russian economy reduced by 2 % (4200).

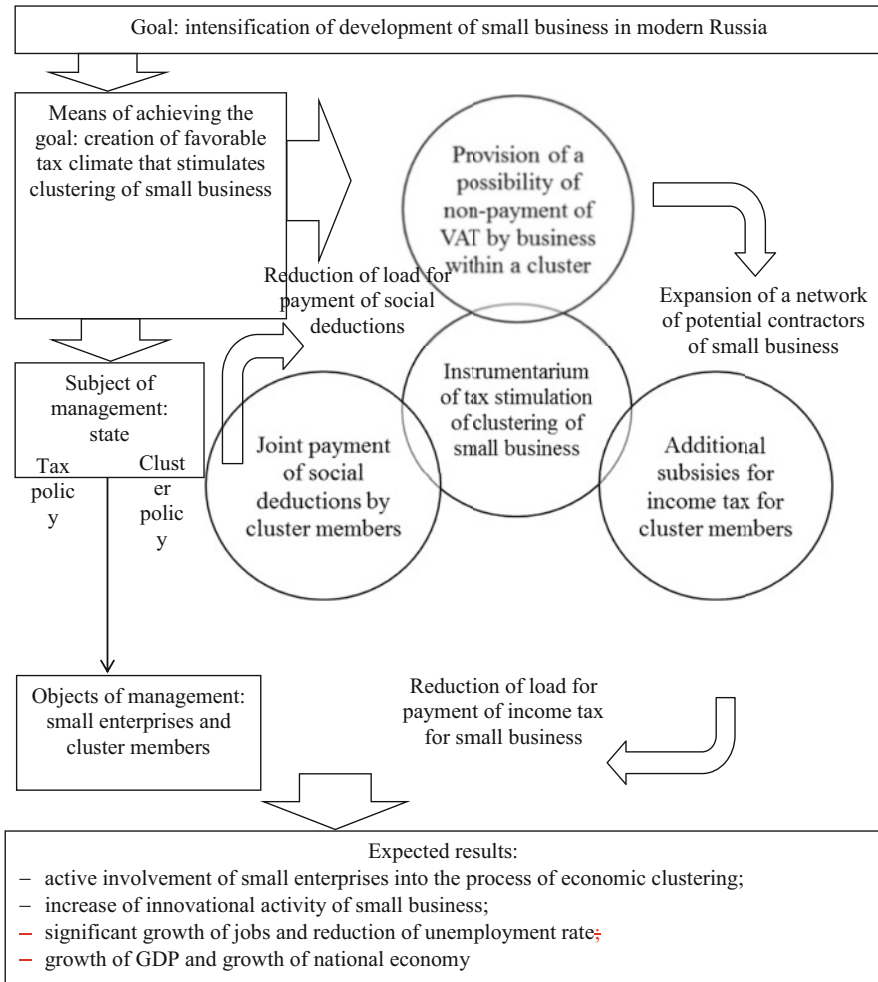
At the same time, cluster initiatives of small business were gradually realized over this period of time. As compared to 2008, when there were only two clusters with participation of small business in Russia, in 2015 the number of such cluster grew by 21 times, constituting 42. There is a positive tendency, and it is possible to state that in case of lower cluster activity under the conditions of crisis, small entrepreneurship in Russia would have suffered more, and the number of small enterprises would have reduced more by now.

Taxation of small business in Russia has its certain specifics. Thus, small enterprises have access to a simplified form of taxation which supposes, in particular, payment of the fixed sum of single tax regardless of factual revenue. Subjects of small and medium entrepreneurship can select a subsidized tax regime that doesn't suppose cancellation of payment of the main fiscal taxes, including added value tax etc. Small small business may claim various tax subsidies, depending on the realized tax policy.

Within economic clusters, small entrepreneurship does not receive additional advantages and may claim only the same tax preferences that are accessible outside of cluster. In our opinion, this peculiarity of modern Russian tax and cluster policy negatively influences the development of small business, as entrepreneurs have no knowledge of advantages of entering the cluster entities and, having no stimuli for that, prefer independent existence outside of a cluster.

Under the conditions of global competition, small business is especially vulnerable, and membership in clusters may be critically important for it. That's why there's necessity for additional state stimulation of cluster processes among the subjects of small business. This work offers the following model of modernization of tax and cluster policy for development of small business in modern Russia (Fig. 2).

As is seen from Fig 2, the purpose of the offered model is intensification of development of small business in Russian economy. This purpose is achieved by creation of favorable tax climate that stimulates clustering of small business. The



**Fig. 2** Model of modernization of tax and cluster policy for development of small business in modern Russia

model is based on managerial mechanism in which a management subject is the state which, with the help of tax and cluster policy, influences the management objects—small enterprises and members of clusters.

As recommendations for improvement of Russian system of taxation of small business within economic clusters, this works offers three tools of tax stimulation of clustering of small business. The first tool is provision of a possibility for joint payment of social deductions to cluster members.

In Russia, social deductions are a serious load on any business, let alone small business. It is possible to provide tax subsidies for social deductions for small



business, but that will contradict the society's interests (first and foremost—interests of these enterprises' employees) and the social policy realized by the state.

It is offered to unite personnel of enterprises within a cluster. This will allow eliminating doubling of the functions and optimizing the staff (reducing the number of employees). As a result, total and private liabilities of cluster members for payment of social deductions will reduce, which will decrease tax load on small business with preservation of social liabilities before employees.

The second tool is provision of additional subsidies for income tax for small enterprises in specific spheres of activities (investment, innovational, research, etc.), which are within an economic cluster.

The third tool is provision of a possibility of non-payment of VAT by medium and large business in a cluster. Outside of cluster, many medium and large enterprises prefer not to cooperate with small business that does not pay VAT, as payment of this tax is transferred to them.

Realization of the offered measure will allow expanding the network of potential contractors of small business. Expected results of realization of the offered model are: active involvement of small enterprises into the process of economic clustering, increase of innovational components of small business, significant growth of the number of jobs at enterprises, and growth of GDP, which will lead to positive changes in Russian economy.

