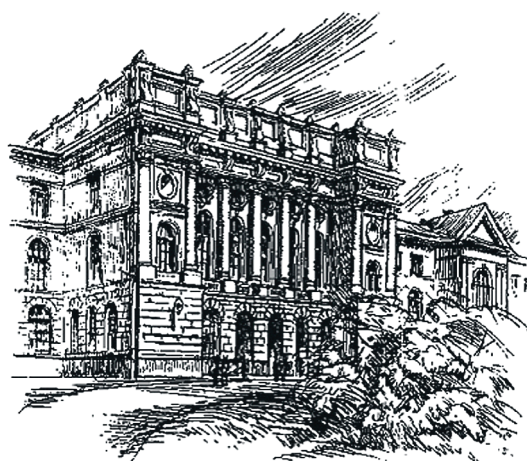


THE MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION



ST. PETERSBURG STATE POLYTECHNICAL UNIVERSITY JOURNAL

Economics

Vol. 11, No. 2, 2018

Polytechnical University Publishing House
Saint Petersburg
2018

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The journal was published since 2008 as part of the periodical edition *Nauchno-tekhnicheskie vedomosti SPbGPU* (ISSN 1994-2354)

Subscription index **36637** in the "Press of Russia" Joint Catalogue.

The journal is registered with the Federal Service for Supervision in the Sphere of Telecom, Information Technologies and Mass Communications (ROSKOMNADZOR). Certificate ПИ № ФС77-52146 issued December 11, 2012

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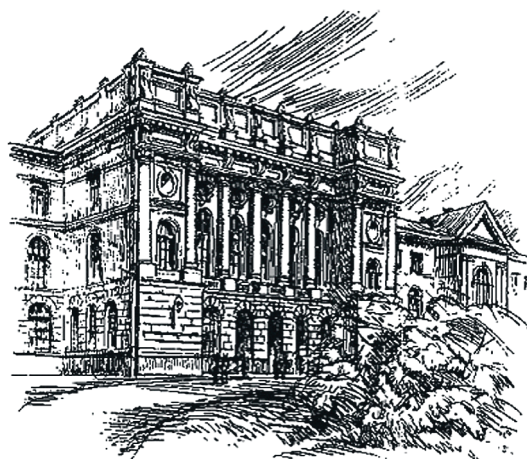
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МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ



НАУЧНО-ТЕХНИЧЕСКИЕ ВЕДОМОСТИ

САНКТ-ПЕТЕРБУРГСКОГО ГОСУДАРСТВЕННОГО
ПОЛИТЕХНИЧЕСКОГО УНИВЕРСИТЕТА

Экономические
науки

Том 11, № 2, 2018

Издательство Политехнического университета
Санкт-Петербург
2018

НАУЧНО-ТЕХНИЧЕСКИЕ ВЕДОМОСТИ САНКТ-ПЕТЕРБУРГСКОГО ГОСУДАРСТВЕННОГО ПОЛИТЕХНИЧЕСКОГО УНИВЕРСИТЕТА. ЭКОНОМИЧЕСКИЕ НАУКИ

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Журнал с 2002 года входит в Перечень ведущих рецензируемых научных журналов и изданий, где публикуются основные результаты диссертаций на соискание ученой степени доктора и кандидата наук.

Сведения о публикациях представлены в Реферативном журнале ВИНИТИ РАН, в международной справочной системе «Ulrich's Periodical Directory».

С 2008 года выпускался в составе сериального периодического издания «Научно-технические ведомости СПбГПУ». ISSN 1994-2354.

Подписной индекс **36637** в объединенном каталоге «Пресса России».

Журнал зарегистрирован Федеральной службой по надзору в сфере информационных технологий и массовых коммуникаций (Роскомнадзор). Свидетельство о регистрации ПИ № ФС77-52146 от 11 декабря 2012 г.

Журнал включен в базу данных «Российский индекс научного цитирования» (РИНЦ), размещенную на платформе Научной электронной библиотеки на сайте <http://www.elibrary.ru>

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DOI: 10.18721/JE.11201
UDC 37.014.54

THE PRINCIPLES OF ORGANIZING THE EDUCATIONAL SYSTEM FOR PERSONNEL TRAINING IN A DIGITAL ECONOMY

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The article considers the changes taking place in almost all countries of the world, associated with the transition to a digital economy. The focus is on the peculiarities of higher education as the most important factor determining the opportunities for the development of any economic system. Currently, Russia has to modernize higher education in accordance with the needs of the labor market and further integration of Russian education into the global economic and educational space. The article confirms that universities have to change the educational paradigm in the developing digital economy. We have proposed a change from the outdated traditional models of educational activities to new ones that can stand up to the challenges of our time. We have formulated the main principles of organization of the educational process, such as the introduction of the competence approach into the educational process, use of methods of project-based learning, digitalization and informatization of education, the implementation of individual educational trajectories. We have considered the principle of forming professional competences through the integration of education, science, business structures and enterprises of high-tech industry on the basis of communities of teachers, students, and scientists. The proposed method of electronic portfolio (web portfolio) as one of the innovative teaching methods based on the formation of an individual educational trajectory. Analysis of the structure and interaction of the portfolio of the university allows to improve the system of criteria and indicators for estimating the efficiency of educational and scientific activities of faculties and institutes of the university, to streamline the organization and management of the university. Measures based on the principles offered will allow to implement new forms of training, increase the motivation of participants in carrying out scientific research and the efficiency of university's management. This will provide the possibility of forming an innovative environment of the university on a qualitatively new level, and building a system of university management in accordance with the university's tasks and taking into account modern trends. There is a plan to develop a mechanism of managing the innovative potential of the university in the nearest future in order to conduct personnel training on a fundamentally new quality level, taking into account contemporary tendencies.

Keywords: digital economy; higher education; human resources; competence; project learning; individual educational trajectory

Citation: N.O. Vaseyskaya, V.V. Glukhov, The principles of organizing the educational system for personnel training in a digital economy, St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 7–16. DOI: 10.18721/JE.11201

ПРИНЦИПЫ ОРГАНИЗАЦИИ СИСТЕМЫ ОБРАЗОВАНИЯ ПРИ ПОДГОТОВКЕ КАДРОВ В УСЛОВИЯХ ЦИФРОВОЙ ЭКОНОМИКИ

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Санкт-Петербург, Российская Федерация

Рассмотрены изменения, происходящие практически во всех странах мира, связанные с процессом перехода к цифровой экономике. Большое внимание уделено особенностям функционирования системы высшего образования как важнейшего фактора, предопределяющего возможности развития любой экономической системы. В настоящее время для России необходимыми являются процессы модернизации высшего образования в соответствии с потребностями рынка труда, а также в целях интеграции отечественного образования в мировое экономическое и образовательное пространство. Показана необходимость смены образовательной парадигмы университетами в результате развития концепции цифровой экономики. Предложен переход от устаревших традиционных моделей образовательной деятельности к новым, наиболее соответствующим вызовам современности. Сформулированы основные принципы организации образовательного процесса, такие как внедрение компетентностного подхода в образовательный процесс, использование методов проектного обучения, цифровизация и информатизация образования, реализация индивидуальных образовательных траекторий. Рассмотрен принцип формирования профессиональных компетенций в результате интеграции образования, науки, бизнес-структур и предприятий высокотехнологичной промышленности на базе сообществ преподавателей, студентов, ученых. Предложен метод электронного портфолио (web-portfolio) как один из инновационных методов обучения на основе формирования индивидуальной образовательной траектории. Результаты анализа структуры и взаимодействия портфолио вуза позволят совершенствовать систему критериев и показателей оценки эффективности образовательной и научной деятельности кафедр и институтов вуза, организацию и управление деятельностью вуза. Выполнение мероприятий на основе предложенных принципов позволит реализовать новые формы обучения, повысить мотивацию участников при проведении научно-исследовательской деятельности и увеличить эффективность управления вузом. При этом будет обеспечиваться возможность формирования инновационной среды университета на качественно новом уровне, а также выстраивания системы управления вузом в соответствии с решаемыми им задачами и с учетом современных тенденций. Планируется разработка механизма управления инновационным потенциалом вуза в целях подготовки кадров на качественно новом уровне с учетом современных тенденций.

Ключевые слова: цифровая экономика; высшее образование; кадры; компетенции; проектное обучение; индивидуальные образовательные траектории

Ссылка при цитировании: Васецкая Н.О., Глухов В.В. Принципы организации системы образования при подготовке кадров в условиях цифровой экономики // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 7–16. DOI: 10.18721/JE.11201

Introduction. For the last ten years, the development of information and communication technologies (ICT) has gained vast significance in the world. Countries are rapidly moving towards a new economy which has digital technologies as its main instrument and information as a main production resource on a

level with energy, materials and finances. Scientists call this new economy digital, communicative, network, or Internet economy in their works, that is, they emphasize the point that ICT, digital communication, computer networks, modern communications have to be used in business.

The term 'digital economy' was the subject of much debate at the beginning of the 21st century, since different specialists had different opinions on what the new economy was, and, accordingly, described it by different names. The term appeared due to two factors: the rapid development of this phenomenon in Great Britain, the USA and Australia, as well as formalization of the term in the European Union [1].

The notion of digitalization indicates a new step in the improvement of production management and production itself on the basis of implementing ICT, from the Internet of things to digital government technologies. In the foreseeable future, the rank of each country in the world community will be governed by the level of computerization. The countries that are able to implement the principles of digital economy will achieve economic efficiency, competitiveness, a permanent increase of standard of living, a cutback in the cost of living, optimization of educational trajectories for disabled people, usage of their potential as a positive element of digital economy.

The modern development of digital economy has led to digital transformation of all aspects of human activity [2–5], such as commerce, construction, power engineering, development of cities and railroads. In these conditions people and their ways of communication with the environment must change in order to meet the demands on performing industrial and other functions in the digital world. Digital transformation influences both industrial and social spheres, including education.

The sphere of education is one of the key and most promising fields of the competition for economic influence between the countries in the 21st century. Global competition sets completely new goals for the government in the sphere of education. These goals are connected with emerging new professions, as well as needs for personnel in amounts that is cannot be found at the labor market. To ensure successful development of digital economy, the educational system must provide competent specialists for the economy. The countries able to adapt their educational infrastructure to the new needs will significantly strengthen their economic positions while shifting to digital economy. Russia has every chance to maintain its own competitiveness by modernizing the educational system and personnel training.

Representatives of 40 most developed countries signed the «Digital Economy: Innovation, Growth and Social Prosperity» Ministerial Declaration at a Ministerial Meeting under the auspices of the Organization of Economic Co-operation and Development (OECD), held in June 2016 in Cancun (Mexico). Russia joined this path in December 2016.

In December 2016, the path to digital economy became the leading direction for Russian economy in general. It happened after President Vladimir Putin stated the following in his annual address to the Federal Assembly: «I suggest that we should launch a widescale systematic program of the economy of new technological generation – the so-called digital economy. In its realization we will rely on Russian companies, scientific, research and engineering centers of the country».¹ At the moment, when it comes to the development of Russian economy, the most important issue is the necessary competences and educational technologies for developing such skills.

Under the auspices of the Agency of Strategic Initiatives (ASI), the Russian Federation Government approved the Program «Digital Economy of Russian Federation» (referred to as the Program from now on) on July 28, 2017. The Program is aimed at «creating the conditions of the development of people's knowledge in the Russian Federation, increasing the general quality of citizens' lives through increasing the availability and quality of goods and services that are made in the digital economy using contemporary digital technologies...».² This Program is implemented within the framework of the Strategy of the Development of Information Society in Russian Federation for 2017–2030, approved by the Decree of the President of the Russian Federation issued on May 9, 2017, and it takes into consideration the objectives fulfilled within the framework of the National Technological Initiative.³

¹ Poslaniye Prezidenta Rossiyskoy Federatsii Federalnomu Sobraniyu Rossiyskoy Federatsii ot 01.12.2016. URL: <https://ria.ru/politics/20161201/1482599952.html> (accessed October 24, 2017).

² Ob utverzhdenii programmy «Tsifrovaya ekonomika Rossiyskoy Federatsii». Rasporyazheniye. Rasporyazheniye No. 1632-r ot 28 iyulya 2017 g. URL: http://www.consultant.ru/document/cons_doc_

³ LAW_82134/ (accessed October 24, 2017).

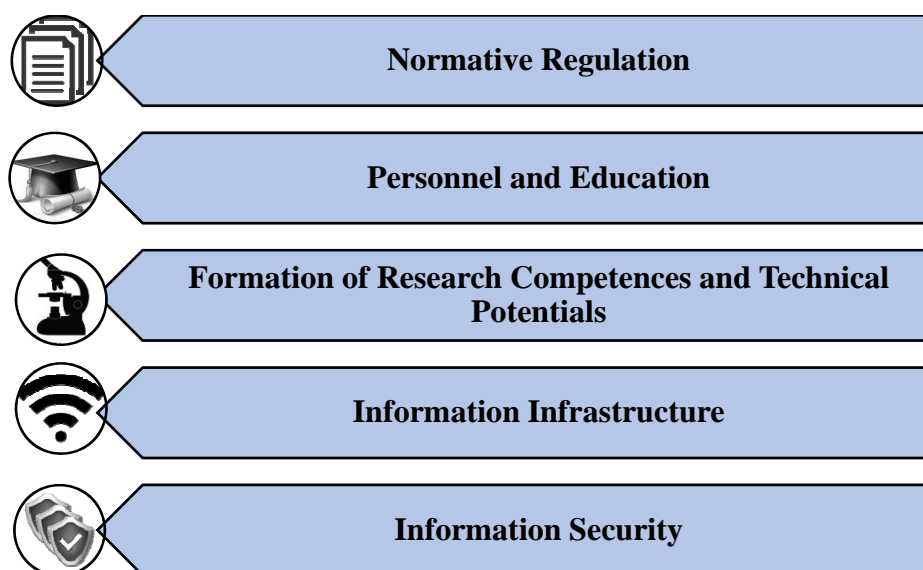


Fig. 1. Basic directions of the Program «Digital Economy of Russian Federation»

The report «Global Information Technologies» for 2016, assessing the extent to which digital technologies were used by countries to increase competitiveness and prosperity, was presented at the World Economic Forum. The data shows that Russian Federation holds so far the 41st rank in readiness for digital technology [6]. At the same time, Russia significantly falls behind such countries as Singapore, Finland, Sweden, Norway, the USA and the Netherlands. The Program projects that in eight years Russia will take the leading positions in the rating of attractiveness for highly skilled specialists, which is especially important in the global economic environment, where integration processes are intensifying. Skilled personnel are needed to fulfil such plans.

Personnel training is one of the five basic directions of the Program within the framework of the «Personnel and Education» direction (Fig. 1). Apart from the basic directions, the Program proposes three more directions, such as «Government Management», «Smart City» and «Digital Health Care».

The main goals of the «Personnel and Education» direction are:

- creating the key conditions of personnel training for the digital economy;
- perfecting the educational system which should provide competent personnel for the economy;
- the labor market that should rely on the demands of the digital economy;

- creating a motivation system for acquiring the necessary competences and participation of personnel in the development of Russian economy.⁴

The analysis of these goals shows that Russia has every chance to maintain its competitiveness through modernization of education systems and personnel training.

Goals and objectives. The main goal of the study is to formulate a number of principles which must be the foundations of the smart university concept. Accordingly, the objectives of the study are to analyze and determine the main principles of the organization of smart universities and to show the connection between these principles. From the theoretical point of view, the study is significant for the formation of the basics of conceptualization of smart education.

Renewing outdated programs of vocational education and career training to eliminate the gaps in digital skills necessary for modern economy may be one of the government's first steps in adapting the educational system to the needs of the digital economy. These changes must be introduced at the federal level, since a significant part of industries requiring qualified specialists for digitalization are situated outside big cities. The curriculums of modern

⁴ Ob utverzhdenii programmy «Tsifrovaya ekonomika Rossiyskoy Federatsii». Rasporyazheniye. Rasporyazheniye No. 1632-r ot 28 iyulya 2017 g. URL: http://www.consultant.ru/document/cons_doc_



universities virtually lack subjects preparing students to search for problems and objectives, analyze the society's needs and ways of satisfying them. For this purpose, it is expedient to develop intellectual information and analysis systems for vocational education management [6, 7].⁵ A system of information management and analysis in the sphere of education should perform a number of complex tasks, aimed developing the educational system in accordance with the objectives set and the current activities of educational establishments. Artificial intelligence systems (information, expert, analytical ones) are expected to be widely introduced into the educational process in the foreseeable future.

The current share of employees whose functions are connected with the implementation and development of digital technologies is 2 % of the general working population of Russia [8]. This is half as much as in the countries that are digital leaders, such as the USA and Europe. Russia also falls behind the leading countries in the level of employment in the high tech and knowledge-intensive branches. This indicator is estimated to be about 5.5 % in Russia, while in Germany it is about 10 % [8].

In the long term, all levels of the Russian educational system need to undergo extensive transformations on the basis of the following principles:

- usage of methods of project teaching;
- implementation of the competence approach;
- digitalization and computerization of education;
- individualization of teaching (flexibility of educational trajectories).

Let us consider the implementation of each of these principles that can be used to develop a full-scale concept of a new type of university.

A transition to **project education** is happening in the world. Projecting is defined as the creation of new objects with pre-determined characteristics. On-the-job training during various projects becomes the main method of personnel training. To achieve that, integrative scientific and educational creative spaces have to be created at universities. Such spaces must be aimed at forming the environment for interdisciplinary project work on Russian and international industry orders executed jointly by

representatives of academic institutions, industrial enterprises, students, postgraduate students and teachers. In order to successfully develop this activity, the key technologies should be rapidly introduced, the material and technical base should be improved, and a positive experience of working with the world's leading high tech enterprises should be acquired.

Using the methods of project teaching in personnel training implies integrating the educational processes with scientific search. As a result, on the one hand, the learners' creativity is improved, they generate new knowledge and become highly qualified specialists in the future, and, on the other hand, knowledge-intensive technologies are created and subsequently introduced data into the real sector of economy. The educational process in such a university is implemented by education within the process of creating new knowledge, that is, through the integration of science, the educational process and production. This type of education is connected with practice much more closely. Thus, the university becomes both a direct producer of new knowledge and an active participant of transforming the gained knowledge into technologies and services.

Integration of the educational, scientific and business environments and the real sector of economy allows industrial enterprises to influence the teaching process and to obtain the personnel trained in accordance with the current tendencies. In their turn, universities monitoring the changing demands of different industrial branches for specialists are interested in swiftly reassessing the contents of educational programs and teaching methods, which in turn increases the competitiveness of a university.

In the developing digital economy, the main tasks of higher educational institutions include not only transferring a certain set of relevant skill and training specialists in a narrow professional field, but also teaching students to independently and quickly extract the necessary information from a rapidly increasing volume of data, create knowledge, develop competencies, that is, the introduction of a **competence approach**. It is advisable to focus on the competences of graduates as an end result of project-oriented learning. Competencies can be defined as personal qualities that are continuously developed in the process of education in a university,

⁵ LAW_82134/ (accessed October 24, 2017).

expressed in the ability and readiness for independently solving research tasks on the orders of domestic and global industrial enterprises, mastering the methodology of research work, being capable of using the existing methodological developments in professional activities.⁶

The best results in forming the competences of specialists can be achieved with the help of practical solution of complex industry tasks by teachers and different kinds of students working in interdisciplinary teams based on the leading scientific schools through mutual accomplishment of interdisciplinary research using high techn equipment and innovative industrial technologies (Fig. 2).

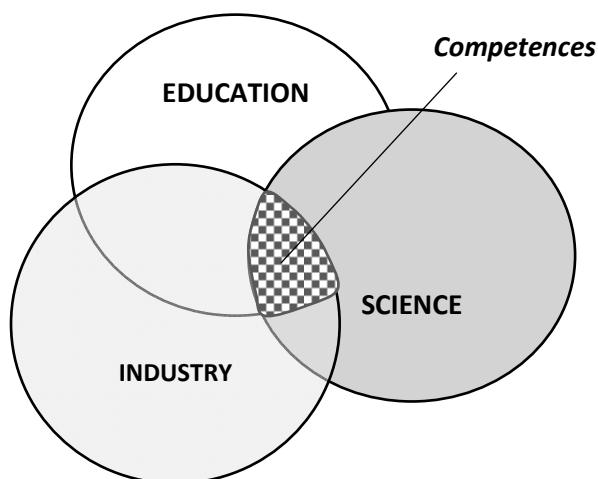


Fig. 2. The principle of the formation of professional competences

The most important factor in the transformation of modern society and higher education in particular is its global **computerization** and **digitalization**, caused by rapid development of information technologies, Internet resources, communication channels and different means of transfer and exchange of information. Information technologies bring new opportunities for the educational system, allowing educational establishments to cover additional categories of students, including foreign ones, opening up new horizons of

teaching and learning, giving new means and innovative educational technologies, enhancing research opportunities.

Since the digital society is based on intellectual labor, a system of continuous education (called 'lifelong' in the USA, 'continued' in England and 'renewable' in Sweden [9–14]) is very important. Continuous education takes into account the demands of the real economy and involves constant training of specialists throughout their life. The modern smart society and its approach to lifelong education entail providing access to training where it is convenient to the learner, that is, the mobility of content consumption becomes an essential principle of smart education.

Implementation of cloud technologies allows to provide a universal net access to a general repository ('storage' of information), which assumes that an intelligent search system is available. Access to the Internet resources for every user, as well as the availability of various educational Internet content satisfy the students' need to obtain information and improve their knowledge. Cloud evaluations and a quick inflow of mobile devices have determined one of the important directions in education that is mobile training as a modern technology of studying, personnel training and re-training [15].

The importance of students' personal development is becoming evident, which requires personalizing the training trajectories in the format of lifelong education, as well as increasing the self-sufficiency in studying. Individual training involves diagnostics of individual achievements and difficulties, prediction and planning of individual educational trajectories, assessment of relative (individual increments) and absolute (compliance with external criteria) results, giving recommendations to learners. At the same time, a crucial factor here is supporting every student's motivation, as well as providing educational elements, which give opportunities for maximum development of individual abilities and talents.

The traditional system of personnel training in higher vocational education assumes that the interconnection of participants of the educational process is built on subject-object relations, where the teaching subject is limited by the conditions set by curriculums, and the learning object has to gain a certain amount of knowledge (passive acquiring of information) [16, 17].

⁶ О Стратегии развития информационного общества в Российской Федерации на 2017–2030 годы Указ Президента Российской Федерации No. 203 от 09.05.2017 г. URL: <http://www.kremlin.ru/acts/bank/41919> (accessed October 24, 2017).

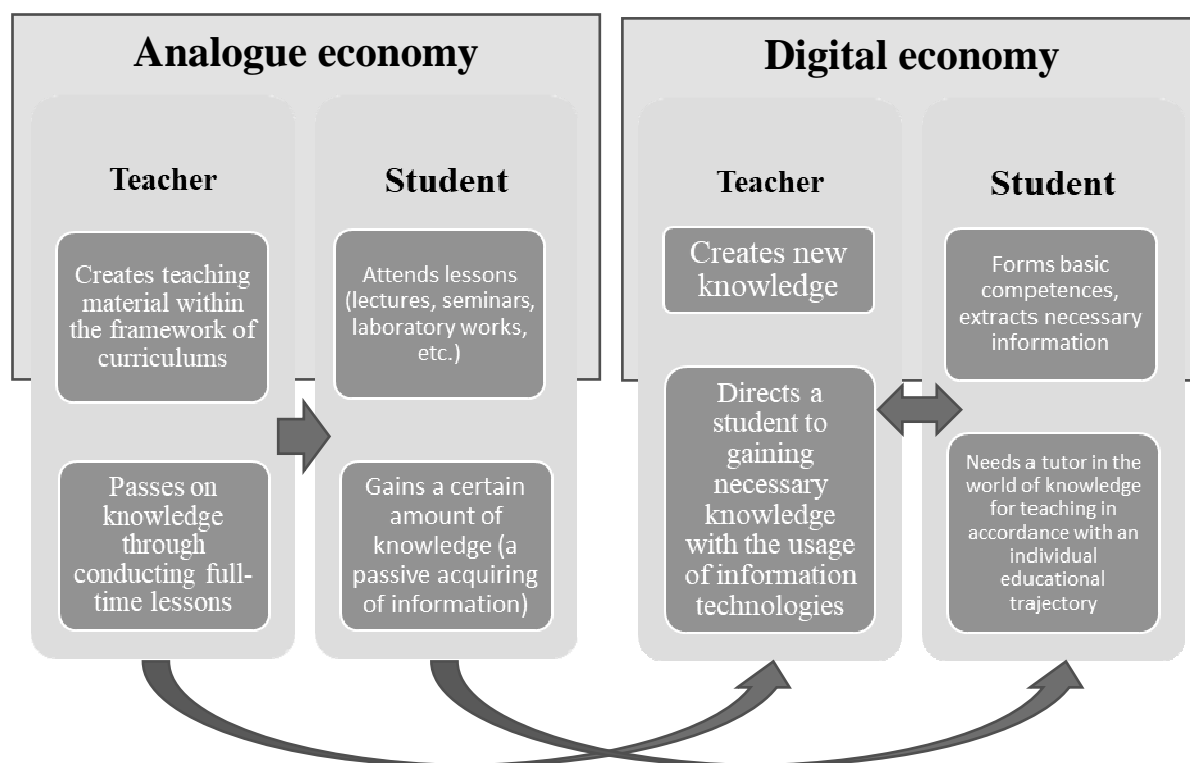


Fig. 3. Change in the positions of the participants of the educational process

Innovative methods in education should lead to a change of the teachers' role: they act not just as knowledge holders, but also as tutors (consultants, experts) who initiate the students' creative search for applying innovative technologies in the studying process, as well as of forming competences and developing individual educational trajectories (Fig. 3). The traditional lecture-seminar system of teaching should be complemented with an interactive form of teaching, carried out as a cooperation of students and teachers where the participants interconnect, make decisions together, share information, model situations.

The method of web-portfolio is an innovative method of training on the basis of forming an individual educational trajectory. The portfolio is a modern innovative educational technology which is based on authentic estimation of results of educational, scientific and professional activities. As a rule, the portfolio represents students' self-presentation of their achievements, recorded by the students themselves. Within the framework of the competence approach, the portfolio manifests itself as a way of demonstration, development and evaluation of students' competences, a mechanism

of monitoring their achievements, presenting the students' successes to interested parties. The portfolio contributes to the development of social and professional communication of students and graduates, helps establishing contacts with potential employers. Unlike the traditional resume, the web portfolio allows to present and evaluate social, personal and professional competences of students, define their inclinations, trace the direction of their development significantly better.

The totality of portfolios of students, graduates and teachers makes up the portfolios of departments and institutes, which in turn form the portfolio of the university, within which they all actively integrate with one another and with the external environment, i.e., applicants and employers (Fig. 4).

Thus, web portfolios of students and teachers are the core of their achievement rating. Analysis of the portfolios contents allows to improve the system of criteria and performance indicators related to educational and scientific activity of departments and institutes, as well as to improve the organization and management of the university's activity.

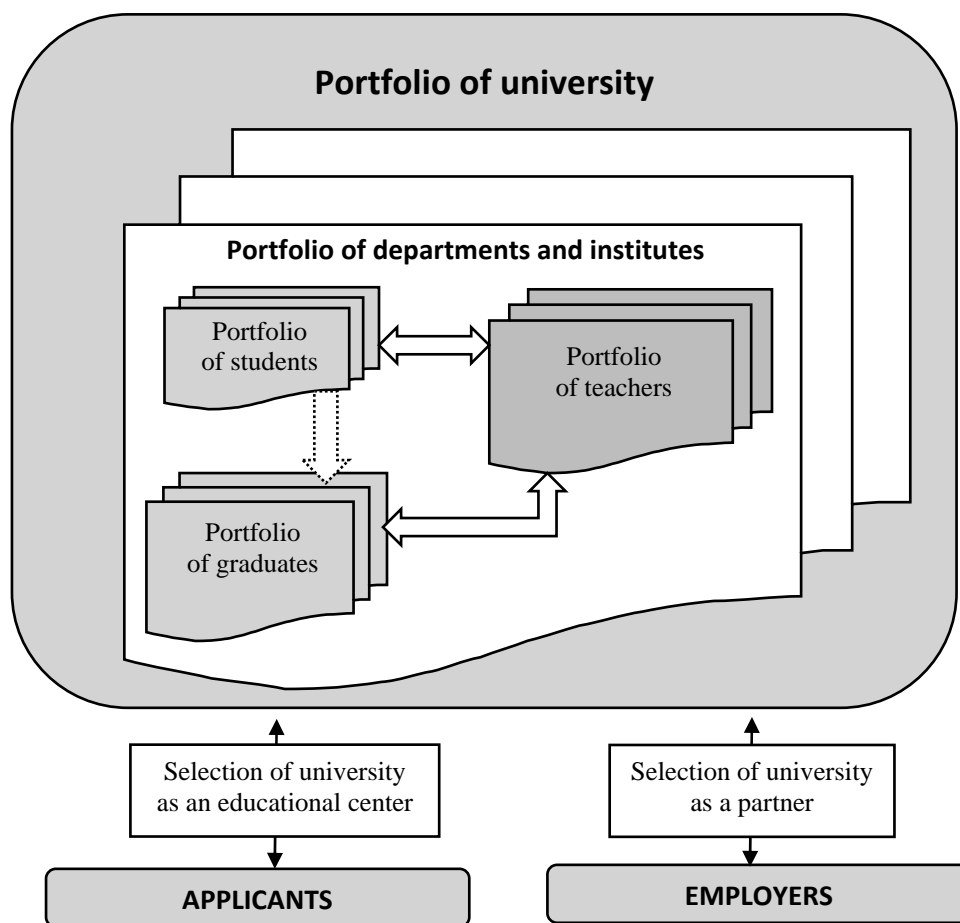


Fig. 4. The structure and interaction of the university's portfolios

The results obtained.

1. We have established that universities need to change the educational paradigm as a result of the development of the concept of digital economy.

2. We have defined the general principles of the organization of educational process, such as the implementation of the competence approach, the use of project teaching methods, digitalization and computerization of education, implementation of individual educational trajectories.

3. We have examined the principle of forming professional competences as a result of integration in education, science, business and high tech industries on the basis of the communities of teachers, students and scientists.

4. We have offered a method of web portfolio as one of the innovative methods of teaching on the basis of forming an individual educational trajectory.

Conclusions. We believe that effective use of modern educational technologies in the teaching practice of Russian educational establishments offered in this study will make it possible to improve the quality of educational services and increase the amount of highly qualified personnel in the digital economy in the long term.

The main principles of organization of education are the implementation of the competence approach to the educational process, use of methods of project teaching, digitalization and computerization of education, implementation of individual educational trajectories.

One of the methods of education within the framework of a smart university is the method of web portfolio, which is based on forming an individual educational trajectory. The analysis of the structure and interaction of the university's portfolio allows to improve the system of criteria and indicators for assessing the educational and scientific performance of departments and



institutes, as well as to improve the organization and management of the university's activities.

Introducing the measures based on the principles offered will allow to implement new forms of training, increase the motivation of participants in carrying out scientific research and the efficiency of the university's management.

The directions of possible research. There is a plan to develop a mechanism of managing the

innovative potential of a university in the nearest future in order to conduct personnel training on a fundamentally new qualitative level, taking into account the modern trends.

The study was conducted with the financial support of RFBR, project № 18-010-01119 «Management of digital transformation of innovation and industrial cluster as a backbone element of the industry digital platform: methodology, tools, practice».

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Статья поступила в редакцию 13.11.17

INDUSTRIAL DEVELOPMENT IN THE CONDITIONS OF DIGITALIZATION OF INFOCOMMUNICATION TECHNOLOGIES

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The advancement of the innovation sector as a key driver for the development of the industrial sphere, which is the foundation of the economy, has become a worldwide trend. In its turn, the form of economic development based on innovative processes is permanently undergoing changes in connection with the introduction of advanced information and communication technologies developing in the direction of global digitalization. The digital development strategy, which is a fundamentally new platform for the implementation of digital solutions in the field of information and communication technologies, is one of the main priorities from the point of view of ensuring the competitiveness of the economy in general and the industrial sector in particular, as well as raising the population's standard of living, which determines the relevance of the topic of the article. The purpose of the study is to identify the specific features of the transforming Russian economy and of the industrial sector in particular, as well as to develop the principles of the digital economy in terms of identifying additional sources of efficiency of business systems, taking into account the development of infocommunication technologies in the direction of digitalization. Both quantitative (mainly statistical) and qualitative research methods (analogy method, methods of content and expert analysis and synthesis) are used in the study, on the basis of which the modern level of industrial development of Russia is analyzed and assessed in terms of conditions for transition to a new industrial-digital platform. At the same time, this transition is connected with the technological modernization of the manufacturing industry, which involves integrated development of fixed assets and technologies, the renewal of domestic research and development, based on education and science. Special models of the methodology of studying innovative processes are also used in the article, such as push and pull models, as well as an interactive dual model, tested in terms of adequacy to digital technologies. The article proves the feasibility of an interactive nonlinear model based on the paradigm of open innovation and cloud business systems implemented at the expense of the current level of development of infocommunication technologies. We have identified the sources of growth of the efficiency of business systems in general and innovations in particular through the reduction of transaction costs resulting from the transfer of a significant volume of business processes to electronic form, as well as transformation costs resulting from the implementation of the paradigm of network business systems, which increases the efficiency of both material and labor resources and reduces the transformation costs in terms of their conditionally constant component. The article describes the path of further research in the direction of creating institutional conditions for the development of network-centric (cloud) systems and high-tech businesses, as well as updating (or adapting) the methods and tools for analysis and evaluation of economic efficiency.

Keywords: digitalization; labor productivity; linear and nonlinear models of innovation process; closed and open innovations; cloud business systems; infocommunication technologies; transaction and transformation costs; economic efficiency

Citation: N.V. Kvasha, D.S. Demidenko, E.A. Voroshin, Industrial development in the conditions of digitalization of infocommunication technologies. St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 17–27. DOI: 10.18721/JE.11202

ИНДУСТРИАЛЬНОЕ РАЗВИТИЕ В УСЛОВИЯХ ЦИФРОВИЗАЦИИ ИНФОКОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ

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Выдвижение инновационного сектора в качестве ключевого драйвера развития индустриальной сферы, являющейся фундаментом экономики, стало общемировой тенденцией. В свою очередь, форма экономического развития, основанная на инновационных процессах, перманентно претерпевает изменения в связи с внедрением передовых инфокоммуникационных технологий, развивающихся в направлении глобальной цифровизации. Стратегия цифрового развития, представляющая собой принципиально новую платформу реализации цифровых решений в области инфокоммуникационных технологий, является одним из приоритетов с точки зрения обеспечения конкурентоспособности экономики вообще и индустриального сектора в частности, а также повышения уровня жизни населения, что определяет актуальность темы исследования. Цель исследования — выявление специфических особенностей трансформируемой российской экономики вообще и промышленного сектора в частности, а также развитие принципов цифровой экономики в части выявления дополнительных источников эффективности бизнес-систем с учетом направления цифровизации. Применяются как количественные (преимущественно статистические), так и качественные методы исследования (метод аналогий, методы контентного и экспертного анализа и синтеза), на основе которых анализируется и оценивается современный уровень индустриального развития России с точки зрения условий для перехода к новой индустриально-цифровой платформе. Данный переход связан с технологической модернизацией обрабатывающей промышленности, предполагающей интеграционное развитие основных фондов и технологий, возобновление отечественных исследований и разработок, базис которых — образование и наука. Используются специальные модели методологии исследования инновационных процессов, такие как выталкивающая и втягивающая модели, а также интерактивная дуальная модель, протестированные с точки зрения адекватности цифровым технологиям. Обосновывается целесообразность интерактивной нелинейной модели, базирующейся на парадигме открытых инноваций и облачных бизнес-систем, реализуемых за счет современного уровня развития инфокоммуникационных технологий. Выявляются источники роста эффективности бизнес-систем вообще и инноваций в частности за счет снижения транзакционных издержек в результате перехода значительного объема бизнес-процессов в электронный вид, а также трансформационных издержек в результате реализации парадигмы сетевых бизнес-систем, что повышает эффективность использования как материальных, так и трудовых ресурсов и снижает трансформационные издержки в части их условно-постоянной составляющей. Заданы траектории дальнейших исследований в направлениях создания институциональных условий развития сетевых (облачных) систем и высокотехнологичного бизнеса, а также обновления (или адаптации) методов и инструментов анализа и оценки экономической эффективности.