## 4 Discussion

The results of the conducted research prove the initial hypothesis—realization of combined measures within modernization of tax and cluster policy stimulates activation of development of small business in modern Russia. Perspectives of development of small business under the conditions of economic clustering are related to establishment of regimes of tax preferences for small cluster entities.

## 5 Conclusions

It is necessary to pay attention to the fact that the basis of the proprietary conclusions and recommendations is modern Russian practice of realization of state tax and cluster policy. That's why the results of the research have a narrow character of application and cannot be adapted to economies of other countries, which is a certain limiting factor of the research.

For the purpose of further development of tax concept of small business within economic clustering, it is expedient to study experience of foreign countries in tax stimulation of cluster processes on the spheres of small business for determination of universal and most effective tools.

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# Economic Growth in Russia: Influence of Oil Shock and Macro-Economic Factors

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and Elvira R. Baykova

**Abstract** Topicality of the subject of the research is predetermined by dependence of the rates of modern economic growth in Russia on the situation on the world oil market, sanction policy of the Western countries, and such macro-economic factors as dysfunction financial market, structural shift of economy in favor of raw materials and processing spheres, and insufficient volume of investments into high-tech and social sectors of economy.

The article includes results of analysis of dynamics of economic growth, views various groups of factors influencing economic growth of the country, including dynamics of world prices for oil, sanctions against Russia, development and problems of financial institutes, and structure of investments into main capital for the types of economic activities.

## 1 Problem Setting and Its Connection to Important Scientific or Practical Tasks

Rates of economy growth are one of the topical problems of Russia as of now. The 2015 saw the start of long adaptation of Russia to the shock caused by reduction of oil prices and the 2014 sanctions which increased uncertainty regarding the rates of economic growth. This situation led to reduction of consumer demand, reduction of investments, and ruble depreciation, which, in its turn, led to growth of inflation rates. These factors led to reduction of real GDP by 3.7 % over 1 year (Long way to

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restoration of economy 2016). Against the background of significant reduction of oil prices, drawbacks of the Russian model of economic growth were exposed.

It is generally known that living standards depend directly on the country's economic growth. Reduction of real income of households reduced total consumption by 7.5 %, contribution of which into reduction of GDP in 2015 was estimated for 5.4 %, which also led to growth of the number of the poor from 11.2 % of the population to 13.4 % (Long Way to Restoration of Economy 2016).

## 2 Analysis of Recent Publications on the Issue

The possibility for achievement of good economic growth with high stock of natural resources is widely discussed by economists and politicians. Most of empirical research set the connection between the quality of economic growth and presence of natural resources.

Economists W.M. Corden and J.P. Neri distinguished the factors determining interconnection between the stated variables: Dutch disease, high rental, democracy, and quality of institutes. With quick growth of raw materials sector, it starts to take labor resources away from industrial sector, in which “direct deindustrialization” takes place. Besides, high revenues of those working in raw materials sectors increase consumption and demand for non-traded commodities and services, which leads to growth of prices for them and flow of labor resources from industry to the service sphere. The industry has the effect of “indirect deindustrialization”. Political institutes could be described as existing form of a political regime—democracy, autocracy, or dictatorship. Political institutes could be set by political power or a powerful group with access to economic resources in society. Availability of natural resources leads to reduction of total revenues if the institutes are inclined to corruption, and vice versa: availability of natural resources leads to growth of total income, when institutes support manufacturers. A peculiar feature of many developing countries that export oil is poverty, low quality of education, and lack of civil society. Democracy becomes a market one, and members of parliament become representatives of not population but corporate interests, because all positions and solutions are sold and purchased like merchandise. Proofs of negative influence of resources rent on the institutes are given not only by foreign but also by Russian authors. The work by V. Polterovich, V. Popov, and A. Tonis (Polterovich et al.) shows significant negative influence of these indicators on quality indices of the World Bank institutes. There is also proof of the theory of conventional curse for institutes: there is institutional threshold of influence of resource provision, below which the resource wealth aggravates the quality of institutes even more, and above—stimulates their improvement (Chistyakov 2006).

A notion “resource curse” was introduced by R. Outi in 1970–1980s in order to explain the drop of living standards in the countries that export oil (Auty 2001). According to this theory, economies which are rich for natural resources have low rates of growth and living standards. If the economy is not competitive, all the positive effect from free trade will be spent due to rent-oriented behavior and will

not be used to the society's benefit. According to H. Mechlum, K. Mone, and R. Torwick (Mehlum et al. 2005), if rent-oriented behavior is stimulated, investors invest into acquisition of rent—in the opposite case, when investments are related to a large risk, preference will be given to investments into production. Finally, the first variant of development of events does not bring profit to society, and the second one accelerates the economy growth.

Studies by N.I. Suslov (Suslov 2015) note that production of oil rent increases competitiveness in successful countries and reduces it in unsuccessful ones. The main factor here is the level of institutes' development. In case of inflow of oil rent into the country, the exchange rate of national currency may grow and reduce, this influencing the economy's competitiveness. If institutes are poorly developed, the rent leads to growth of prices; if institutes are well-developed, prices are reduces. Rent revenues shows a strong positive connection with income: each dollar created in oil and gas sector of average economy adds \$1.86 to GDP (Suslov 2015).

In the twentieth century, resource factor was acknowledged to be one of the most significant ones in the global economy. According to studies by D. Ergin (Ergin 2016), over the recent century, oil became the main factor of economy development. The problem of economic growth in the country, related to high share of raw materials sector in GRP and export, was formulated by J. Sax and E. Warner (Sachs and Warner 1997). Surely, countries with large stock of oil export it as a raw material. According to Russian economists S. Guriev, G. Egorov, and K. Sonin (Guriev et al. 2007), a large part of extracting spheres in gross domestic products shows insufficient economic development. Surely, the countries that depend on raw material sector are subject to influence of the world situation. Russia cannot influence the change of world oil prices, but still needs stable and high prices—which is supplemented by the factor of a large market for taking in all the export oil.