Ключевые слова: цифровизация; производительность труда; линейные и нелинейные модели инновационного процесса; закрытые и открытые инновации; облачные бизнес-системы; инфокоммуникационные технологии; транзакционные и трансформационные издержки; экономическая эффективность

Ссылка при цитировании: Кваша Н.В., Демиденко Д.С., Ворошин Е.А. Индустриальное развитие в условиях цифровизации инфокоммуникационных технологий // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 17–27. DOI: 10.18721/JE.11202

Introduction. The concept of economic development associated with the process of introducing innovations replaces the concept of economic growth (as an increase in the time of production and consumption of goods) in the new economy. The innovation sector advancing as a key driver for the development of the industrial sphere (which is the foundation of the economy) has become a worldwide trend. This form of economic development is the basis of national security and technological independence of a country [13]: in a globalized world, countries that have not solved the problem of achieving progressive industrial development can not become an integral part of the core of the global economic system and will be relegated to the sidelines as, for example, a raw material appendage, a source of cheap labor, etc. It is beyond argument that none of these roles are acceptable for Russia because of historical and cultural characteristics.

Thus, there is a common opinion among scientific researchers and practitioners in the field of economics that gaining leading positions requires a transition to the so-called innovative model of the economy [see, for example, 1, 9, 10, 18],¹ that is, an economy based on the flow of innovation, continuous technological progress and the production of products with high added value. As infocommunication technologies are evolving towards global digitalization and the implementation of the «Industry 4.0» concept, which implies that a digital society and digital ecosystems are formed, the concept of «innovative economy» has been transformed into the concept of «digital economy».

Problem statement. Thus, an exceptional opportunity to ensure competitiveness and positive development of the national economy is its transformation according to the innovative scenario, taking into account the development of infocommunication technologies in the direction of digitalization. Moreover, while the principles of this transformation (as a scientific basis) are common to all industrial countries, the set of approaches and methods for the formation of the national digital economy must have its own

specifics, since simply copying the models implemented in other countries will not bring the desired results due to differentiation of the stages of development of the industrial sector.

The following sequence of stages of successful transformation of the economy into an innovative digital one is suggested:

- gaining a comprehensive understanding of the transformed economy, taking into account all specific aspects.
- studying the principles of formation and the laws of the development of the digital economy.
- developing the approaches, methods and tools for creating a digital economy adequate to the current state and capabilities of the society.
- analyzing the ability of both spheres of society (public and private) to implement a developed system of approaches, methods and tools.

The goal of this study is to identify the specific features of the Russian economy being transformed in general and the industrial sector in particular, as well as to develop the principles of the digital economy in identifying additional sources of efficiency of business systems, taking into account the development of infocommunication technologies towards digitalization.

Methodology of the study. Both quantitative and qualitative research methods were used in the course of the study. Quantitative methods include collection and comparative analysis of statistical data characterizing the economic indicators of Russia's development. The qualitative methods included the analogy method used to justify the applied parameters, as well as the methods of content and expert analysis and synthesis generalizing the results.

Furthermore, it is known that a country's competitiveness depends on the commercialization of new knowledge rather than on its production. It is the business model aimed at commercializing innovations, determined, among other things, by the organizational and marketing innovations implemented, that gains importance in these conditions. Chesbrough, who is one of the leaders in technology and business, demonstrated with specific examples that similar technologies introduced to the market as part of different business models bring different economic results to enterprises [5]

The modern methodology of innovation studies (like the logistic methodology of research) identifies three main models of innovation processes:

- the push model, from research to the market;

¹ V. Glukhov, E. Balashova. Economics and management in information and communication: a tutorial, St. Petersburg, Peter, 2012; Innovation economy: Training manual. Moscow: Moscow state university, 2016.

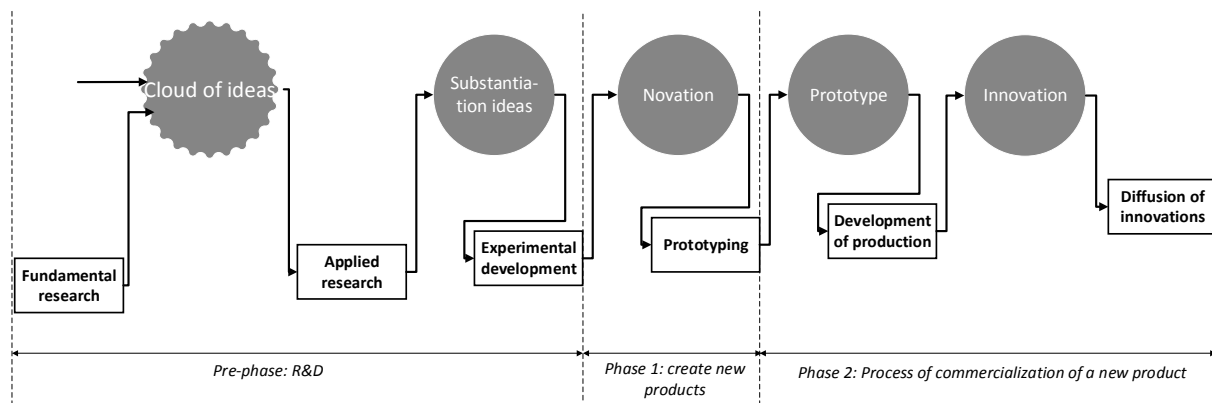


Fig. 1. Linear model of the innovation process

– the pull model, from the market's needs to research;

– the interactive dual model, including feedback.

The driver of innovation within the push model is fundamental and applied research and development (R&D), and the innovation process is a succession of the three main phases: pre-phase, phase 1 and 2 (Fig. 1). Prerequisites for the innovation effect, which is generated during the second phase and is subsequently distributed among the participants (subjects) of the innovation process (innovators) and consumers, develop within the first phase of the innovation process.

The strict sequence of steps implemented in the push model is described by a linear model of the innovation process (Fig. 1), which establishes a direct linear relationship between the volume of R&D and the number of innovations being introduced.

The push model has the following drawbacks:

- the focus of investments is shifted towards fundamental research, which causes a low frequency of commercialization.
- the consequence of this shift towards R&D is also the low efficiency of capital investments:
 - firstly, the model does not take into account the market needs, therefore phase 2 often simply does not occur in the push model;
 - secondly, applied, let alone fundamental research is by no means always necessary for creating innovation.

The driver of innovation within the pull model are the market needs that trigger the chain of steps presented in Fig. 1. Taking into account these needs significantly increases the effectiveness of innovation compared to the push model, because the innovation process is

launched only when there are market conditions for successful commercialization of innovations. In addition, the pull model allows to exclude the R&D pre-phase (it is involved only if necessary), which significantly increases the return on innovative investments.

At the same time, the pull model has the drawbacks of the linear innovation process, such as the weak interconnections between the stages, the absence of feedback, and the low correlation with the distant external environment (i.e., the development trends of the global and national economy, society, environmental requirements).

The solution is the implementation of the so-called interactive models, in which the innovation process acquires a complex nonlinear character (Fig. 2).

The nonlinear model has the following distinctive characteristics:

- new ideas can arise and be developed at all stages of the innovation process;
- different stages are connected with each other by loops of feedback, which ensures their interconnectedness and reduced duration of the entire innovation process due to the possibility of parallel implementation;
- the correlation with the near (market) and distant external environment is strengthened;
- it is possible to commercialize various forms of research results at all stages of the innovation process.

The interactive nonlinear model is based on the paradigms of open business models and open innovations, the transition to which was largely due to the development of information technologies [4, 6].

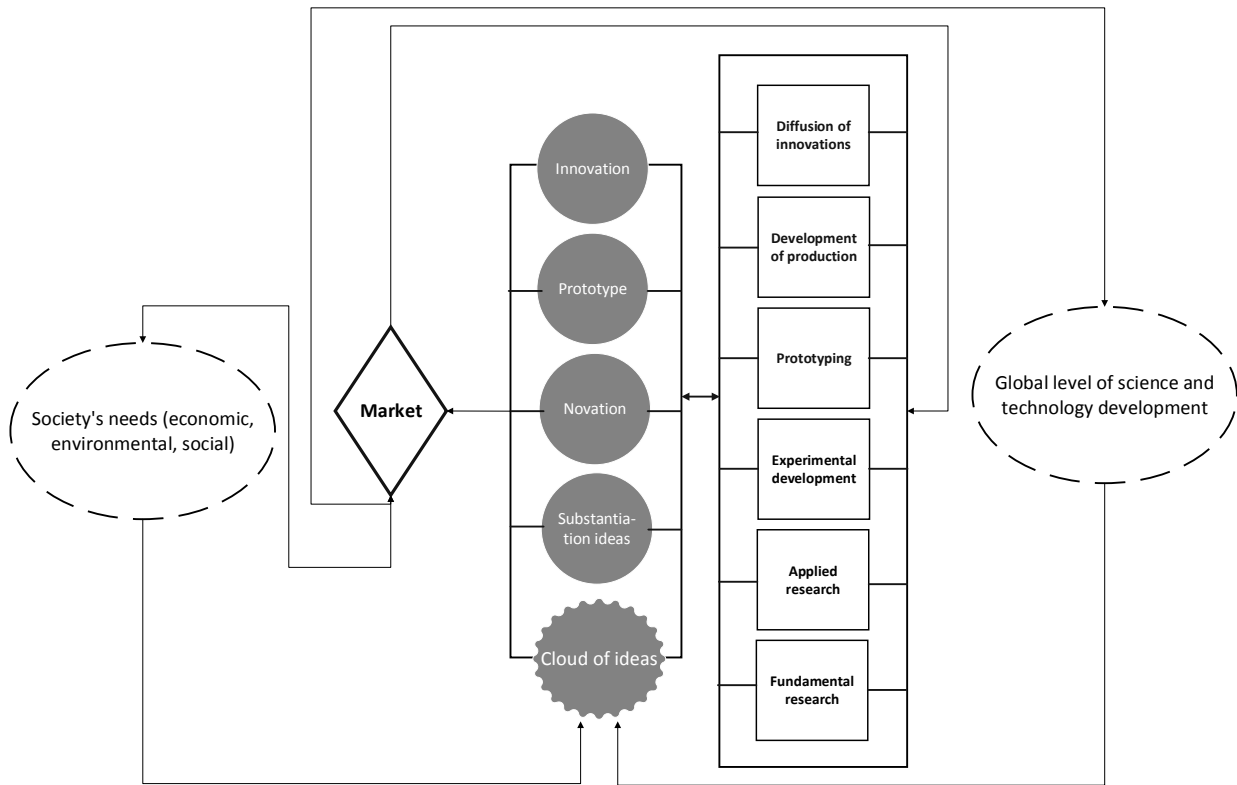


Fig. 2. Interactive non-linear model of the innovation process

Results. Analysis of official statistical indicators leads to the conclusion that there has been a weak economic growth in Russia in 2016-2017, which should indicate the benefits of direct and retaliatory sanctions. At the same time, the gap between the commodity and manufacturing sectors shows that the recovery trend is highly deceptive. Thus, the analysis of the dynamics of the index of industrial production showed that domestic industrial production has been falling after 2013 which was the borderline, in terms of imposed sanctions; the weak growth in 2016 is due to growth in the commodity sector, caused by improving conditions in the energy market.

Fig. 3 presents discrete GDP dynamics for PPPs of Russia in comparison with established world economic leaders (USA, Germany, Japan), as well as with former outsiders with comparable GDP at the start of comparison (China, India) for 20 years.

Analyzing the data in Fig. 3, it can be noted that developed world leaders demonstrate a stable growth of the economy, despite the high

base effect. In the catch-up zone, China is the undoubted leader with an almost tenfold increase in GDP. China is also the world leader in terms of economic growth and the absolute value of GDP for PPPs, starting from 2014. India, although still a backward country, has impressive GDP growth rates. With almost the same «base» in 1996, India's GDP has since grown almost twofold compared to Russia's.

Unlike isolated dynamics, Russia's economic growth is practically unnoticeable compared to other countries,. The share of the Russian economy with respect to the economy of the countries taken for comparison is just over 6 %. This can be explained by the postulated thesis that sustainable economic development is provided by development of the industrial sector and, above all, the manufacturing industry. This could be confirmed by the example of China, as its fantastic breakthrough is primarily due to the growth of manufacturing industries, which have grown by almost 14 times in almost 20 years, making it a new industrial world leader.

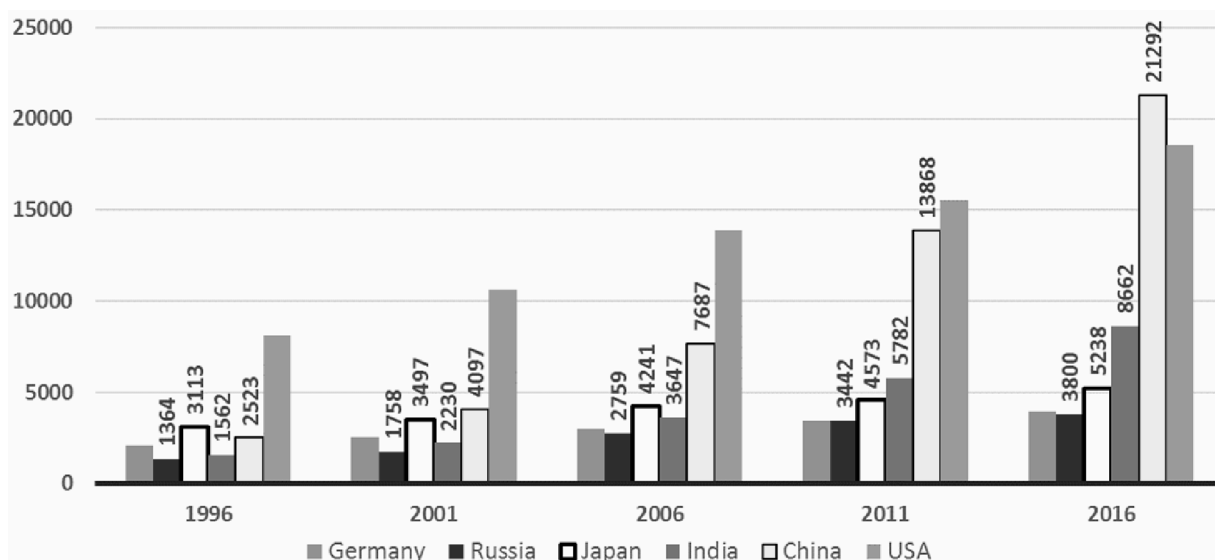


Fig. 3. GDP dynamics for PPPs in different countries of the world, billion dollars

Compared to industrial shifts in other countries, Russia's indicators show signs of de-industrialization. According to UNIDO, the share of Russia in the added value of manufactured goods either stands still or falls even in such traditionally «Russian» sectors as metallurgy, which, without increasing labor productivity, is an indicator of large-scale de-industrialization and primitivization of the economy over the years of market transformation [17].

For successfully transforming the national economy into an economy based on a flow of innovations that significantly enhances the effectiveness of the current system, it is necessary to have this very system in place. In other words, Russia's transition to a post-industrial stage is not possible without going through the stage of industrialization, that is, the current target function of the national economy is the so-called neo-industrial model based on a highly developed manufacturing industry. Researchers claim that the concept of industrial development on a new informational and technological basis is changing the paradigm of a post-industrial society [13, p. 224]

It should be noted that the Chinese model of industrialization is not applicable in Russia, as China has embarked on a path of extensive industrialization, relying on the involvement of an entire «army» of relatively cheap labor made up of former peasants. Russia does not have this opportunity, so the first task that must be accomplished within the above-mentioned target

function is to ensure the growth of labor productivity.²

At present, there is a significant gap between the indicators of labor productivity in Russia and the leading countries. It is known that there was a steady increase in labor productivity in the USSR from the 1950s until the early 1990s [1]. Further, after a serious drop in indices during the disintegration of the USSR and shock therapy, their recovery growth was observed, followed by stagnation and even a drop, as evidenced by the official data of Rosstat.

In economic theory, two main factors are known to increase labor productivity: the improvement of the means of labor (fixed assets, and, to a large extent, intangible capital), as well as the qualifications and motivation of personnel. With regard to improving the means of labor, it is known that domestic statistics demonstrate the technological backwardness of the country: the depreciation coefficients by industry are increasing, the renewal and retirement rates are very low. In addition to the aging of fixed assets, the share of the active part of fixed assets (machinery and equipment) stagnates with the dynamics of reduction, which is also a factor in the reduction of economic efficiency due to the low level of introduction of new more productive equipment.

² President's address to the Federal Assembly, 2016. URL: <http://www.kremlin.ru/events/president/news/53379>

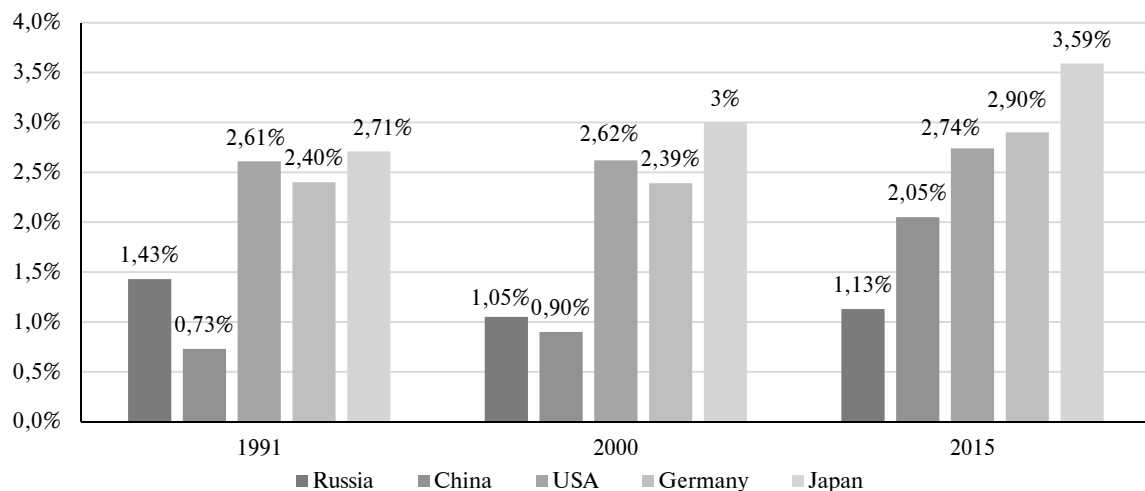


Fig. 4. Dynamics of expenditure on research and development by country, as percentage of GDP

The second factor in the dynamics of labor productivity is the level of workforce qualification. Here, too, there is a rather critical situation, termed de-intellectualization by some researchers.³ In Russia, there is a systematic reduction in investment in human capital [11], the relative level of public spending on education (as a percentage of GDP) is declining and quite significantly behind developed countries: in 2014, this figure was 3.2 %, for comparison, it was 4.2 % in Germany, 4.7 % in the USA, 4.9 % in France and 5.2 % in the UK [2].

The processes of Russia's de-intellectualization are also observed in the scientific sector. Russian science remains in crisis since the collapse of the USSR. Employment in the scientific sector of Russia, as well as the number of researchers, has declined many times over the years of reform and this process continues [9]. In addition, Russia is seriously lagging behind the leaders in terms of the share of expenditures for research and development in the total GDP (Fig. 4). If we focus on the OECD data, China, with its almost 1.5 billion population, has been ahead of our country in terms of per capita R&D expenditure since 2015. In Russia, this indicator was \$269 per person based on PPP, and in China it was \$271 per person based on PPP.⁴

³ V. Glukhov, E. Balashova. Economics and management in information and communication: a tutorial, St. Petersburg, Peter, 2012.

⁴ Science. Innovations. Information society: 2016: short statistical book. Ed. G.I. Abdrakhmanov, Yu.I. Voyniliv, N.In. Gorodnikova, L. Gokhberg, etc.; the NAT. research. University «Higher school of Economics», Moscow, Higher school of Economics, 2016.

As noted above, the country's industrial development should be based on a new informational and technological basis. At the moment, the improvement of infocommunication technologies is carried out in the direction of digitalization. As a result, the digital development strategy, which represents a fundamentally new platform for the implementation of digital solutions in the field of information and communication technologies, is one of the priorities from the point of view of ensuring the competitiveness of all sectors of the economy and improving the standard of living of the population [14]. At the same time, according to the report «Global Information Technologies» for 2016, there is a significant gap in the development of the digital economy in Russia compared to other world leaders. The Russian Federation occupies 41st place with a significant gap from the leaders in readiness for digital economy, 38th place with a significant gap in terms of economic and innovative results using digital technologies.⁵

Thus, it is necessary to develop the principles of digital economy in general, as well as to identify additional sources of efficiency of business systems, taking into account the development of infocommunication technologies in the direction of digitalization.

As noted, the traditional paradigm of closed business models implemented during the second half of the 20th century (as the legacy of the first and second industrial revolutions) was linear progression of all phases of the innovation process

⁵ The program «Digital economy of the Russian Federation», Approved by the order of the Government of the Russian Federation of July 28, 1632-p (2017).

within the boundaries of the enterprise, as well as the implementation of centralized (platform-centric) business systems [15]. The platform-centric type of business systems was determined by the level of development of infocommunication technologies, within which they played only a supporting role of information support for «manual» business processes. This determined the high level of costs of interaction between business systems, that is, external transaction costs. As a result, according to Coase's [7] findings, transactions (including those related to the innovation process) were more internalized, which caused the growth of the size of the enterprise, ensuring the effectiveness of large-scale business systems.

Thus, under the paradigm of closed innovations, only large vertically integrated enterprises with a large volume of resources and a powerful research base could really compete in the market. The markets in which such enterprises functioned were characterized by inefficient oligopolistic and monopolistic structures.⁶

Inadequate (excessive) consumption of resources is an essential shortcoming of «closedness» of innovations in particular and business models in general. Large back-integrated enterprises are characterized by a «linkage» of resources in a volume significantly exceeding their average level of needs. Keeping research laboratories requires a large amount of resources, while the «results» of their activities (knowledge, development) are often duplicated by different isolated business systems, and cannot be used in full within a single company. Summarizing, we can conclude that the reason for the ineffectiveness of closed systems is the uneven load on resources: the volumes of ownership of an isolated resource are determined taking into account single peak loads, while a significant part of the load time is close to zero [8]. In other words, the low level of development and use of infocommunication technologies determined the high level of not only transaction costs, but, as a consequence, transformational costs.

The development of infocommunications at the present stage has led to the emergence of such end-to-end digital technologies as wireless communication, virtual and augmented reality, big data, distributed register technologies, robotics, sensorics, etc., which ensured the transition of

business processes to electronic form. This, in turn, caused a decrease in external transaction costs, and, as a consequence, a reduction in the effective size of the enterprise. At the same time, ties in modern business structures are beginning to gravitate toward horizontal directions.

New production is quite different from the recent standard of industrial plants. According to data of about 330 thousand industrial enterprises of the USA, these are enterprises with less than 10 employees [13]. In most countries of the European Union, manufacturing enterprises are enterprises with less than 20 employees. At the same time, the aggregate number of small manufacturing enterprises (from 0 to 249 employees) is more than 99 % of the total in the vast majority of countries (Fig. 5).⁷ This trend is most clearly seen in innovation-oriented enterprises, increasing their mobility and readiness for permanent development.

The development of infocommunications provides an opportunity to build open network-centric (or, as they are also called, cloud) business systems with a distributed structure, which allows to integrate isolated resources (including innovative ones) into general funds, with a high level of elasticity and scalability, i.e., ready to provide the necessary volume at the right time, but no longer a physical resource, but a service based on a fund of physical resources [12].

Conclusion

1. The analysis showed that in order to build a competitive Russian economy, it is necessary to switch to industrial development on the basis of a new informational and technological platform that ensures an exponential growth in labor productivity. The solution of this task is connected with the technological modernization of the manufacturing industry. This modernization involves the integration development of fixed assets and technologies, which contributes to a qualitative update of production processes and methods of production organization and, as a result, a rapid increase in labor productivity.

As an example of updating the production process, the so-called additive technologies can be proposed, which, according to researchers, allow achieving labor productivity growth by more than 20 times even at their current level of development [13].

⁶ C.R. McConnell, S.L. Brue, S.M. Flynn, Economics. Principles, problems and policies, Moscow, Infra-M, 2017.

⁷ Innovation economy: Training manual. Moscow: Moscow state university, 2016.

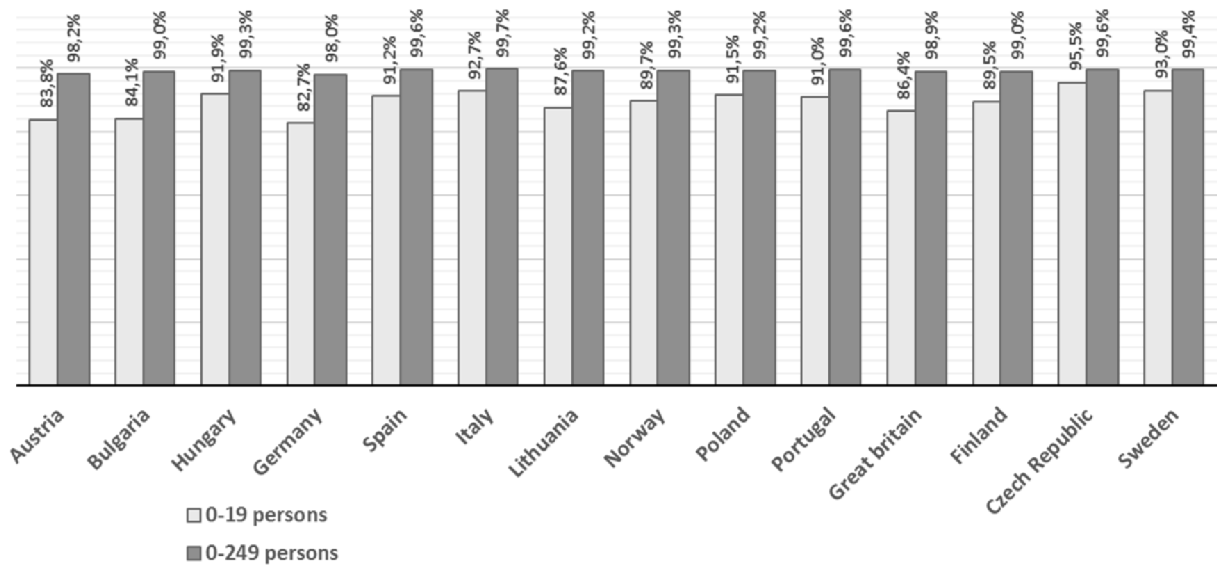


Fig. 5. The share of manufacturing enterprises in terms of the number of employees (percentage of the total number of enterprises)

As an example of renewal of methods of organization of production, the use of cloud services can be proposed, which, among other things, promotes the implementation of the principles of crowdsourcing to attract a wide range of microenterprises, individual entrepreneurs by type of subcontract work, and, among other things, ensuring self-employment of the population.

2. The second direction of technological modernization, in our opinion, should be resuming domestic research and development, the basis of which is education and science. At the same time, fundamental science is the key competitive advantage of Russia. Realization of this advantage requires a revision of the state policy of funding of science in the direction of its growth to promising world standards.

3. The development of information technologies in the direction of digitalization (wireless communication, virtual and augmented reality, large data, distributed registry technologies, etc.) provides an opportunity to reduce the following categories of costs of industrial enterprises:

— First, the transfer of a significant amount of business processes to electronic form causes a decrease in both internal and external transaction costs. In accordance with Coase's findings, the reduction of external transaction costs in turn reduces the effective size of the enterprise, including microenterprises, increasing their mobility and readiness for permanent

development. This trend is most clearly seen in innovation-oriented enterprises.

— Secondly, the implementation of the paradigm of open innovation in particular and networked business systems in general increases the efficiency of using both material and labor resources (up to 100 % in the future) by ensuring their consumption only in the required amount, which significantly reduces the transformation costs in part of their conditionally constant component. At the same time, the enterprise is an open system that combines internal functions and interacts with both the distant and the near external environment.

4. By proposing a paradigm for open business processes, we understand that cloud business systems are more sensitive and demanding to the quality of the institutional environment (which is confirmed also by the findings of other researchers [8]). In Russia, there are both significant gaps in the regulatory framework and an insufficiently favorable environment for doing business and innovation even at the government level.⁸ Thus, further research is needed on the creation of institutional conditions for the development of network-centric (cloud) systems and high-tech businesses.

⁸ The program «Digital economy of the Russian Federation», Approved by the order of the Government of the Russian Federation of July 28, 1632-p (2017).

5. The task of forming methods and tools for creating a digital economy adequate to the current state and capabilities of society also requires updating or, at least, adapting a system of indicators characterizing economic efficiency. For example, a criterion is needed that ensures the interconnection of economic, environmental and social vectors in the concept of sustainable development. It is known that due to differences in the volumes and quality of the factors of production available to each member of society, a state in which 1 % of the population gets 99 % of the national income can be a Pareto-efficient one. Another known disadvantage of the GDP indicator (as a quantitative criteria of economic growth) is its «costly» nature. Economic growth,

measured by GDP, is essentially an increase in costs in the economy. However, as was shown above, the development of infocommunications in the direction of digitalization can significantly reduce the entire set of costs of the economic system, both at the level of the transaction and the transformation component. Under these conditions, stagnation or even a fall in such a quantitative growth criteria as GDP can be observed, amid a significant improvement in the quality parameters of the standard of living of the population. Accordingly, the need for new or possibly additional quantitative criteria for economic growth is evolving in the digital economy, taking into account its informational and technological component.

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Статья поступила в редакцию 19.02.18

DOI: 10.18721/JE.11203

UDC 332.12; 338.262

LEGAL AND INSTITUTIONAL PROBLEMS OF SETTING THE PRACTICE OF MUNICIPAL STRATEGIC PLANNING IN RUSSIA

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Sub-regional level of the organization of economy and public administration takes an important place within the development strategy of the Russian economy. This is reflected in the strategic planning implementation as a vertical of management actions and planning documents, mutually coordinated and based on a common methodological basis. In addition, a significant contribution of the sub-regional management link to the achievement of economic and social priorities of the Russian economy is possible only in case of effective functioning of local self-government institutions. Such effective operation of local self-government institutions needs a system of preconditions of economic, legal and institutional nature. At present these preconditions are not formed to the extent necessary for successful development and implementation of development strategies in the municipal management. This makes the transition to strategic planning one of the most important goal-setting guidelines for identification and implementation of further steps in the course of municipal reform in the Russian Federation. We should note that it is not the vector of changes itself that is important but the procedure by which these changes are introduced. Recently, the situation has obviously evolved towards separating the population from solving the key questions of functioning and reorganization of local government. Everything, including transformations in local government institutes, is decided by representative bodies of municipalities, and sometimes at the level of the government of sub-federal entities. At the same time, the idea of developing local government as a result of an initiative and responsibility of the population is only growing weaker instead of stronger. The study we have conducted allows to allocate two main conditions allowing to eliminate the formalism in implementation of municipal strategizing. The first one is legislative adoption of a practice in which this strategizing means the highest and most significant form of direct implementation of functions of local government by the population. The second one is legislative confirmation and developed methodological support of flexible forms of municipal strategizing coordinated both with the operating types of municipalities, and with a variety of social and economic conditions of development of territories in various territorial subjects of the Federation.

Keywords: local self-government; strategic planning; spatial regulation; municipal reform

Citation: E.M. Bukhvald, O.N. Valentik, Legal and institutional problems of setting the practice of municipal strategic planning in Russia. St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 28–37. DOI: 10.18721/JE.11203

ПРАВОВЫЕ И ИНСТИТУЦИОНАЛЬНЫЕ ПРОБЛЕМЫ УТВЕРЖДЕНИЯ ПРАКТИКИ МУНИЦИПАЛЬНОГО СТРАТЕГИЧЕСКОГО ПЛАНИРОВАНИЯ В РОССИИ

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Субрегиональный уровень организации экономики и публичного управления занимает важное место в стратегировании развития российской экономики. Это находит свое отражение в реализации стратегического планирования как вертикали управленческих действий и плановых документов, согласованных между собой и построенных на единой методологической основе. Весомый вклад субрегионального звена в достижение хозяйственных и социальных приоритетов российской экономики возможен лишь при условии эффективного функционирования институтов местного самоуправления. Это обеспечивается системой предпосылок правового и институционального характера. К настоящему времени эти предпосылки не сформировались в той мере, в какой это необходимо для качественной разработки и реализации стратегий развития в муниципальном звене управления. Это делает переход к стратегическому планированию одним из наиболее важных целеустанавливающих ориентиров для определения и реализации дальнейших шагов в ходе муниципальной реформы в Российской Федерации. Отмечается, что важен не столько вектор отмеченных изменений, сколько процедура их проведения в жизнь. Последние годы ситуация явно эволюционирует в сторону оттеснения населения от решения ключевых вопросов функционирования и реорганизации местного самоуправления. Все, включая преобразование в институтах местного самоуправления, передается на откуп представительным органам муниципалитетов, а иногда решается и на уровне государственной власти субъектов РФ. При этом идея развития местного самоуправления, инициативы и ответственности населения не только не укрепляется, но все больше «уходит в тень». Проведенное исследование позволяет выделить два главных условия, позволяющих уйти от формализма в реализации муниципального стратегирования. Во-первых, законодательное утверждение практики, при которой такое стратегирование будет означать высшую и наиболее значимую форму непосредственного осуществления населением функций местного самоуправления. Во-вторых, законодательное закрепление и развернутое методологическое обеспечение гибких форм муниципального стратегирования, согласуемых как с действующими типами муниципалитетов, так и с многообразием социально-экономических условий развития территорий в различных субъектах РФ.

Ключевые слова: местное самоуправление; стратегическое планирование; пространственное регулирование; муниципальная реформа

Ссылка при цитировании: Бухвальд Е.М., Валентик О.Н. Правовые и институциональные проблемы утверждения практики муниципального стратегического планирования в России // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 28–37. DOI: 10.18721/JE.11203

Introduction. Current transition to the strategic planning system is characterized by a number of innovations in the principles and instruments of the federal policy of regional development, which solves in practice the main tasks of spatial regulation of the country's production forces. These innovations primarily include subregional management, which is in general aimed at forming one of the bases of an

effective practice of strategic planning. It is sometimes suggested that Russian local self-government should be supported economically only slightly to prepare it for performing strategic planning functions. But this opinion is less than fully reasonable. The solution of this problem requires a wide range of initial conditions. Several ways of forming these conditions are considered in this article.

Problem statement. Scientific studies have mainly focused on economic (budgetary) and personnel problems of elaboration and implementation of strategies for social and economic development in the municipal management so far. These problems remain highly important nowadays. However, the range of issues listed above is far from covering all the obstacles that arise in achieving local self-government as a fully-fledged subject of the strategic planning system making a significant contribution to the achievement of the country's economic and social priorities.

In the context of transition to the strategic planning system, targeted legal and institutional provision of municipal strategy practice becomes essential, along with the economic aspects of the federal center interacting with the regions. Accordingly, the informative framework or the range of tasks of the federal regional development policy is now expanding substantially.

The importance of legal and institutional components is naturally increased in this policy. These components create the prerequisites for the subfederal element not to remain an insignificant «add-on» for strategic planning at the federal level, but to actively solve its economic, social and other tasks.

However, an exhaustive justification of the ways of solving this problem has not been found yet. In particular, the initiative to make strategizing mandatory for the municipal management element was not legally supported. No progress was made in creating flexible methodological bases and documentary forms for it. Above all, a strong economic fiscal base of municipal strategies was not formed.

These foundations of the municipal organization are still very far from the requirements of strategizing of socio-economic development of territories [1, 20].

Finally, the ongoing institutional changes in the system of Russian local self-government are not just problematic, but they also do not exhibit a real focus on making municipal strategies take an important place in the unified system of strategic planning in the country. In fact, there is a situation now when the transition to strategic planning should not simply invigorate the slow municipal reform, but also determine its future shape and targets more clearly [2].