Multiple studies, starting from 1990s, show significant role of financial sector in economic growth. Articles by King and Levine (1993), De Gregorio and Guidotti (1995), Levine (1997), Amable and Chatelain (2001), Levine et al. (2000), Bekaert et al. (2005) are used as time rows and inter-country comparisons for various selections of developing and developed countries which prove presence of statistically significant positive correlation between the level of development of financial sector and rates of economic growth. As Ross Levine emphasized, “spheres and companies that rely on external financing grow quicker in countries with developed banking sector and stock markets than in countries that are peculiar for weal development of financial systems” (Levine 1997. p. 690; Amable and Chatelain 2001).

Thus, analysis of existing publications on the subjects of the research showed that most authors agree on a possibility of economic growth of national economies under the condition of balance of social, economic, and financial factors.

### 3 Formulation of the Research Goal

The goal of the scientific research is to determine the level of influence of situation on the world oil market and certain macro-economic factors on economic growth in Russia.

The authors use the methods of analysis of data and formal logic. The selection was built on the basis of official statistical data for 2009–2015 on the main macro-economic indicators published on the web-site of the Federal State Statistics Service, and the data on the state of financial sector represented on the web-site of the Central Bank of Russia.

## 4 Main Results of the Research with Substantiation

### 4.1 High-Quality Analysis of Economic Growth in Russia in 2009–2015

Russia entered the phase of long economic stagnation. Over 2015, the volume of Russian GDP constituted RUB 80,804.3 billion, which is equal to the 2008 level. After the 2008 crisis, there was economic growth in Russia in 2010–2013, which slowed down in 2013 and turned into quick downfall in 2015. Based on the data of the Federal State Statistics Service, the dynamics of Russian GDP has the following form: 2009—7.8 %, 2010 +4.5 %, 2011 +4.3 %, 2012 +3.4 %, 2013 +1.3 %, 2014 +0.6 %, 2015 – 3.7 % (Table 1). Forecast value of GDP for 2016 constitutes –0.2 % (according to the data of the Forecast of socio-economic development of Russia for 2017–2019). Thus, over 5 years (2012–2016), the growth of Russian GDP constitutes only +1.3 %.

Over 2009–2015, there was gradual reduction of the rates of economic growth (over 7 years, growth of GDP constituted only 1.7 %), and disproportions in the sphere of production and consumption grew. Developed based on extensive use of main production factors reduced competitiveness of Russian economy.

**Table 1** Dynamics of the main factors of economy development in 2009–2015, in % to the previous year

Indicators	2009	2010	2011	2012	2013	2014	2015
GDP	92.2	104.5	104.3	103.4	101.3	100.6	96.3
Internal demand	85.3	108.3	108.8	105.5	100.5	101.3	89.7
Including final consumption of household economies	94.9	105.8	106.8	107.4	103.7	101.7	89.9
Investments into main capital	84.3	106.3	110.8	106.8	100.8	97.3	91.6
External demand	95.3	100.7	100.3	101.4	104.8	99.4	92.4
Average export prices	66.5	123.1	132.9	101.6	95.7	94.3	64.8
Average import prices	99.1	101.7	109.2	97.3	102.5	98.2	81.1
Prices for Urals oil	63.4	128.7	139.3	101.0	97.2	90.9	52.9
Official exchange rate (RUB/USD)	102.9	100.7	105.6	94.3	107.8	171.9	129.5

Source: based on the data of the web-site of the Federal State Statistics Service. Access: <http://www.gks.ru/>

**Table 2** Dynamics of industrial production, wages, and labor efficiency

Indicators	2009	2010	2011	2012	2013	2014	2015
Index of industrial production	90.7	107.3	105	103.4	100.4	101.7	96.6
Real money revenues of population	103.0	105.9	100.5	104.6	104.0	99.3	96.0
Labor efficiency	95.9	103.2	103.8	103.0	101.9	100.8	96.8

Source: based on the data of the web-site of the Federal State Statistics Service. Access: <http://www.gks.ru/>

Among the main factors that slowed down development of Russian economy over the recent years (2009–2015), the following could be distinguished: reduction of external demand (–6.0 %) and prices for main Russian raw materials commodities (including oil—by 46.3 %), which are the basis of export potential; reduction of internal demand (–3.1 %), related to reduction of economy’s revenues (enterprises’ income) and growth of expenses; reduction of the scale of import<sup>1</sup> (Table 1).

Expansion of internal demand for products that took place until 2013 was caused by growth of money revenues of population and wasn’t accompanied by corresponding increase of labor efficiency (Table 2).

Among the main factors that slow down development of Russian economy over the recent years (2009–2015) is reduction of volumes of Russian and foreign investments into main capital (–4.7 %). Causal connections between the growth of economy and investments was proved practically and theoretically. Nevertheless, the growth of investments into main capital that was observed until the second half of 2013 did not lead to growth of feedback to an invested item.

Structure of investments into main capital for the types of economic activities could be characterized in the following way. In 2000–2015, three spheres were peculiar for the largest investments: extraction of natural resources, transport and communications, and real estate operations (Table 3). As of year-end 2015, these spheres received 16.2, 20.8, and 16.7 % of the total volume of investments by Russian enterprises, accordingly. It should be noted that over the recent years, indicators of the volumes of investments and share of each of these spheres in sectorial structure of investments were higher than with other spheres of economy.

As of year-end 2015, the share of machine building and metal processing—the most important spheres among high-tech and science-intensive ones—in the structure of total volume of investments into main capital remained at the level of post-crisis 2009, constituting 3.1% (in 2010—3.2 %) ([www.gks.ru](http://www.gks.ru)). Small investments in 2015 characterize the industry of building materials (0.7 % of the total volume of investments into main capital), glass industry (0.3 %), light (0.2 %), medical (0.2 %), and polygraphic industry (0.2 %). There was reduction of investments into transport starting from 2011, caused by finish of large investment projects in pipeline transport and reduction of scales of investments into railway transport due to reduction of cargo turnover. The results of 2015 also show preservation of

<sup>1</sup>The indicators are calculated based on the data of Table 1 by multiplying the chain indices for the given years.