Municipal reform in Russia:

a mixture of obvious successes and outright failures

The municipal reform in the Russian Federation began with the adoption of Federal Law No. 131-FZ of October 6, 2003, «About the general principles of organization of local self-government in the Russian Federation» (referred to as 131st Federal Law from now on). The reform had passed through its main phases even before the transition to practical implementation of strategic planning ideas began. At the same time, the entire course of the reform showed a paradoxical mixture of certain achievements and simultaneously obvious failures. The positive sides of the reform include making local self-government more available for the population, more precise limitation of the municipal economy, nominations of a large group of talented municipal leaders and so on.

Obvious failures are the excessive universalism of the organization of local self-government, despite the huge variety of conditions in the subjects of the Federation, minimization of regulatory functions of the subjects of the Federation in relation to the organizations of local self-government, excessive obsession with administrative fragmentation of municipalities, inability to fundamentally improve their fiscal space, lack of clarity in legal handling of the issues of local importance, etc. Many issues related to the transfer of certain state powers to the municipal level of management, as well as to their financing remain unresolved [3, 4]. The consequence of this situation was a huge number of amendments to the law that not only consistently filled the initial gaps and corrected blatant errors of this legislative act but also allowed to somehow approximate its main provisions to the economic, socio-demographic and other realities of modern Russia and its regions [5].

However, economic, legal and institutional principles of Russian local self-government were not fully improved due to changes and additions to the 131st Federal Law. Moreover, many problems have even deepened.

First of all, the number of local issues, recorded for all types of municipalities, increased by 1.5 times compared to the original list without significant redistribution of tax and non-tax revenues in favor of local budgets. Secondly,



the number of state powers transferred to the municipal level (part 2 of article 132 of the Constitution of the Russian Federation) increased dramatically. Thirdly, there are no clear legislative restrictions, i.e., such a transfer for municipalities is unconditional and blinding, despite the constitutional record (Article 12) stating that local government bodies should not be included in the system of public authorities. Finally, it should be mentioned that the powers of local self-government bodies in the sectoral legislation are not described clearly enough and that the powers of local self-government fixed in the sectoral legislation and in the 131st Federal Law are inconsistent. Various forms of inter-municipal cooperation, the conditions for the establishment of inter-municipal enterprises and organizations and the practice of municipal-private partnership also need additional legal regulation.

As the range of issues of local importance fixed in the 131st Federal Law is gradually increasing, the discrepancy between the number of these issues and the natural functions of local government as a special institution combining the beginnings of public authority and civil society is clearly indicated. Moreover, the balance of these principles in Russian self-government eventually turned out to be sharply shifted in favor of a representative and administrative mechanism for exercising power. At the same time, forms of direct implementation of the functions of local self-government (local referendum, assembly or assembly of citizens, etc.) by the population, formally prescribed in the law, have not gained any substantial use at the local level.

It largely turned out to be a logical continuation of the fact that any real participation of the population in the institutionalization of local communities during the municipal reform was ruled out initially. Everything was done by legalization «from above», although in accordance with Part 1 of Art. 132 of the Constitution of the Russian Federation, «The structure of local self-government bodies is determined by the population independently.» Meanwhile, it is the variety of forms of institutionalization of local communities and the active dissemination of direct forms of democracy that historically determines the border separating real local government from representative power structures

that can function on a uniform basis at the national, regional and even local level. As Khudokormov rightly points out: «In modern society local self-government is perceived not so much as a democratic and autonomous institution, designed to activate the initiative of the population, but rather as a lower level of the state apparatus that is authorized to manage local taxes and fees and to regulate deductions through the system of local budgets from state taxes.» [6].

The country's population was initially «removed» from resolving key issues of reforming Russian local self-government. Maybe it is not worth mentioning this fact, but, according to many experts, this was exactly what led ultimately to notable manifestations of passivity and even complete indifference of the population in relation to the activities of municipal government at the local level [7, 21]. The tendency of substituting direct electivity of municipal heads from the population with a system of so-called «city-managers» has considerably deepened the negative impact of this situation.

Not coincidentally, the dominance of universalist and centralization tendencies in the transformations of Russian local self-government after 2003 enabled experts to compare these innovations with Zemstvo counter-reforms of Alexander III during the period of 1889–1894 [8]. In this regard, the idea that municipal strategy will not achieve its expected effects becomes all the more relevant, since it will remain the prerogative of the administrative apparatus and will not be implemented on the basis of the population's initiative or its willingness to take responsibility for the socio-economic development of the territory in the long term [9]. Moshkin noted in the study on the strategic plan of the municipality: «the principle not fixed legislatively but important in the process of strategic planning must have priority. This is the publicity principle, i.e., dialogue and co-ordination of interests of all subjects who are interested in the results of strategic planning such as authority, business and public» [10]. It is reasonable to assume that local self-management legislation should not only designate formally admissible forms of direct democracy, but also make using these forms of democracy mandatory in solving certain significant issues of municipal development. In

particular, these forms should be used in development and adoption of strategic plans of municipalities. This applies also to the need to reflect the role of municipal private partnership in the law as one of important mechanisms of development and realization of strategic plans of municipalities.

At this stage, clear positioning of Russia's main institutes in the system of strategic planning has a paramount importance for the development of legal and institutional bases of local self-management. This assumes that there is coordinated development and elaboration of the 131st FL and Federal law № 172 of June 28, 2014 «Of strategic planning in Russian Federation» (172nd FL). In this case the norms of the 172nd FL are obviously basic. They should make provisions for key elements of frameworks and the procedures of strategic planning in municipal management. However, nowadays the solution of this problem is substantially complicated by the initial gaps in the 172nd FL. In particular, its regulatory statutes on 'the vertical' are unbalanced. It is well-known that the first versions of this law were aimed mainly at regulating strategic planning practices at the federal level of control. A more or less full picture of documentary and operational components of strategic planning in the subjects of the Federation was given only in the final version of the law. The foundations of municipal strategic planning were only described briefly, and this type of planning had an optional nature and was addressed only to municipal districts and city areas [11, 12].

It would seem that the main efforts on developing the legislation bases of Russian local self-management should be concentrated on implementation of ideas of strategic planning in the 131st FL after acceptance of the 172nd FL.

However, in reality this has not been occurred yet. Additional clarifications on tasks, documents and procedures for strategic planning in the local self-government system were not made to the 172nd FL. Experts expressed divergent views while discussing such specific structurization of legislation on strategic planning. Some believed that the socio-economic situation in Russian municipalities is so diverse and peculiar that it is simply impossible to dictate the necessity of strategic planning to all of them, moreover, at the federal level along with a detailed list of all

procedures and documents of such planning. Opponents of this view said that if there is independent legislative regulation on local self-management in the country, the main conditions concerning strategic planning in this control link, including the issues of its necessity for some types of municipal formations, order of co-ordination of municipal strategies with the units of public authority of Federation subjects and so forth, should be established eventually. In this regard, proposals were expressed and legislative initiatives were developed, directed at making strategic planning compulsory for all types of municipal formations «in developing» the conditions of the 172nd FL. Therefore, the range of powers of institutions of local government described in paragraph 17 of the 131st FL should be revised entirely.

However, it seemed that the most realistic proposal was to avoid extreme decisions. The most realistic proposal was for local governments to retain the right to make their own choice (in consultation with the units of public authority of Federation subjects) to develop either strategies or the plans of complex socio-economic development of municipal formations (KOSAR) initially contained in the legislation.¹ Furthermore, practical limitation of management, information and personnel resources of most local government institutions (particularly settlement-type) leads to problems in making a clear distinction between the «strategies» currently developed in some municipalities and the former KOSAR plans. It would be expedient to reflect the right to regulate these issues at the regional level in paragraph 6 of the 131st FL «Powers of public authorities of subjects of Russian Federation in the area of local self-government».

As a result, these changes turned out to be ambivalent and even contradictory. Only at the end of 2017 (i.e., 3 years after the adoption of the 172nd FL), a special item 4.4 appeared in the 131st FL, giving institutions of local government (without specifying which institutions) powers in the area of strategic planning, provided for in Federal law no. 172 of June 28, 2014 «About strategic planning in the Russian Federation». Such a reference in one law to another, not giving

¹ Nakhodiashchiesia na rassmotrenii zakonoproekty s popravkami v federal'nyi zakon «Ob obshchikh printsipakh organizatsii mestnogo samoupravleniia v Rossiiskoi Federatsii», Munitsipal'noe pravo, 4 (76) (2016) 105–109.



enough detailed regulation on the appropriate range of issues, can only be regarded as an outright «legal dummy».

At the same time, the earlier power of local government authority to organize and execute plans and programs of complex socio-economic development of municipal formations was dropped from the 131st FL. Municipalities only retained the right to design and establish programs of complex development of communal infrastructure systems, programs of complex development of transport and social infrastructure. The position to move the legal regulation of municipal strategizing procedures to the level of Federation subjects was not supported. The proposal to legislatively establish the gradual transition of Russian municipalities to the system of strategic planning was not supported as well. The first stage of such a transition started with city areas, or «capitals» of Federation subjects, then moved on to most economically important city areas and municipal areas, municipal formations where federal and regional development institutes (special economic areas, areas of territorial development, territories of advanced development, and so forth) are located and, finally, Russian towns and monocities receiving or eligible for purpose-oriented assistance from federal or regional level. The practice of strategic planning could be then be extended to other municipal formations, including settlements that could use such strategizing with a simplified procedure.

In general, it can be observed that granting «a right» to implement functions of strategic planning to municipalities eventually turned out to be in line with that common indefinite treatment of the statements of the 131st FL regarding the powers for local issues [13–15]. The essence of this ambiguity is that the law interprets these powers more like rights to appropriate actions than obligations to implement them unconditionally. Formally, the powers related to local issues for municipalities of all types are divided into «compulsory» (paragraphs 14, 15, 16 of the 131st FL) and «voluntary» (paragraphs 14.1, 15.1, 16.1 of the 131st FL). However, «compulsory» powers are not in fact unconditionally mandatory. It is a well-known fact that actual implementation (budgeting) of such powers, particularly, in settlement municipalities, is not carried out to

the full extent: up to half of all powers or even less are implemented. It is highly inappropriate to leave this issue of legal regulation of municipal strategizing practices in such a suspended condition.

Municipal reform: institutional bends. The main institutional result of the reform of the mid-2000s was a sharp increase in the number of municipalities in the country (initially almost up to 25,000). Afterwards the process of their gradual reduction began.

In total, almost 2,000 municipalities, primarily settlement ones, have disappeared since the full-scale reform implementation in the country.

The situation of «institutional instability» in the system of Russian local self-government still exists.

Meanwhile, practice shows that the adequacy of municipal organization to the requirements of strategic planning is determined primarily by two parameters (conditions): institutional stability and economic security. Of course, there are also such factors as sufficient supply of personnel at the municipal level of management [16], information security, or, rather lack of it at the municipal management level due to the disappointing state of municipal statistics [17] inconsistent with the requirements of socio-economic strategy, etc. Nevertheless, it seems to us that the first two conditions are of decisive importance. They are the ones that form the regime of trust in the local authorities, which allows to implement the practice of municipal strategizing as a special product of the population's will, initiative and responsibility. However, in fact, the course of the municipal reform has already made it extremely difficult to sustain all these conditions. The institutional structure of local self-government failed almost from the start of the reforms. The promise to transfer a solid economic (financial and budgetary) base, commensurate with the whole range of issues of local significance, to municipalities, was mostly left on paper.

It is well-known that at the initial stage of the municipal reform the grid (boundaries) of municipalities was generated formally by laws of the constituent entities of the Federation. It was based on the notorious principle of transport and/or pedestrian accessibility of the municipal

center (i.e., mainly based on the territories that corresponded to the former rural and city councils), but not with the goal to form in the new conditions a system of municipal entities that are self-sufficient in economic terms and, accordingly, capable of carrying out all the necessary tasks. The principle of «accessibility» was originally inadequate and rejected by all subsequent reform practices. Therefore, it turned out to be even more incompatible with the inclusion of the municipal management into the system of strategic planning as a basis for structuring the institutions of local self-government.

However, here we must make a reservation. Of course, economic self-sufficiency makes it possible to raise municipal strategy to a qualitatively higher level, making it independent of the factors are associated, for example, with possible changes (especially in the long term) in the instruments and volumes of financial assistance received from municipalities of a higher level of governance. Nevertheless, when choosing a model of institutionalization or, as it is often termed in the regions, «grid» of municipal entities, the principle of economic self-sufficiency should not be seen as an end-all. Financial and economic self-sufficiency of municipalities is not 'solid' even in the most developed countries of the world [18].

There is obviously a contradiction, which is still being processed by our theory and practice of municipal management. It consists in the fact that the population's interest in creating (and maintaining) its 'own' municipality is 'confronted' by its economic insecurity. At the same time, the above contradiction is not solved but simply «covered up» through progressive consolidation of municipal entities.

The actual resolution of this contradiction can only be real empowerment and responsibility of local communities, including in the choice of institutionalization of these communities with full transparency of information about the benefits that the community gains within its 'own' municipality and what risks, including economic, can arise in this case. Then, the issue of whether to retain the municipality or merge it with another more economically secure one should be decided by means of direct democracy (in a local referendum).

However, the idea of municipal reform in line with the support to intensify initiatives and responsibilities of local communities did not advance significantly. Moreover, many recent legislative innovations concerning the Russian local government are, frankly, quite bewildering. These changes are not only aimed at improving the institutional framework for strategy development in the management positions, but, in fact, mean giving up many of the most fundamental principles of municipal reform. For example, on April 3, 2017, the President of the Russian Federation signed Federal Law No. 62-FL (referred to as the 62nd FL from now on), introducing new significant changes in the 131st FL. These changes establish the ability to convert municipal areas to urban districts by combining all settlements included in the area. The law also removed the restriction that the urban district should necessarily be based on a city settlement (that is, it is possible to create urban districts consisting exclusively of rural settlements).

So, the municipal reform is reversing in a way in a number of key positions. Indeed, there are two key innovations in the organization of local government in the Russian Federation originally described by the 131st FL. Firstly, this is the mandatory restructuring of municipal institutions in all regions of Russia as a system of urban districts (single, i.e., one-level municipalities) and municipal districts (two-level municipalities including the system of settlement municipalities with independent budgets). Second, intra-municipal entities are eliminated in all Russian cities except cities of federal significance.

The latter institutional innovation was the first one to be gradually abolished. Federal Law of May 27, 2014 № 136 FL regranted the possibility to create intracity municipalities in «other» Russian cities. Respectively, local government institutions eliminated in the course of municipal reform were reestablished by law, namely, the city district with intracity division and the intracity district, an urban municipality within the territory of the city district. However, only the «capitals» of only three constituent entities of the Federation (Dagestan, Samara and Chelyabinsk regions, see Table) gained an intracity municipal division by early 2017.

Number of municipal entities by subjects of the Russian Federation (units)

Total	Including, by type:							
	municipalities	city districts		Intracity areas	Intracity municipal formation of a city of federal significance	settlements		
		total	including with intracity division			Total	including	
							city	rural
On January 1, 2007								
24207	1793	520	—	—	236	21658	1732	19919
On January 1, 2017								
22327	1784	567	3	19	267	19609	1589	18101

Source: URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1244553308453

In April 2017 it was the turn of another institutional innovation, the 2003 reform mentioned above. Recent amendments allow, as mentioned above, to convert municipal districts to city districts. This process, which previously affected only specific districts, is now almost as a general trend in the reorganization of local government institutions in the country. Essentially, the idea of a two-level system as supposedly the most effective form of organization of local self-government was gradually abandoned. [19]

The formal reason for these changes was the desire to create a more effective system of territorial management; to concentrate managerial and financial resources; to reduce the number of municipal employees, etc. Consolidation of institutions of local government, ostensibly, greatly simplifies the practice of strategic planning in municipal management positions, as well as planning and territorial development in the subjects of the Federation. In many ways, these arguments seem valid. However, there are two points about them that must be addressed.

First of all, all of the arguments made above are true as much as they are not new. All these fears (complicated vertical of municipal government, the «smearing» of local finances, the swelling of the municipal government apparatus, etc.) were repeatedly voiced by experts before the start of the reform, and in the course of its implementation. It would seem that the current trend of reforms is still the same, which is to say that realization of the truth only comes after a series of mistakes has been made.

But even more important is not the vector of the changes but how these changes are implemented. In recent years, the situation has clearly evolved in the direction of pushing the population away from resolving key issues of functioning and reorganizing local self-

government. Everything, including the above-mentioned transformations in institutions of local self-government, is transferred to the representative bodies of municipalities, and sometimes it is decided at the level of state power of the subjects of the Federation. In this case, the idea of local self-government as a result of public initiative and responsibility only grows weaker instead of stronger.

Conclusion. This study allows to distinguish two main conditions that allow to eliminate the formalism in the implementation of municipal strategizing. Firstly, the legislative approval of the practice, in which such a strategy development will mean the highest and most important form of direct realization of local government functions by the population. Secondly, legislative consolidation and detailed methodological support of flexible forms of municipal strategy, consistent with both 6-7 existing types of municipalities, and with the diversity of socio-economic conditions for the development of territories in various subjects of the Federation. To ensure effective functioning of the institution of local self-government within the vertical of strategic planning in the country, it is necessary to implement the following institutional and legal measures.

1. Adoption of the Strategy for the Development of Russian Local Government, in which strategic guidelines for this institution should be presented. This Strategy should be included in the mandatory strategic planning documents identified in the 172nd Federal Law. Subsequently, the main provisions of such a Strategy should be enshrined in the adoption of a completely new version of the 131st Federal Law.

2. The powers of local self-government enshrined in the current legislation should be

reassessed; existing inconsistencies should be eliminated; duplication of authority between different levels of government should be eliminated; consistency between the powers of municipalities on local issues and the volume of profitable sources of local budgets should be ensured.

3. The possibility of a differentiated approach to organization of local self-government and the implementation of strategic planning procedures for a number of special types of municipalities (for example, industrial innovative municipalities

and science cities, municipalities where federal and regional development institutions are located).

4. Federal entities should adopt special state (regional) programs for the development of local government, aimed at organizational and methodological support and co-financing strategies for the development of separate territories; at supporting various initiatives of local communities; at creating local development institutions (business incubators, business support centers, industrial parks, municipal banks), as well as wider practice of municipal private partnership.