**Table 3** Investments into main capital for the main types of economic activities, in %

	2000	2005	2010	2011	2012	2013	2014	2015
Investments into main capital, total	100	100	100	100	100	100	100	100
Including for the types of economic activities:								
Natural resources production	18.1	13.9	13.8	13.9	14.8	14.9	16.0	16.2
Processing productions	16.3	16.4	13.2	12.9	13.4	14.4	14.9	11.9
Transport and communications	21.2	24.5	25.5	28.2	26.4	24.5	22.9	20.8
Operations with real estate, rental, and provision of services	15.2	16.8	17.9	15.1	15.6	16.3	17.5	16.7

Source: based on the data of the web-site of the Federal State Statistics Service. Access: <http://www.gks.ru/>

**Table 4** Dynamics of macro-economic indicators of Russia in crisis years

Indicator	2009	2015	Difference
GDP, %	-7.8	-3.7	4.1
Basic spheres, %, including:	-6.0	-4.8	1.2
Agriculture	1.4	3.0	1.6
Industrial production	-10.7	-3.4	7.3
Construction	-13.2	-7.0	6.2
Retail	-5.1	-10.0	-4.9
Paid services for population	-4.2	-2.1	2.1
Wholesale	2.0	-10.4	-12.4
Cargo turnover	-10.1	0.2	10.3
Investments, %	-13.5	-8.4	5.1
Inflation, on average per year, % 1	11.7	15.6	3.9
Real wages of population, %	-3.5	-9.5	-6.0
Change of average annual price for Urals oil, \$	-35.3	-47.5	-12.2

Source: data of Higher School of Economics

insignificant volumes of investments into the most important spheres of social spheres: healthcare (share of investments into this sphere constituted 2.5 % of their total volume), education (1.8 %), and culture and art (1.0 %).

Thus, over 2010–2015, the most important peculiarity of sectorial structure of investments into the main capital of Russian economy was preserved—significant share of spheres of raw materials direction. At that, a large share in structure of industrial investments, like in previous years, constituted investments of export-oriented spheres.

In 2015, inflation in Russia grew substantially (15.6 %), while real wages of population reduced (-9.5 %). Index of industrial production decreased by 3 %. As is seen from the data for certain spheres, the situation in Russia in 2015 became even worse than in 2009 (Table 4). The situation in retail (-10 %) and wholesale (-10.4 %) trade aggravated a lot.

For the analyzed period, agriculture (+1.6 %) and cargo turnover (+10.3 %) showed positive dynamics. As for basic raw material spheres, production of natural resources (+3.1%) grew, with simultaneous negative dynamics of processing industry (−15.2 % in 2009, −5.4 in 2015) against the background of reduction of oil prices (−12.2%). The volume of external trade reduced by 27 %.

#### ***4.2 The Oil Shock, Shown in Quick Reduction of Oil Prices on World Markets***

Definition of economic growth in Russia as a “raw materials” one is only just. Development of extraction industry and export of mineral products provided formation of “profit” budget of Russia. However, the problem consists not in the fact that the raw materials complex develops extensively but in the fact that results of its development are viewed not as intermediary achievement and basis for revival of the whole natural economy.

Let us view export of mineral products from 2000 to 2014. In 2000–2007, export of mineral products grew from \$55.5 billion to \$228 billion (2007)—i.e., in 4.11 times, and by 2013—by 5.8 times. It influenced the economy a lot. However, positive dynamics of export did not lead to expected revival in 2000–2007: GDP grew only by 57.4 % (Table 5).

Profitability of economic activities of enterprises reduced from 18.9 % in 2000 to 13.1 % in 2007 (by 31 %) and to 8.6 % in 2014. The data shows that expenses of enterprises grow quicker than their revenues and income from export.

In 2014, there was slowdown of growth of demand for oil against the background of slow economic activities in several key countries, including Japan and Western Europe. Besides, pressure on demand for oil was influenced by weak growth of GDP in China. As a result, in the second quarter of 2014, growth of demand for oil was at the lowest level for two and a half years. On the other hand, there was growth of supplies of oil from the OPEC countries and non-OPEC countries, reaching 92.8 million barrels daily in the second quarter of 2014,

**Table 5** Export of mineral products and profitability of economy

	2000	2007	2008	2009	2010	2011	2012	2013	2014
Export of mineral products, \$ billion	55.5	228	326	203	271	363	375	377	350
Growth of cost of export of mineral products by 2000, %	100	411	587	368	488	654	676	679	631
Profitability of goods and services in economy, %	18.9	13.1	13	10.8	10	9.6	9.7	7	8.6
Reduction of profitability of goods by 2000, %	100	69	68.8	57	53	51	51.3	37	45.5

which is by 1.2 million barrels more than demand during that quarter. The five largest oil-extracting companies include: Russia (10,110,000 barrels per day), Saudi Arabia (9,735,000 barrels per day), the USA (8,653,000 barrels per day), China (4,189,000 barrels per day), and Canada (3,603,000 barrels per day). Oil production in the OPEC countries was relatively stable, despite the conflict in Iraq which produces more than 3 million barrels per day and is one of the main pillars of global supplies. Against the background of political and military tension in Iraq, investors were troubled by breaks in supplies, and oil prices grew to the maximum of \$115 in June 2014. Worries regarding аров за баррель в июне 2014 года. Anxiety regarding the breaks was not long, so in July 2014 the prices went down again, which was strengthened by expectation of stability of global reserves of oil. As a result, the prices dropped to \$57 for barrel by December. Such situation influenced negatively the cost volumes of export of mineral products. The reduction constituted \$27 billion, or 7.16 % as compared to 2013.

In 2015, according to the Ministry of Economic Development of Russia, the volume of oil production reached 533 million tons. During the year, there was growth of rates of oil production by 2014, and in December 2015 the volume of production grew by 2.2 %, as compared to the level of December 2014. According to operative data of the Ministry of Energetics of Russia, export of oil in 2015 was estimated at 242.3 million tons (108.4 % to the corresponding period of 2014), including into the non-CIS countries—219.5 million tons (110.1 %). At that, the volume of oil export into the CIS countries reduced, constituting 22.8 million tons (94.5 %) due to termination of supplies into the Republic of Kazakhstan according to the inter-governmental agreement (Report by the Ministry of Economic Development 2015).

At the beginning of 2015, mineral & raw materials and energy sectors of Russian economy provided around 25–30 % of the country's GDP, 60 % of revenues of the federal budget, 75 % of export revenues, and 35 % of investments into main capital. At that, appr. 80% of their total contribution accounts for oil and gas complex, the share of which over the years of economic transformations grew significantly: while in 2004 in provided only 21.4 % of the federal budget revenues, as of year-end 2014 it provided 52 % of the federal budget revenues (Kryukov 2016).

The idea of influence of export of oil & gas resources on macro-economic indicators could be illustrated by the data on attraction of rental revenues for formation of the state budget—20 % in 2000 and 40 % in 2014. Another direction of the use of nature rent is supplementing the state reserves. Thus, it is possible to say that the share of rent in GDP is huge.

Oil prices were reducing during 2015 due to expectations of long-term increase of production by the OPEC countries under the preserving excess of global production of oil as compared to consumption, reaching the minimum in December—\$36.7 per barrel. External shock from reduction of oil prices is a key factor that influences Russian GDP. According to the estimates (Long Way to Restoration of Economy 2016), in the mid-term, Russia's contribution into the global growth will be less significant due to low prices for raw materials. Despite the reduction of oil prices, ruble depreciation provided an impulse for growth of competitiveness of

non-raw materials sectors of economy. It should be noted that price advantage will not allow Russian exporters to overcome historical tendencies and structural limitations which determine the character of Russian export.

### ***4.3 Sanction Policy of Western Countries***

Sanctions implemented by the leading countries of the West towards Russia complicated possibilities of economy diversification. A large share of necessary technologies and equipment was banned. Besides, investments into import substituting productions are complicated due to limitation of access of Russian banking institutes and enterprises to international financial markets. Also, there is ban on deals with individuals and legal entities which are in sanction lists. Also, aggravation of Russia's image in the world influences investment potential.

At present, the goal of economy diversification is set before the President and the Government—primarily, in the form of import substitution. However, its realization requires investments into main capital, but recession of economy does not stimulate investments. Investments into main capital reduced by 2.7 % in 2014, and by 8.4 % in 2015 (Zagashvili 2016). At that, over these years, investments into extracting spheres grew, but investments into processing spheres reduced. The norm of accumulation of main capital constituted 20 % in 2014, and reduced to 18 % in 2015 (The Dynamics of Investment Activity 2016).

Double shock from reduction of oil prices and the 2014 sanctions led to significant reduction of GDP and decrease of consumer and investment demand (Vasileva and Salikhova 2016), which was reflected at indicators of real GDP—its reduction in 2015 constituted 3.7 %. Low prices for oil led to ruble depreciation, but the policy of flexible currency rate led to reduction of import share and preservation of the Central Bank's currency and gold reserves, which allowed leveling negative influence of low oil prices on the budget revenues.

The work of M. Klinova and E. Sidorova (Klinova and Sidorova 2014) state that the loss for large economies that implement sanctions is insignificant and usually does not exceed 1 % of GNP. At that, if the annual growth of GDP constitutes around 1 %, like in the EU and Russia, sanctions might lead to negative dynamics in both countries.

Economic sanctions led to banking sector's losing access to the Western credits. The sanctions influenced investments more than trade. Based on experts' forecasts, low rates of growth of investments will be preserved due to the following factors.

Firstly, low global demand for Russian export and low prices for raw materials limit investment possibilities in the spheres oriented at export. Besides, the observed process of reduction of real income of population leads to weakening of internal demand, which leads to reduction of stimuli of enterprises to conduct of investments into growing the capacities of production for internal market. According to A. Bulatova and N. Abulguzina, the effect from sanctions for the raw materials sector has a long-term effect and could be felt some time later. The

**Table 6** New inflow of direct foreign investments for the spheres, 2013–2015

Spheres/sectors	2013	2014	2015
All spheres	40.140	12.907	2.640
raw materials spheres	3.361	2.036	2.551
secondary production	21.172	2.201	1.721
services	14.114	8.244	−1.717
undistributed articles	1.411	370	81

Source: based on the data of the Central Bank of the RF. Access: <http://www.cbr.ru/>

consequences are manifested in separate cases of lack of companies' access to certain technologies (Bulatova and Abulguzin 2015).

Secondly, the regime of economic sanctions limits the access to capital and inflow of direct foreign investments (hereinafter, DFI)—Table 6.

Thirdly, low level of oil prices oil prices and reduction of the volume of oil revenues limit the possibilities of budget for growth of state investments (Long Way to Restoration of Economy 2016).

In 2016, adaptation of economy to low global prices for raw materials continues under the conditions of preservation of sanctions. According to the World Bank forecast, the 2016 will see the recession of economy by 1.9 %. However, positive growth of GDP by 1.1 % is expected in 2017. Based on the experts' estimates, in 2016 the oil prices will stay at the average level of 2015 (\$37 per barrel), which is much lower than estimate price of 2016 (\$53 per barrel) (Long Way to Restoration of Economy 2016). In order to level the influence of sanctions and provide economic growth, the state should be the main investor in the country—in particular, through infrastructural projects (Belokopytov 2016).