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Статья поступила в редакцию 04.02.18

DOI: 10.18721/JE.11204
UDC 338.24

ANALYSIS OF THE FORMATION AND FUNCTIONING OF STRATEGIC PLANNING OF INDUSTRY DEVELOPMENT IN RUSSIA

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The relevance of the topic is determined by the formation of the system of strategic planning, strategies of individual industries, the existing problems of implementation and evaluation of the effectiveness of state programs of industrial development in the Russian Federation. The goal of the study is in analyzing the formation and functioning of strategic planning of industrial development in the Russian Federation, identifying the problems and finding ways for solving them. The objectives of the study are analysis of the problems of formation of the system of strategic planning of industrial development in the Russian Federation; analysis of the current state of strategic planning of industrial development in the Russian Federation; identification of implementation problems, as well as analysis of the effectiveness and efficiency of state programs of industrial development and substantiation of the impact of these problems on achieving industrial development goals; development of elements of the methodology for assessing the effectiveness and efficiency of state programs. The methods of the study are analysis of normative and methodological documents of strategic planning, economic analysis. The article deals with the problems of strategic planning in the Russian Federation, the formation of strategies for socio-economic development and development of certain industries, the formation of institutional and methodological support of strategic planning, evaluation of the effectiveness and efficiency of the state programs of industrial development. We have analyzed the dynamics of the actual values of the target indicators of the state program of the Russian Federation «Development of industry and improvement of its competitiveness» for 2013–2016, compared the actual and planned values of the target indicators, revealed the shortcomings of strategic planning, showed the impact of planning shortcomings on the objectivity of the assessment of the effectiveness. On the basis of the analysis, we have developed the elements of the methodology for assessing the effectiveness and efficiency of state programs at the stage of preliminary diagnosis, taking into account the quality of institutional and methodological support for the formation of the strategic planning system. In order to improve the management of state development programs, improve the quality of strategic planning and reports on the evaluation of the effectiveness and efficiency of the implementation of state programs, we have developed the stages of the algorithm for assessing the quality of planning (evaluation of the validity of the planned values of the target indicators of the state program), which is an integral part of the methodology for assessing the effectiveness and efficiency of the state programs. Directions for further research lie in the development of methods for assessing the effectiveness and efficiency of state programs and in assessing the effectiveness and efficiency of state programs of industrial development in the Russian Federation.

Keywords: state programs; industrial development; efficiency; efficiency evaluation; planning quality; system of strategic planning of industrial development

Citation: S.V. Palash, Analysis of the formation and functioning of strategic planning of industry development in Russia. St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 38–52. DOI: 10.18721/JE.11204

АНАЛИЗ ФОРМИРОВАНИЯ И ФУНКЦИОНИРОВАНИЯ СИСТЕМЫ СТРАТЕГИЧЕСКОГО ПЛАНИРОВАНИЯ РАЗВИТИЯ ПРОМЫШЛЕННОСТИ В РФ

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Актуальность темы определяется формированием в России системы стратегического планирования, стратегий отдельных отраслей промышленности, существующими проблемами реализации и оценки эффективности государственных программ развития промышленности. Цель исследования – выполнить анализ формирования и функционирования системы стратегического планирования развития промышленности в России, выявить проблемы и обозначить пути их решения. Задачи исследования: анализ проблем формирования системы стратегического планирования российской промышленности; анализ текущего состояния стратегического планирования; выявление проблем реализации, а также результативности и эффективности государственных программ развития промышленности и обоснование влияния этих проблем на достижение целей промышленного развития; разработка элементов методики оценки результативности и эффективности государственных программ. Методы исследования: анализ нормативных и методических документов стратегического планирования, экономический анализ. Рассматриваются проблемы стратегического планирования в России, формирования стратегий социально-экономического развития и развития отдельных отраслей промышленности, формирования институционального и методического обеспечения стратегического планирования, оценки результативности и эффективности реализации государственных программ промышленного развития. Дан анализ динамики фактических значений целевых индикаторов Государственной программы РФ «Развитие промышленности и повышение ее конкурентоспособности» за 2013–2016 годы. Сопоставлены фактические и плановые значения целевых индикаторов, выявлены недостатки стратегического планирования, показано влияние недостатков планирования на объективность оценки результативности и эффективности государственных программ развития промышленности. На основе анализа разработаны элементы методики оценки результативности и эффективности государственных программ на этапе предварительной диагностики с учетом качества институционально-методического обеспечения формирования системы стратегического планирования. С целью совершенствования управления государственными программами развития, повышения качества стратегического планирования и отчетов по оценке результативности и эффективности реализации государственных программ разработаны этапы алгоритма оценки качества планирования (оценки обоснованности плановых значений целевых индикаторов государственной программы), который является составной частью методики оценки результативности и эффективности государственной программы. Направления дальнейших исследований видятся в разработке методики оценки результативности и эффективности государственных программ и в оценке результативности и эффективности реализации государственных программ развития промышленности в России.

Ключевые слова: государственные программы; развитие промышленности; результативность; оценка эффективности; качество планирования; система стратегического планирования промышленного развития

Ссылка при цитировании: Палаш С.В. Анализ формирования и функционирования системы стратегического планирования развития промышленности в РФ // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 38–52. DOI: 10.18721/JE.11204

Introduction. The scientific literature, the political environment, the media are now actively discussing the issues of strategic planning, the formation of strategies for the socio-economic development of the national economy and individual sectors of the economy, the problems of assessing the effectiveness and efficiency of the implementation of state programs as tools for strategic planning, improving their efficiency. The formation of a new strategy for socio-economic development is very important, because it should become a strategy for Russian economy, and industry, in particular, to recover from the state of depression. With a new strategy of socio-economic development, strategies for the development of individual sectors, on the basis of which state development programs can be developed, should be coordinated. Now the new legislative base of strategic planning and industrial policy, strategies of development of separate branches is developed, the number of tools of industrial policy increases, several state programs directed on the development of separate industries of the Russian Federation and the industrial complex as a whole are realized. However, the analysis of the implementation of state programs for the development of industry in recent years shows that the tools used do not yet give the planned result.

The goal of the study is the analysis of formation and functioning of strategic planning of industry development in the Russian Federation, revealing the problems and finding ways of solving them. The objectives of the study are analysis of the problems of formation of the system of strategic planning of industrial development in the Russian Federation; analysis of the current state of strategic planning of industrial development in the Russian Federation; identification of implementation problems, as well as analysis of the effectiveness and efficiency of state programs of industrial development and substantiation of the impact of these problems on achieving industrial development goals; development of elements of the methodology for assessing the effectiveness and efficiency of state programs.

Problems of forming a system of strategic planning of industry development. In our opinion, the system of strategic planning of

industrial development includes legislative and regulatory framework of strategic planning of federal, regional, municipal levels, strategies of socio-economic development of macro-, meso-, micro levels, methodological support of strategic planning, forecasts of socio-economic development, accounts (reports) on the evaluation of the effectiveness and efficiency of state programs.

The problems of formation and implementation of socio-economic development strategies include, among other things, the lack of agreement in the scientific and political circles about the choice of macroeconomic management goals, means and target proportions of the object of management, as well as the lack of attention paid in the process of developing a strategy for the enterprise as the main structural unit of the organization of modern economy [12] and other problems.

Kleiner lists the following basic requirements for the strategy of socio-economic development of the country: reliance on the «image of the past» and «image of the present»; «image of the future»; multiple levels (macro-, meso-, micro-, nanostrategy); full coverage of economic space-time; consistency; interaction with other types of strategies, in particular, with the strategy of economic security [10]. The «image of the future» is a systemic economy, whose signs include the integrity of economics as a subsystem of society; availability of mechanisms of coordination of interests of actors irrespective of their scales (including on the basis of mechanisms of multilevel system strategic planning); consistency of administrative decisions made at all hierarchical levels; consistent criteria of social justice and economic efficiency [11].

According to Methodical recommendations of the Ministry of economic development of Russia on preparation of strategies of development of branches of economy, one of the main tasks of development of strategies of branches of economy is «providing the most effective solution of the structural problems of the Russian economy that hinder social and economic development».¹ It should be noted that the structural problems of the Russian

¹ Guidelines for the preparation of strategies for the development of sectors of the economy. URL: <http://economy.gov.ru> (accessed February 22, 2018).



economy have been discussed for decades in scientific publications [4], and the analysis of their content in the past, as well as the current state shows that the problems are not solved, they have become more acute. In particular, economic policy and public administration mistakes are not the least mentioned among the structural constraints to economic growth and technological modernization of industry.

Industrial policy, the modernization of industry, import substitution, re-industrialization, restructuring, and risk management of industrial enterprises were discussed by Aganbegyan, Bodrunov and Glazyev [3], Greenberg and Dementiev [3], Kleiner [12], Kachalov, Lenchuk and Romanova [24, 25], Sukharev [21, 22], Tatarkin [23–25] and other Russian scientists. The questions of methodology of state management by objectives, evaluation of effectiveness and efficiency of state programs of social and economic development of regions are revealed in the works Ivanter [6], Lexin [6, 13, 14], Porfiryev [6, 13, 14], the scenario approach to the development of federal target programs of innovative nature, evaluation of the effectiveness of targeted state scientific and technical programs and federal medical programs in the application of high technology are described in studies by Dementyev [5], Pronichkin [20], Kapitsyn [7], Basyrov, Gerasimenko, Andronov. Issues of assessing the effectiveness of state development programs are addressed in the works of Karpov [8, 9], Lagzdin [9], Loginov [8, 9, 15], Korableva [8], Breusova [2], Markov [16], Markova, Yuzhakov [26], Dobrolyubova, Alexandrov, Aleksashina [1] and other authors.

The problems associated with monitoring and assessing the socio-economic effectiveness of implemented state programs have been discussed in the scientific literature for many years. These problems include: 1) «no clear definition of the objectives of state participation in the industry» [5]; 2) insufficient methodological and informational support for the development of state programs [5], lack of consistency of goals, objectives and target indicators of the program, insufficient justification for the selection of target indicators, lack of justification for determining the values of target indicators at different stages of the program [17, 18], etc.; 3) shortcomings of methods for assessing the efficiency of implementation of

the state programs [19], which is also acknowledged in reports on implementation of state programs of the Ministry of economic development;² 4) shortcomings of forecasts used to determine the values of target indicators of the program [5], and shortcomings of strategic planning [17, 18]; 5) absence of a reasonable distinction between the influence of external factors and direct participants in the implementation of programs on the results and effectiveness of their implementation, «differentiation of response measures to deviations of individual indicators from their intended values» [5], which leads to difficulty or inability to assess the effectiveness and efficiency, as well as the fact that participants may try to lower the planned values to be confident in their achievement.

The characteristic of the current state of the system of strategic planning of industrial development in Russia. The system of strategic planning in the Russian Federation is in the process of formation. A system of strategic planning of industrial development, part of which are state programs for the development of industry, is also being formed. Let us describe the current state of the system of strategic planning of industrial development in the Russian Federation, based on a comparison of the requirements for strategies for socio-economic development and the current state of the system of strategic planning; next, we shall identify the problems of strategic planning of industrial development in Russia (Tab. 1).

Thus, the current state of the system of strategic planning of industrial development partially complies with four of the six selected criteria of the requirements for socio-economic development strategies, and does not at all comply with two. Consider the compliance of the current state of the system of strategic planning of industrial development signs of the system economy as «image of the future» (Tab. 2).

² Updated consolidated annual reports on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2014, 2015. Consolidated annual report on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2016. URL: <http://progams.gov.ru/Portal/> (accessed February 12, 2018).

Table 2

Compliance of the current state of the system of strategic planning of industrial development with the features of the system economy as «image of the future»

Criterion	Compliance* with the criterion	Characteristic
The integrity of the industry as a subsystem of the economy and society	—	If integrity means a property of programs (strategies) to provide completeness of the structure of the actions necessary for achieving objectives, and also consistency of communications between these actions, the current state of system of strategic planning of industrial development does not comply with this criterion owing to the above-mentioned shortcomings and problems of strategic planning
Existence of mechanisms of coordination of interests of actors irrespective of their scales (including on the basis of mechanisms of multilevel system strategic planning)	—	Higher-level strategic planning documents often do not take into account the problems of the development of lower-level socio-economic systems (do not take into account the problems of co-financing of individual instruments from the regions, the problems of the functioning of individual industries and complexes, individual industrial enterprises)
Consistency and consistency of management decisions at all hierarchical levels	—	Inconsistency in the development and approval of strategic planning documents at different levels of hierarchy, which can lead to increased costs of strategic planning, inconsistency (misalignment) of individual tools and measures, etc.
Consistency of criteria of social justice and economic efficiency	—	The strategic planning documents do not deal with reconciling the criteria of social justice and economic efficiency; there are indicators (target indicators) that characterize the economic efficiency of the evaluated systems; there are no indicators that characterize social justice, and, therefore, it is impossible to conclude about the consistency or inconsistency

Source: compiled by the author based on the criteria [11], as well as on the analysis of normative and methodological documents of strategic planning.

Note: * «+» – full compliance; «+ / –» – partial compliance «-» – mismatch.

Let us consider the correspondence of the system of strategic planning of industrial development to the requirement of consistency of management decisions taken at all hierarchical levels. There is a certain hierarchy of strategic planning documents: sectoral development strategies (individual industries) should be based on strategic planning documents of the federal level: federal law, Strategy of social and economic development of the Russian Federation, Strategic forecast of the Russian Federation, Forecasts of social and economic development of the Russian Federation for the long and medium term, etc. In 2016–2018, projects are devised and strategies are approved for the development of certain industries for the period up to 2030 (aviation, automotive, chemical and petrochemical complex, industry for processing, recycling and disposal of production and consumption waste, building

materials industry, etc.); these projects and strategies are based on documents of a higher level of hierarchy, adopted in 2008 for the period up to 2020 (in particular, Strategy for socio-economic development of the Russian Federation in the current edition of «The Concept of socio-economic development of Russia up to 2020»), that do not take into account the changes over the past period of time, economic and political conditions. The development and approval of a new strategy for socio-economic development will either entail a change in the already approved sectoral policies, passports of government programs (which will increase the transaction costs of the strategic planning process), or the strategic planning system will be fragmented, contradictory (if strategies at different levels of hierarchy do not agree), or the strategy for socio-economic development will be fragmentary and

uninformative. In the short, medium and/or long term, all three of these options will have a negative impact on the quality of the formation of the strategic planning system, the effectiveness of state support measures for industry and the effectiveness of the cost measures aimed at the implementation.

Thus, in the existing system of strategic planning, the «image of the future» of the industrial complex is not worked out systematically enough, and significant efforts are needed to finalize it.

Quality of strategic planning of state programs of development of the industry and problems of analysis of efficiency and of their implementation. We have analyzed the dynamics of the actual values of the target indicators of the state program of the Russian Federation «Development of industry and improvement of its competitiveness» for 2013–2016, compared the actual and planned values. Let us consider the dynamics of the actual values of the target indicators of the state program of the Russian Federation «Development of industry and improvement of its competitiveness» for 2013–2016 (Fig. 1, 2), compare the planned and actual values for 2016 (Fig. 3), as well as the

planned values of 2016 with the actual ones for 2015 (Fig. 4).

Industrial production has been declining since 2014 compared to the previous year. Optimistic planning values for 2016 have not been achieved. In 2014, 2015, labor productivity decreased. In 2016, there is a positive increase in labor productivity and the volume of investments in fixed assets, but the actual values of these indicators in 2016 are lower than planned. For two consecutive years, the number of high-performance jobs has been decreasing in relation to the previous year: by 8.1 % in 2015 and by 4.8 % in 2016. The share of costs for technological innovations in the total volume of goods shipped, work performed, services remains at a fairly low level: 2 % in 2016. Innovative activity of industrial production organizations is less than 10 % in 2014 and 2015, and 10 % in 2016. The optimistic target value of 50 % was not achieved in 2016. The planned value in terms of exports of Russian high-tech goods is also not achieved.

In 2016, three indices (industrial production, labor productivity, physical volume of investments in fixed assets by the previous year) show positive gains, but do not reach the planned values.