#### ***4.4 Insufficient Development of Financial Sector***

A decisive factor that determines sustainable development of Russian economy is presence of financial resources. Establishment and development of market economy in Russia for the recent 25 years allow stating that lack of sufficient volume of long-term financial resources was one of significant obstacles for full-scale modernization of infrastructure and main funds of enterprises.

As to the type of financing of economy, Russian banking system relates to the system of continental type (Table 7). Banking institutes are the most multiple group of financial intermediaries with the 90 % share in the structure of assets of financial intermediaries of Russia. Accordingly, the share of non-credit financial institutes accounts for only 7 % of all total assets. Evaluating the dynamics of development of financial intermediaries, it is necessary to note annual growth of their assets—however, ratio of assets to GDP grew from 72 % to 110 % in 2009–2015, which is not sufficient.

**Table 7** Dynamics of quality and assets of financial intermediaries in Russia

Main indicators	Commercial banks		Insurance companies		IPF		DFF		Total	
	2009	2015	2009	2015	2009	2015	2009	2015	2009	2015
Quantity	1,228	797	786	537	243	118	1,061	1,553	3,318	3,005
Assets (RUB billion)	28,022.0	73,513.4	773.0	1,585.8	578.0	2,826.4	646.0	2,538.9	30,019	80,464.5
Ratio of assets to GDP (%)	67.5	100.4	1.8	2.2	1.4	3.9	1.6	3.5	72	110.0
Share of institute in total structure of financial intermediaries (for assets)	93	91	3	3	3	4	2	2	100	100

Source: based on the data of the Central Bank of the RF. Access: <http://www.cbr.ru/>

Under the conditions of sanctions against a range of Russian banks, expansion of resource base from 2014 took place primarily due to internal sources of funding: organizations' assets and population's reserves. As compared to 2013, dynamics of corporate crediting is more intensive—due to necessity for substituting external financing by credits of domestic banks. The banks evaluate their own risks more conservatively and form additional reserves for possible losses for the loans. Due to that, income of banking sector in 2014 and 2015 was lower than before. Besides, the Bank of Russia continues realization of measures for cleaning the banking sector from financially unstable organizations that are not capable to ensure preservation of customers' assets and from banks that perform doubtful operations.

Slowdown of crediting growth is supported by low business activity, which is at the level of the 2009 crisis. Credit rates are too high for development of business, but banks cannot reduce the interest—there are no cheap “long-term money” and risks are too high.

However, the problem of expensive and short banking credits is not solved and is even aggravated. Interest rate for credits in Russia almost always exceeds the inflation rate (Bagautdinova and Tokareva 2014).

In the sectorial aspect, the largest share and growth of debt accounts for credits issued to enterprises of extracting and processing productions (22.2% of corporate portfolio as of January 1, 2015) and enterprises of retail and wholesale trade (19.0%).

The level of interest rates for banking credits was influenced by expensive funding in 2014–2015. Average interest rates for ruble credits, provided by the banks to non-financial organizations for more than 1 year constituted 15.09% at the beginning of 2015, and dropped to 12.95% at the end of the year.

The fact that the main function of banks consists in provision of real sector of economy with credit resources is generally known. But 2014–2015 shows an opposite process: financial resources are taken from real sector of economy in the form of taxes and are given to commercial banks in the form of state support. According to some estimates, the sum of such operations constitutes RUB 2 trillion (Ponkratov 2015).

As a result of realization of anti-crisis plan of the Government of the RF for 2008–2009, only large banks participated in capital increase. In the anti-crisis plan, established in January 2015, the main recipients were large state and private banks—which gave them advantages in competitive struggle and, under the conditions of lack of control over the targeted use of the assets, stimulated the banks for search for speculative sources of income.

Thus, the factors that perform significant influence on existing stagnation of Russian economy include:

- reduction of external and internal demand;
- reduction of the scale of import;
- reduction of prices for main Russian raw material products;
- reduction of volumes of Russian and foreign investments into main capital;
- oil shock, manifested in quick reduction of oil prices in the global markets;

sanction policy of the Western countries; effect from sanctions on raw material, extracting, and processing industry and machine building has a long-term character, and might be felt in future; problems of development of financial sector, and, as a consequence, insufficient volume of financial resources.

## 5 Conclusions

In order to ensure the GDP growth of 1 % per year by the middle of the twenty-first century, there's necessity for dynamics growth of oil prices and/or modernization of economy, as well as supporting a certain level of oil extraction. Being dependent on the OPEC policy regarding oil prices, Russia cannot control the first factor, but is still can manage the other two.

Russian economy has a long way ahead to restoration after a long period of functioning under the conditions of low prices for oil and sanctions.

The main task of the government for the long-term is support for growth of competitiveness of economy and provision of economy's diversification beyond the raw material sector. Diversification of Russian export requires conduct of structural reforms and provision of favorable investment and business climate, which will allow improving long-term perspectives of development of Russia as compared to current forecasts of growth of 1–2 % during 2017–2018.

A key role for economic growth belongs to provision of economy with accessible and cheap financial resources. At the same time, existing structure and quality of development of financial intermediaries do not conform to the need of Russian economy. The main problems hindering the expansion of long-term crediting of enterprises and organizations include low capital increase of the banking system, high interest rate, and lack of long-term resource base. Outflow of money assets from economy due to various circumstances aggravated liquidity of banking and credit system, which also slows down the growth of investment activity in real sector. Insurance companies, non-state pension funds, and mutual funds, the assets of which in developed countries could be compared to assets of the banking system, are too weak in Russia for supporting real sector of economy by the long-term financial resources.

In order to improve the current state in the financial sphere, the Bank of Russia has to conduct the policy aimed at control over the targeted use of credit resources (including by presence of its representatives in credit committees of commercial banks) and at reduction of interest rate as one of components of expenses for manufacture of products. Modern economic development requires conduct of expansionist money and credit policy aimed at increase of money offer and stimulation of demand for money.

There should be reduced rates for agriculture, construction, and other "seasonal" spheres with low profitability. Access to the refinance system should be opened for all commercial banks under the universal conditions, including targeted use of



credits, and for banks of development—under the special conditions that correspond to the profile and targets of their activities.

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# Transformation of Ethnocultural Development of Indigenous Peoples in the Conditions of Socialist Modernization of the Far East in 1920–1970s: Problems of Historiography

Anna V. Akhmetova

**Abstract** The paper addresses the historiography of the problem of transformation of ethnocultural development of the indigenous peoples in the conditions of the socialist modernization of the Far East in 1930–1970s. The theses identified the main stages in the development of historical scientific knowledge on the history of minority ethnic groups of the Far East during the study period.

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Russian Federation is a multinational state, so wise management of ethnocultural diversity of Russia is the most important condition for successful development of moral potential of the country, strengthening of its integrity, and increase of living standards.

Study of the history of ethnocultural processes in the Far Eastern region is very topical as of now, as it allows solving many problems of interethnic barriers, which were created earlier, and building comfortable relations in polyethnic environment.

The main problems that are solved in this research are viewed through the prism of the theory of modernization. This concept is very authoritative in history and is a very complex phenomenon of modernization at a higher level of knowledge, which allows determining peculiarities of transitional stage of the society from one type of civilization to another (Gorelikov 2011).

The concept of modernization receives new meaning within study of adaptive (overcoming) variant of modernization, which was Soviet modernization—an

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effort to quickly achieve qualitative and quantitative indicators of the leading Western countries. The socialist variant of modernization that was used in the USSR—despite all ideological differences—was one of the varieties of the general modernization process and adapted reaction of non-Western societies (Gavrov 2010). The model of socialist modernization correlated with collectivist mentality of non-Western societies, including indigenous small peoples of the North. That's why the Soviet variant of transformation of ethnocultural development of traditional peoples became more successful than in the Western countries in the studied period. Negative tendencies, peculiar for the final stage of socialist modernization of ethnocultural development of indigenous peoples, are related to the general systemic crisis influencing the country in the period of stagnation.

The history of national policy regarding small peoples of the Far East was thoroughly studied by many Soviet and modern scholars.

Historiography of these problems could be divided into three main groups for the problem and chronological principle:

1. historiography of the problem until 1956;
2. history of study of the problems after 1956;
3. latest historiography (1991—until now).

Historiography of the history of indigenous peoples of the Far East of the first stage describes the measures of command and administrative system of management that took place in the country. All these scientific works included confidence in the positive results of radical transformations in the sphere of management of national territories.

The work of A.G. Bazanov “School in the Far North” contains very valuable materials on the school construction (Bazanov 1939). The work provides comparative and historical study of the state of schools during the Tsar regime and of school construction after the October Revolution, as well as analysis of the setting of teaching work in the northern educational establishments, which makes this work a valuable source of knowledge on the history of the national school in the Far East.

The problem of transition of indigenous population to the Soviet mode of life was viewed by M.A. Sergeev. His conclusions, based on historical and ethnographic material, are important in the issues of study of economic potential of indigenous peoples of the Far North. In his works, he compared the pre-revolutionary culture of indigenous population of the Far North and state & national construction, beginning from the civil war. Sergeev considered that for the historical science a special interest was presented by solving the problems that appeared during the Tsar period, after establishment of authority of new Soviet government. “Resurrection of indigenous peoples showed that these peoples became overcoming in their development due to unfavorable socio-political environment” (Sergeev 1955)—these are conclusions by M.A. Sergeev at the end of his work. This work started a range of studies devoted to various aspects of non-capitalist path of development.

The next period of the historiography of the studied problems began in 1956 with political events of the “Khrushchev Thaw”.

Specifics of historiography of 1950–1960s is closely related to cardinal changes in social and political life that took place in the country after the 20th Congress of the Communist Party of the Soviet Union. This period saw the introduction of new historical sources for the history of national policy of the country which became accessible for the scholars, and the first effort to overcome dogmatism in scientific works was done.

In her work “Small peoples of Amur region after the socialist revolution”, E.V. Yakovleva viewed establishment of councils (soviets) in national regions (Yakovleva 1957). She also studied establishment of cultural and teaching work in the Far North.

In Soviet historiography of this period, revolutionary transformations of indigenous peoples were traditionally viewed as a transition to socialism with passing capitalism, which could be seen in the works of Russian researchers.

A significant place among the works on national policy in the Far East belongs to the work by V.G. Balitskiy (Balitskiy 1969), in which economic and cultural development of indigenous peoples after the October revolution is analyzed.

A large contribution into development of the studied problems was done by I.S. Gurvich (Gurvich 1961), who substantiated effectiveness of the conducted modernization transformations, aimed at enlargement of kolkhoz, but still distinguished their insufficient attention to national peculiarities of small peoples, which could negatively influence their further development (Gurvich 1960).

On the whole, historiography of 1950–1960s is peculiar for the fact that together with generalizing works that study the transformations of the indigenous peoples of the Far East, there are purely ethnographic works that study state measures in the sphere of administrative and territorial management, economics, teaching, and culture of specific small peoples. Monographs of C.M. Taksami (Taksami 1964), V.G. Larkin (Larkin 1964), A.V. Smolyak (Smolyak 1966), K.G. Kuzakova (Kuzakov 1968), and I.S. Vdovin (Vdovin 1973) are devoted to peculiarities of ethnocultural development of koryaks, the Nivkh, Udegoj, the Ulch, etc. The tendency of transition to a narrower ethnographic subject allowed the scholars to state that central and regional authorities should pay attention not only to specifics of small peoples but take into account interests of each people, in particular (Taksami 1967a,b).

An important issue of this period is contribution of indigenous small people of the Far East in World War II; this was studied by V.G. Balitskiy in his work “Small peoples of the Far East in the Great Patriotic War” (Balitskiy 1985), V.B. Bazardzhapov in “National regions of Siberia and the Far East during the Great Patriotic War” (Bazardzhapov 1981), L.R. Atlontova in “Soldiers of Sakhalin land: the Nivkh—participants of the Great Patriotic War of 1941-1945” (Atlontova 2007), and V.G. Buldakova in “Indigenous peoples of the Amur region in the Great Patriotic War” (Buldakova 2005).