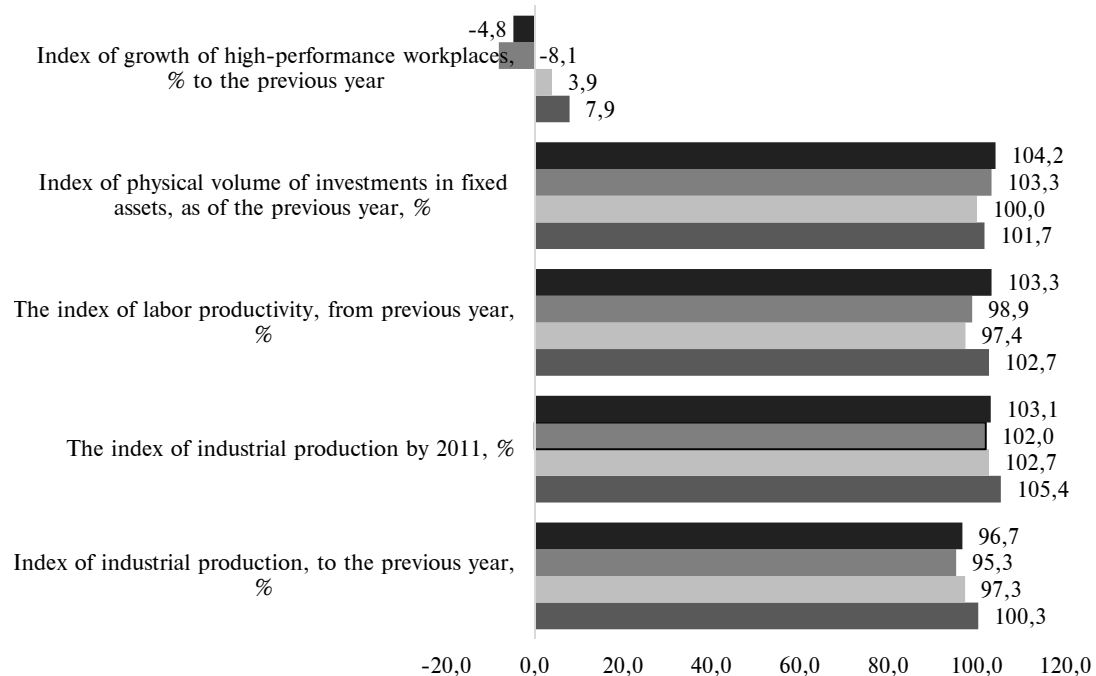


Fig. 1. Dynamics of values of separate target indicators of the state program of the Russian Federation «Development of industry and improvement of its competitiveness»

(■) – 2016; (■) – 2015; (■) – 2014; (■) – 2013

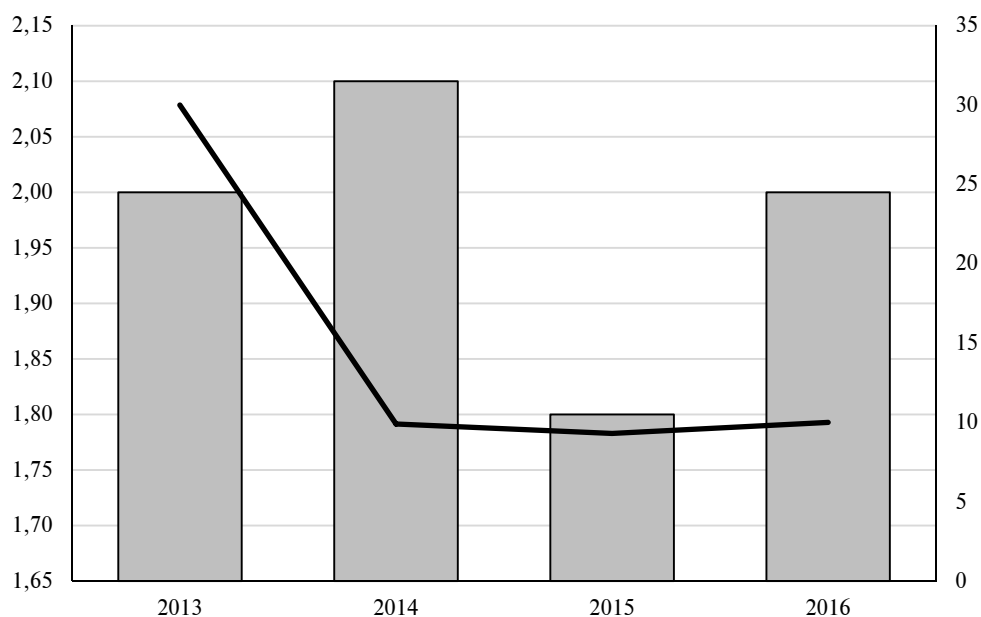


Fig. 2. Dynamics of values of individual indicators of innovative activity of industrial enterprises on the basis of the Consolidated annual report on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation in 2016

(■) – share of expenses on technological innovations in total volume of the shipped goods, the performed works, services of the organizations of industrial production, %; (—) – innovative activity of organizations of industrial production (the share of the organizations of industrial production performing technological, organizational and (or) marketing innovations in total number of the surveyed organizations), %

Thus, the dynamics of the actual values of the target indicators of the program indicates a decline in industrial production, a decrease in labor productivity, low innovation activity and a reduction in external demand for Russian high-tech goods. Despite the negative dynamics of many indicators in 2014–2015, the planned values of the target indicators for 2016 are overly optimistic, which indicates the poor quality of forecasting and planning.

The summary annual report of the Ministry of economic development on the implementation and evaluation of the effectiveness of state programs of the Russian Federation for 2016³ provides the following justification for deviation of the values of actual indicators from the planned state program «Development of industry and improvement of its competitiveness»: low

(insufficient) rates of recovery of industry due to the economic crisis; decrease in business activity; collapse of consumer demand during the crisis; low rates of recovery of consumer demand; the collapse of consumer demand during the crisis; lack of confidence in the growth of incomes in the future; drop in demand for investment goods during the crisis, etc. In 2014, the Ministry of economic development stated that the the main reasons for the failure to meet the planned values were «the decline in production caused by a reduction in solvent demand, an increase in interest rates on loans, as well as an increase in prices for imported components due to a decrease in the national currency» (which was not least due to structural problems and current financial policy), a reduction in the volume of production of main types of products and underloading of production capacities of enterprises.

Next, let us examine the indicators of effectiveness of implementation of the state program «Development of industry and improvement of its competitiveness» in 2014–2016 (Tab. 3).

³ Updated consolidated annual reports on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2014, 2015. Consolidated annual report on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2016. URL: <http://progov.ru/Portal/> (accessed February 12, 2018).

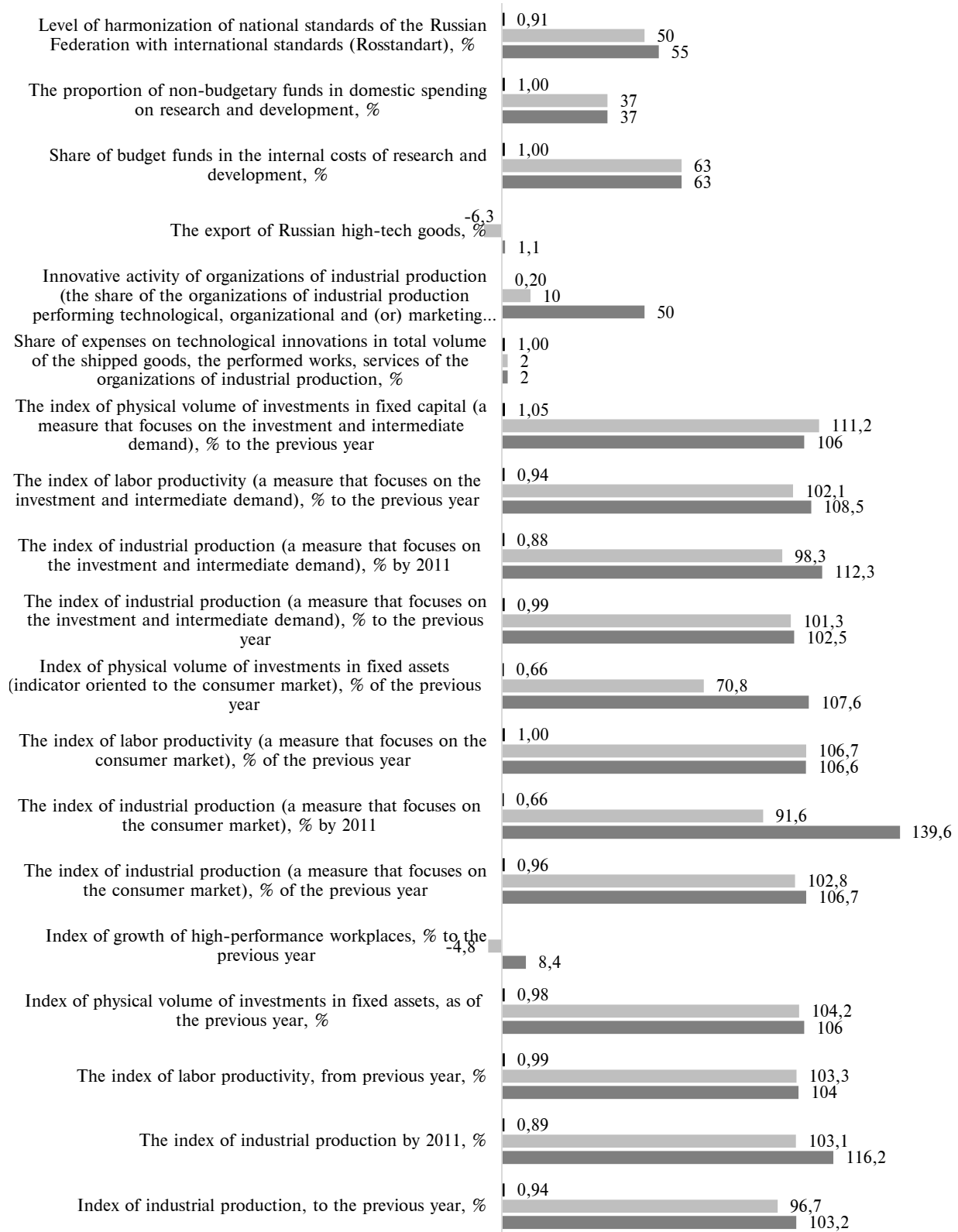


Fig. 3. Achievement of the planned values of target indicators of the state program in 2016

(■) – % execution of plan; (□) – 2016 fact; (▒) – 2016 plan

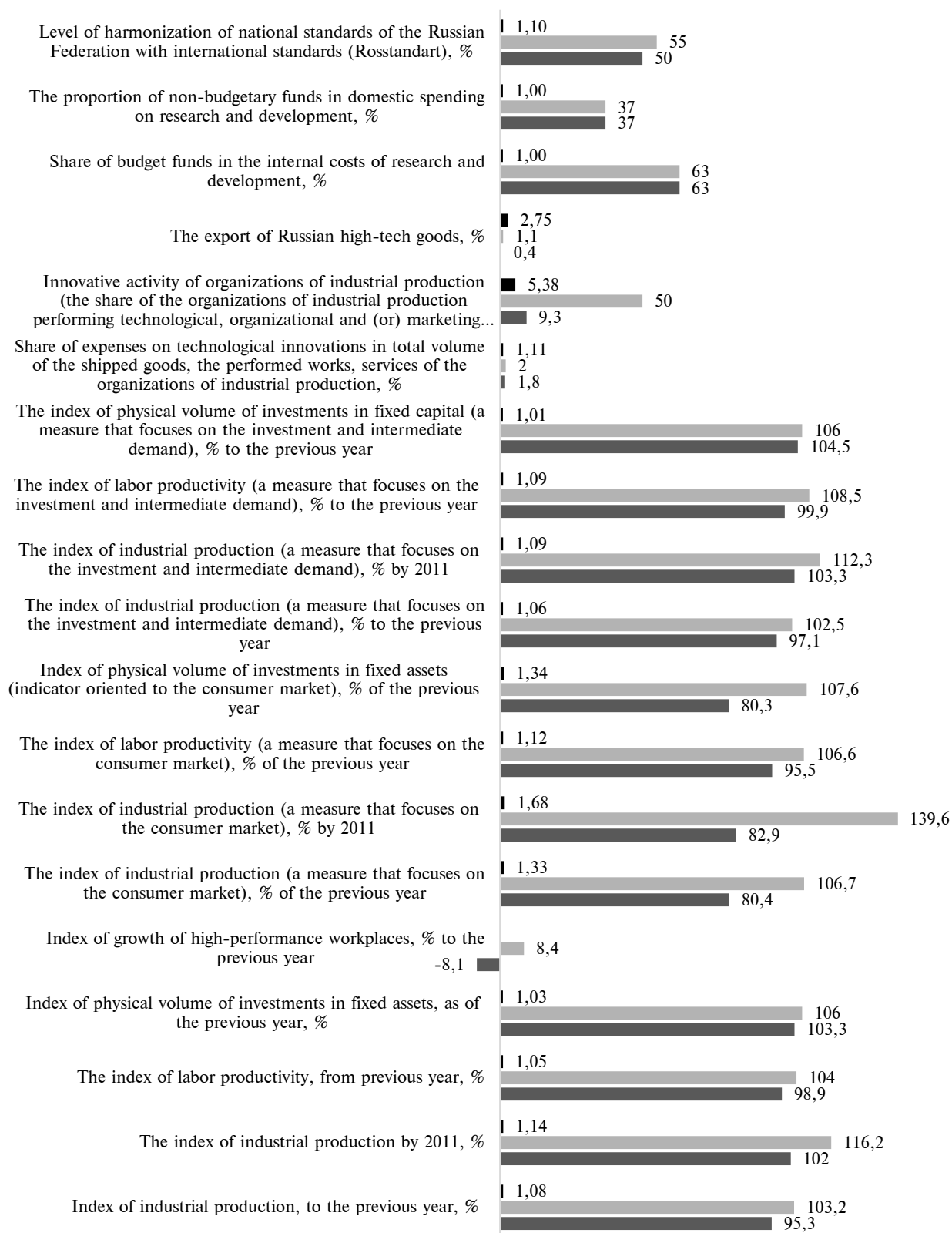


Fig. 4. Increase in the target values of the state program of 2016 compared to the actual values of 2015
 (■) – relation on the 2016 plan to the 2015 fact; (■) – 2016 plan; (■) – 2015 fact

Table 3

Evaluation of the effectiveness of the state program «Development of industry and improvement of its competitiveness», %

Indicators of evaluation of the state program	2014	2015	2016
Degree of achievement of target indicators of the state program of the Russian Federation	86.6	68.5	86.1
Degree of implementation of control events of the state program	93.4	49.3	93.2
Level of cash execution of expenses of the federal budget	99.94	93.0	92.4
Estimate of the effectiveness of the executive in charge (Ministry of industry and trade of the Russian Federation)	—	25	25
Degree of efficiency of the state program	93.3	56.5	76.6
Rating estimate	—	28 of 32	30 of 37

Source: Updated consolidated annual reports on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2014, 2015. Consolidated annual report on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2016. URL: <http://programs.gov.ru/Portal/> (accessed February 12, 2018).

According to the consolidated annual reports on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2014, 2015, 2016, the degree of achievement of the targets of the state program «Development of industry and improvement of its competitiveness» for the period under review did not rise above 86.6 %. The highest performance indicators of the state program for the period under review were in 2014. In 2015, the values of indicators decreased. The degree of effectiveness of the state program in 2015 amounted to 56.6 %, and to 76.6 % in 2016. At the end of 2015, the state program ranked only 28th in the efficiency rating, among the 32 implemented state programs. In 2016, the level of cash execution of Federal budget expenditures decreased, the performance assessment of the executive in charge (Ministry of industry and trade of the Russian Federation) remained at a fairly low level (25 %), but the degree of achievement of targets, the degree of implementation of control events and the degree of efficiency of the state program as a whole increased. However, in the ranking of the effectiveness of state programs, the program «Development of industry and improvement of its competitiveness» was only at the 30th place out of the total 37 in 2016. Thus, the program of industry development in 2015 and 2016 was one of the most inefficient.

It should be noted that the annual report of 2015 of the Ministry of economic development⁴

recognizes the need to improve the quality of strategic planning, as well as to improve the effectiveness and efficiency of implementation of state programs, including improving the system of risk assessment of implementation of state programs and methods of their management, and improve the methods of evaluating the effectiveness of state programs.

The steps in the algorithm for assessing the appropriateness of the planned values of target indicators of the state program. Since performance and hence the effectiveness of the state program can be assessed only if the planning quality is sufficient (the validity of the planned values of the target indicators), the analysis of the achievement of the planned values of the target indicators at the stage of evaluating the effectiveness of the state program should be preceded by an analysis of the quality of planning. If the planned annual values are not achieved, if with the negative annual dynamics of the actual values of the target indicators it is planned to increase the values of these indicators for the next year by 25 %, 50 %, or 2-5 times, or if the values of target indicators are planned below the actual values of the base year, it should be concluded that the quality of planning is low, the planned values are not justified, and, therefore, on the basis of a comparison of actual values with these planned indicators it is impossible to evaluate the impact of implementation of the state program and accordingly, an evaluation of its effectiveness. In this case, the evaluation of the effectiveness of the program will be purely formal and will not provide useful information for the management process and, in the worst case (if further management decisions are made on the basis of this evaluation),

⁴ Updated consolidated annual reports on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2014, 2015. Consolidated annual report on the implementation and evaluation of the effectiveness of the state programs of the Russian Federation for 2016. URL: <http://progams.gov.ru/Portal/> (accessed February 12, 2018).

will contribute to the adoption of inefficient and even inadequate management decisions.

To assess the quality of planning, it is necessary to analyze whether target indicator target values were 'chronically' not achieved in the previous years, analyze the dynamics of the actual values of target indicators for a number of years, calculate and analyze the ratio of planned values of the target indicator to their actual values in the previous year (or years). We propose the following stages of the algorithm for assessing the quality of planning (validity of the planned values of the target indicators of the state program), which is an integral part of the methodology for assessing the effectiveness and efficiency of the state program (Fig. 5).

The poor quality of planning is certainly not the only reason for insufficient effectiveness of the state program for the development of industry. One of the reasons for the lack of effectiveness of the measures used in recent years to support domestic industry, from our point of view, is the lack of taking into account the assessment of the impact of the instruments used on the object of regulation. Unfortunately,

certain instruments of industrial policy with limited funding cannot eliminate the consequences of the decade of restrictive monetary policy, «unwavering» adherence to the principles of market fundamentalism in the process of implementing the economic policy, solve the problems of long-term investment hunger, insufficient innovation activity, reduction of industrial production, loss of entire segments of domestic and foreign markets.

In the context of the economic recession, the existing structural imbalances, the unfavorable foreign policy situation and economic sanctions, a mere «dispersion» of funds between the targeted instruments of industrial policy will not lead to economic growth and growth of industrial production, even if the number of these instruments constantly increases. The industrial complex needs systematic mutually coordinated actions over a long period of time, substantial investments, a review of monetary policy priorities in support of industrial manufacturing enterprises, the implementation of the stimulating function of tax policy, stimulating demand in order to give a tangible impetus to the recovery and development of industry.

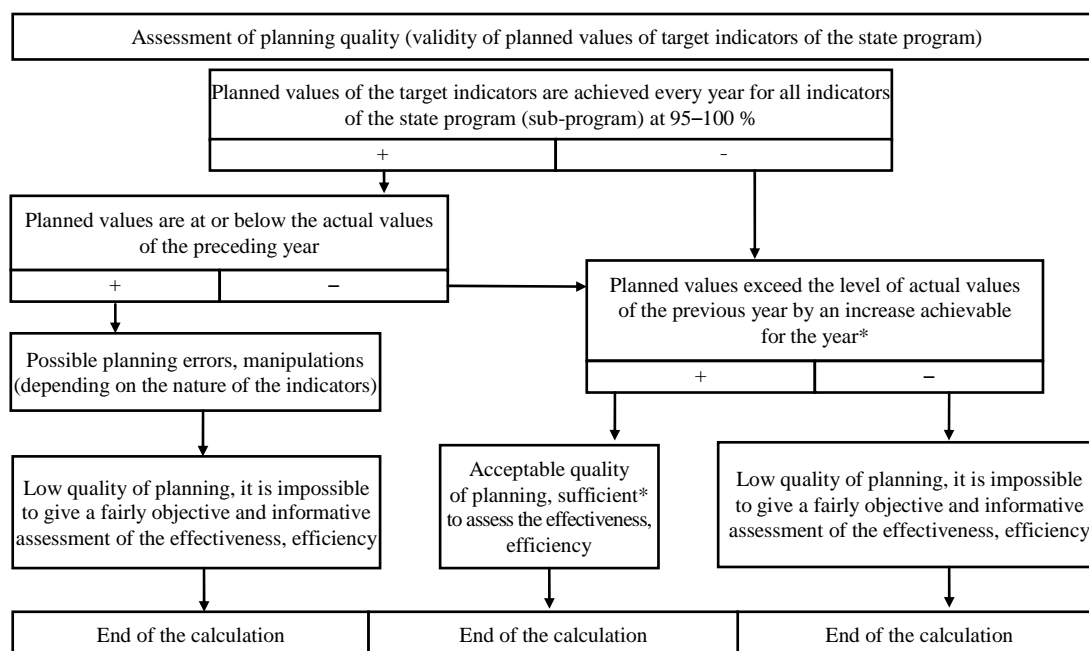


Fig. 5. Stages of the algorithm for assessing the validity of the planned values of the target indicators of the state program

Note *: in order to decide on an acceptable quality of planning sufficient to assess performance, it is necessary to assess the feasibility of the planned increases, taking into account the nature of economic dynamics, external and internal factors, the adequacy of resources, as well as the financial support of the state program and/or individual sub-programs and activities (planned and actual).