The problem of restoration of economy of traditional peoples in post-war period is studied in the works of T.A. Kolpakova “The Policy of Soviet State Regarding Indigenous Small Peoples of the Far East (1945–1960)” (Kolpakova 2006), M.E. Budarin “Way of Small Peoples of the Far North to Communism” (Budarin

1968), and A.N. Babay “Constitutional and Legal State of Indigenous Small Peoples of the Amur Region” (Kiselev 2001).

The issues of the spheres of healthcare and educational system of this period were studied by A.G. Kozlov (“From the History of Healthcare of Kolyma and Chukotka in 1941–1945” (Kozlov 1984) and L.N. Verin “Development of Secondary School in Kolyma and Chukotka (1917–1969)” (Verin 1970), etc.

The topic of national and state development was thoroughly studied. A large contribution into development of the problems of indigenous peoples was done by V.A. Zibarev (Zibarev 1972)—he studied difficulties experienced by the peoples of the North on their path from patriarchal and family mode to socialism. The author showed the successes achieved by indigenous peoples in development of economy and culture in the Soviet period. V.A. Zibarev contradicted M.A. Sergeev and other researchers who considered that transition of the peoples of the North to socialism took place at the end of 1930s, assigning this period to 1950s.

Peculiarities of indigenous peoples were viewed by I.S. Gurvich in his work “Ethnic Development of Northern Peoples in the Soviet Period” (Gurvich 1987). It characterizes socio-economic, language, and ethnocultural changes that took place in the life of indigenous people after establishment of the Soviet power in the peripheral territories of Russia.

The work by V.N. Uvachan (Uvachan 1984) distinguishes general and specific features of Soviet policy regarding indigenous peoples of the North.

The works by A.V. Smolyak are based on analysis of own field material with attraction of archive data. She described peculiarities, culture, and everyday life of the tungusic peoples of the Far East and determined mutual influence in cultural and economic sphere. She studied the social system and religious beliefs of Amur peoples (Smolyak 1984).

The next stage of the historiography of the studied problem is related to radical transformation of social & political and economic life of our country after 1991.

In 1990s, the main direction of the Russian historiography of national policy of the Soviet state regarding small peoples of the Far East was overcoming the flaws of the previous period of development of scientific knowledge, getting rid from ideological influence, and entering a new level of historical research. New aspects of historiography are predetermined by two factors.

The first one is changes that took place in all aspects of public life of Russia that caused transformation of humanitarian cognition. The Russian science had a new methodological setting for priority of not material foundations of people but of personally significant values.

The second factor is related to the fact that drawbacks of transformation of life of indigenous peoples of the Far East were showed vividly in 1990s—they were related to establishment of market relations all over the country, including the Far East. Breaking of traditional economic ties and of national culture, on the one hand, and long paternalism of the state regarding small peoples, on the other hand, led to the fact that they were not ready to new economic realia.

Modern researchers of life of indigenous peoples during the Soviet period evaluate transformations in view of modernization processes of the society.

L.Y. Ivashchenko speaks of teachers of northern schools as of researchers of traditions, culture, and everyday life of the north people (Ivashchenko 1996).

The work by S.V. Bobyshev is very important as well—in it, he views the contest side of activities of such bodies of public authorities as Committees of the North, for helping small peoples in economic and cultural spheres in 1920–1930s and shows positive and negative tendencies in the work of Soviet bodies for conduct of national policy (Bobyshev 2000).

V.P. Serkin (Serkin 2008) views the ways of development of the system of national education and describes existing problems in teaching the indigenous peoples. V.A. Kryazhkov (Kryazhkov 2010) studies the problems of development of normative and legal base for indigenous peoples of the Far North.

It could be concluded that historiography of the studied period is presented very widely. Relations between the Soviet government and indigenous peoples were studied by many scholars, as this subject has been very topical and this period is very problematic, which proves the necessity of deep analysis.

Analysis of historiography of the problem showed a lot of approaches to study of ethnocultural processes. There is no special study devoted to full description of various aspects of interethnic communication in the Far East in the system of historical process of transformation of interrelations of various peoples and cultures. Study of ethnocultural processes in the period of radical transformation of the whole Soviet society and state in regional view is a high-priority direction of modern humanitarian sciences—both Russia and foreign. Interdisciplinary character of this direction conforms to topical tendencies of development of modern science.

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# Conclusions

**Elena G. Popkova, Valentina E. Sukhova, Aleksey F. Rogachev,  
Yulia G. Tyurina, Olga A. Boris, and Valentina N. Parakhina**

The most important results of this volume include determination of contradiction of economic clustering, determination of the role of clusters in development of various spheres of economy and separate markets, and increase of effectiveness of entrepreneurship on the whole. By combining the scholars' efforts, it was possible to analyze the notion, sense, and tendencies in the sphere of transnational cluster initiatives in business, as well as perspectives of their further development.

The scientific studies that are collected in this book contribute significantly into development of modern concept of economic clustering, the concept of innovative development of entrepreneurship, the concept of regional nature use and development of "green" technologies, the concept of globalization and integration, the concept of rationalization and optimization of resources use, the concept of regional economy, the concept of state territorial management, and the concept of sustainable economic growth of the region.

The latest studies that are collected in this volume allow for systematization of scientific knowledge in the sphere of cluster development of economic systems, their integration and sustainable development and provide a platform for development of universal mechanisms for solving these problems. We hope that fruitful

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cooperation of our authors and this book will be the basis for stimulation of interest to new research and inventions in this sphere.

It should be concluded that further perspectives of fundamental and applied research in the sphere of integration, clustering, and sustainable economic growth are related to practical realization and approbation of the developed methodological approaches, authors' recommendations, and economic models in activities of modern socio-economic systems for the purpose of verification of their effectiveness, as well as specification and improvement.