Summary

1. The article analyzes the formation and functioning of the strategic planning system of industrial development in the Russian Federation; identifies the shortcomings and substantiates their impact on achieving the industrial development goals. We have considered the shortcomings: the insufficiently systematically elaborated «image of the future» of the industrial complex, including the selection of goals, objectives, a set of target indicators, the definition and justification of their planned values; low quality of forecasts of socio-economic development, which reduces the quality of strategic planning; insufficient, fragmented coverage of micro-level strategic planning documents; the strategic planning documents of a higher level often fail to address the problems of development of socio-economic systems of a lower level; inconsistency in the development and approval of strategic planning documents at different levels of the hierarchy, which can lead to an increase in the cost of strategic planning, inconsistency (mismatch) of individual tools and measures and other problems, and therefore, in the short, medium and/or long term will have a negative impact on the quality of formation of the strategic planning system, the effectiveness of state support measures for the industry and the effectiveness of the implementation of these measures.

2. To assess the current state of strategic planning of industry development in Russia, we have analyzed the dynamics of the actual values of the target indicators of the state program of the Russian Federation «Development of industry and improvement of its competitiveness» for 2013–2016, compared the actual and planned values of the target indicators, revealed the shortcomings of strategic planning, showed the impact of planning shortcomings on the objectivity of the assessment of the effectiveness. The dynamics of the actual values of the target indicators of the program points to the following problems of its implementation: a decline in industrial production, a decrease in labor productivity, a reduction in high-performance jobs, low innovation activity and a decrease in external demand for Russian high-tech goods. Despite the negative dynamics of many indicators in 2014–2015, the planned values of the target

indicators for 2016 proved to be overly optimistic and for most of the target indicators were not achieved, which indicates the low quality of forecasting and planning. The insufficient quality of planning significantly complicates the assessment of the effectiveness and efficiency of the state program, reduces the information content and usefulness of efficiency assessment reports for the management process.

3. On the basis of the analysis, we have developed the elements of the methodology for assessing the effectiveness and efficiency of state programs at the stage of preliminary diagnosis, taking into account the quality of institutional and methodological support for the formation of the strategic planning system. In order to improve the management of state development programs, improve the quality of strategic planning and reports on the evaluation of the effectiveness and efficiency of the implementation of state programs, we have developed the stages of the algorithm for assessing the quality of planning (evaluation of the validity of the planned values of the target indicators of the state program), which is an integral part of the methodology for assessing the effectiveness and efficiency of the state program.

4. Based on the analysis of the dynamics of the actual values of the target indicators of the state program, it is shown that certain instruments of industrial policy with limited funding, unfortunately, cannot eliminate the consequences of the ongoing decade of restrictive monetary policy, solve the problems of long-term shortage of investment in industry, reduction of industrial production, low innovation activity of industrial enterprises. The use of targeted instruments of industrial policy will not ensure economic growth and growth of industrial production. In order to give a tangible impetus to the recovery and development of industry, systematic and coordinated actions of state support for industrial production, significant investment, demand stimulation and stimulating financial policy are needed.

Directions of further research are in the development of methods for assessing the effectiveness and efficiency of state programs and in assessing the effectiveness and efficiency of state programs of industrial development in the Russian Federation.

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Статья поступила в редакцию 12.03.18



DOI: 10.18721/JE.11205
UDC 330.12

EXPERIENCE OF STATE EXPOSURE ON INNOVATION ACTIVITY IN POWER MACHINERY

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Innovative activity is more or less inherent for any production company as one of the fundamental factors of effectiveness in a competitive environment. Economic and political aspects of the present time impose demands on the knowledge-intensive and technologically complex products, such as power-generating equipment. The products' obsolescence, change of requirements of consumers and behavior of participants of the market sooner or later necessitate the development of new types of production and production technologies, application of new approaches to organizing the processes in the internal and external environment of the company. Competitive conditions in the international markets also force the enterprises to increase efficiency of their activity. Special measures have to be taken and conditions have to be created for ensuring the required level of product competitiveness and, as a result, economic efficiency of the manufacturing company. Innovative activity can ensure long-term competitiveness. The problem of knowledge management is equally urgent. R&D is an important method of a company's scientific and technical development. The article considers management of innovative activity in scientific and production companies. Knowledge-intensive types of equipment require the most financial resources and have to be developed using a variety of government assistance. We present an overview of state regulation and support approaches in the USA, China, Russian Federation and European countries with respect to innovations in power engineering as one of the most high-tech industries. We have also analyzed the international experience of the participation of public authorities in determining the priority technologies and providing the conditions for implementation of R&D and creation of new equipment.

Keywords: innovations; industry; government assistance; R&D

Citation: V.V. Glukhov, Y.K. Petrenya, P.S. Shilin, Experience of state exposure on innovation activity in power machinery. St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 53–61. DOI: 10.18721/JE.11205

ОПЫТ ПРИМЕНЕНИЯ МЕХАНИЗМОВ ГОСУДАРСТВЕННОГО ВОЗДЕЙСТВИЯ НА ИННОВАЦИОННУЮ ДЕЯТЕЛЬНОСТЬ В ЭНЕРГОМАШИНОСТРОЕНИИ

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Инновационная деятельность в той или иной степени присуща любой производственной компании, в том числе как один из основополагающих факторов эффективного функционирования в конкурентной среде. Экономические и политические аспекты современности предъявляют высокие требования к наукоемкой и технологически сложной продукции, такой как энергогенерирующее оборудование.

Моральное старение выпускаемой продукции, изменение требований потребителей и поведения участников рынка рано или поздно приводят к необходимости разработки новых видов продукции и технологии производства, применения новых подходов к организации процессов во внутренней и внешней среде компании. Конкурентные условия на международных рынках заставляют предприятия повышать эффективность своей основной деятельности. Требуется принятие специальных организационных мер и создание условий для обеспечения требуемого уровня конкурентоспособности продукции и, как следствие, экономической эффективности разработчиков и производителей оборудования. Инновационная деятельность – один из способов обеспечения конкурентоспособности в долгосрочной перспективе. Проблема управления знаниями (компетенциями) стоит не менее остро. НИОКР являются неотъемлемым условием научно-технического развития компании. Однако создание «прорывного» продукта требует обеспечения постоянного проведения исследований, поддержания инновационной активности конструкторских и технологических подразделений, организации эффективного взаимодействия с внешней средой компании. Рассмотрен актуальный вопрос обеспечения инновационной деятельности научно-производственных компаний. Наиболее требовательными к финансовым ресурсам являются наукоемкие виды оборудования, разработка которых может быть осуществлена в полной мере при разностороннем государственном содействии. Представлен обзор механизмов государственного регулирования и поддержки инновационной деятельности в США, Китае, странах Европейского Союза, России применительно к энергетическому машиностроению как одной из наиболее наукоемких и высокотехнологичных отраслей промышленности. Проведен анализ зарубежного опыта участия органов государственной власти в определении приоритетных направлений развития техники, обеспечении условий для реализации исследовательских программ и создании нового оборудования.

Ключевые слова: инновации; промышленность; государственное содействие; НИОКР

Ссылка при цитировании: Глухов В.В., Петреня Ю.К., Шилин П.С. Опыт применения механизмов государственного воздействия на инновационную деятельность в энергомашиностроении // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 53–61. DOI: 10.18721/JE.11205

Introduction. Innovative activity is largely unique. In addition to the need for human, financial and material resources, the innovation process requires intellectual resources such as knowledge and extraordinary ideas. For this reason, modern economy is called intellectual, i.e., based on constant technological improvement, development of knowledge-intensive products with a high added value. The flow of new innovative solutions is the main indicator of the functioning of the innovation economy or what is commonly called the knowledge economy, in which the efficiency of an innovative project is determined by the commercialization efficiency, that is, the involvement of scientific and (or) scientific and technical results in economic turnover [1].

Implementation of such projects is only possible with an adequate and efficient innovative infrastructure including sectoral research institutions,

internal corporate mechanisms of organizational and methodological nature, and other auxiliary elements. However, an essential condition for carrying out any research and development is the availability of funding, in particular, this applies to knowledge-intensive products of the power engineering industry.

Analysis of the world experience confirms the special importance of material resources in the implementation of innovation policy. At the same time, the ratio of costs for the implementation of basic research to R&D is 1/10, while the ratio of costs for innovation is 1/100 or more.¹

Purpose of the study. To analyze the world experience of state assistance in innovation, identify the key mechanisms, compare with the situation in the Russian Federation.

¹ Ofitsial'nyi sait Minpromtorga Rossii. URL: <http://www.minpromtorg.gov.ru>

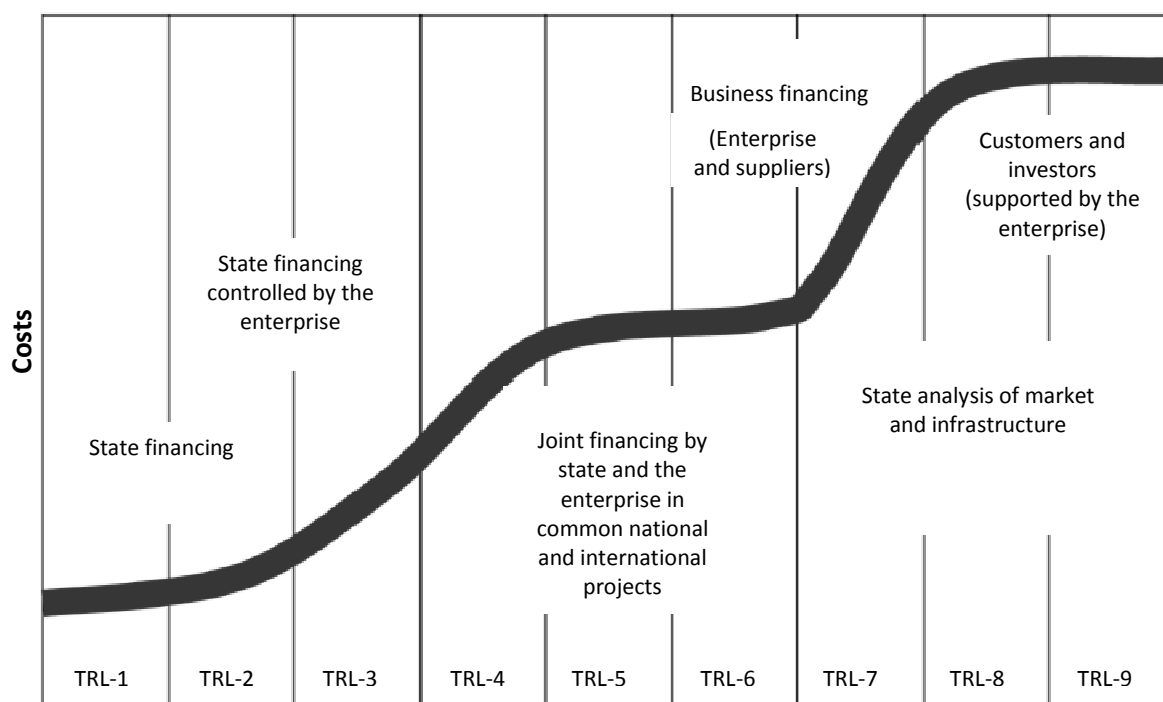


Fig. 1. Development dynamics and funding sources

Study methodology. As a clear illustration of the scale and dynamics of large project funding, we present the «Technological readiness level» model initially developed by NASA for space exploration. The model allows to decompose the development process of new products and technologies into stages and to forecast the costs. The model was later adapted by the US Department of Energy to evaluate its projects.² The process of developing a new technical unit or technology is divided into 9 technological readiness levels (TRL):

- 1 – initial phase of scientific research;
- 2 – intensive research, identification of practical application areas;
- 3 – applied analytical and laboratory studies;
- 4 – creation of basic technological components;
- 5 – integration of the main and supporting technological components, simulation of the operating conditions of the technical unit;
- 6 – development of the representative model of the unit (prototype), testing in real conditions;
- 7 – bringing the prototype to the required technical level, testing;

8 – successful completion of testing, certification;

9 – experimental operation of technology or technical unit.

The structure of funding at each stage is not uniform, private and public involvement is expected (Fig. 1).

The distribution shown is confirmed by R&D funding statistics in the leading countries of the world economy (Tab. 1).³

The 2016 rating composed by the UNESCO Institute for Statistics that the leading countries retained their positions in the R&D funding volume, and that there is positive dynamics in a number of countries (Tab. 2).⁴

In accordance with international practice and depending on the industry, companies invest an average of 1–5 % of their annual income in innovation (R&D and foundations). In Russia, the figures are slightly lower, and amount up to 2 %.⁵

² Ofitsial'nyi sait Departamenta energetiki SShA. URL: <http://www.energy.gov>

³ National Science Board: analit. izd. Arlington, VA: National Science Foundation (NSB-2016-1). (2016) 45.

⁴ Ofitsial'nyi sait Instituta statistiki Iunesko. URL: <http://www.uis.unesco.org>

⁵ Science, Technology and Patent Statistics: analit. izd. URL: <http://www.oecd.org>

Table 1
R&D funding structure in the world in 2012–2014

Country	R&D funding, \$ billion	R&D investment ratio, %			
		business	public	foreign	others
USA	457	60.9	27.7	4.5	6.9
China	334	74.6	21.1	0.9	3.4
Japan	162	75.5	17.3	0.5	6.7
Germany	103	66.1	29.2	4.3	0.4
South Korea	68	75.7	23.8	0.3	1.1
France	58	55.4	35	7.6	2.0
United Kingdom	42	46.6	27	20.7	5.7
Russian Federation	37	28.2	67.6	3.0	1.2
Poland	8	30	61	5.6	3.4

Table 2
Ratio of public and private investments in R&D

Country	R&D funding, \$ billion	R&D investment ratio, %	
		private	public
USA	457	70.6	29.4
China	369	77.3	22.7
India	48	35.5	64.5
Russian Federation	44	59.6	40.4
Australia	22	56.3	43.7

The public policy on co-financing development has its own features in different countries.

1) The United States.

In addition to direct R&D funding (27–30 %), the state has also been developing mechanisms for protecting intellectual property rights, a strategy for technological development of the country, identifying promising areas for scientific research. Currently, there is a clear tendency to develop indirect methods of influence in the field of R&D.⁶

Special-purpose budgetary funding for research is carried out on a competitive basis. Budget contracts and grants are allocated to

government laboratories and research centers, industrial companies and other private-ownership organizations. About half of all fundamental research is carried out by universities at the expense of the federal government. Most of the applied work under federal contracts is carried out by industrial companies.

Regarding the priorities of the US innovation development (Tab. 3), a noteworthy feature is the increase in the volume of long-term R&D funding in the energy sector, which has been observed since 2013.⁷

Industrial companies provide funding for more than 70 % of R&D (mainly, applied research), public research institutions are involved in fundamental research projects. Priority is given to projects covering several areas of science and technology that have commercial value in the long term.⁸

The Department of Energy (DOE) coordinates the implementation of the R&D program related to the energy sector through sector-specific agencies and national research laboratories under their jurisdiction. Government contracts can also be granted by one of the Federally Funded Research and Development Centers (FFRDC). Basic research is carried out by colleges and universities (53 %), business sector (20 %), FFRDC and laboratories (15 %), others (12 %). Laboratories have the financial capacity to employ third-party organizations on a competitive basis. Private research centers involved in performing such services often use the research equipment of national laboratories.

In addition to the above functions, DOE often acts as a link between the authors of new developments and venture funds (there are 26 large funds), provides funding for product prototype development, and organizes exhibitions of new projects.

2) The European Union.

Public support for innovation in the countries of the European Union (EU) shares a common approach in a number of key areas [7]:

– simplified procedure for setting up a business (a common EU database has been developed);

⁷ US Federal Budget 2017. URL: <https://www.usa.gov/budget>

⁸ Small Innovative Company Growth: Barriers, Best Practices and Big Ideas. U.S. Small Business Administration. W., 2015.

⁶ Science and Engineering Indicators 2008: otchet Nats. soveta po nauke SShA. URL: <http://www.nsf.gov>

Table 3

R&D Funding in the United States, \$ billion.

Departments and agencies	year				
	2013	2014	2015	2016	2017
Department of Defense	63 838	63 856	65 547	70 872	72 825
Department of Health and Human Services	29 969	30 912	30 453	31 942	32 714
National Agency for Aeronautics and Space Research	11 282	11 667	12 145	12 410	12 043
Department of Energy	10 740	11 359	14 354	14 405	17 160
National Science Foundation	5 319	5 729	5 944	6 117	6 529
Department of Agriculture	2 116	2 418	2 452	2 674	2 923
Department of Commerce	1 360	1 632	1 524	1 913	1 888
Department of Veterans Affairs	1 164	1 174	1 178	1 220	1 252
Department of Transportation	829	853	885	924	1065
Department of National Security	684	1032	919	579	585
Environmental Protection Agency	532	560	523	516	530
Department of Education	319	323	279	242	248
Others	2 180	2 167	2 075	2 324	2 571
Total expenditure on R&D	130 332	13 3682	13 8278	14 6138	15 2333

– a set of measures to secure and protect the intellectual rights of the developers of new technologies;

- financial support mechanisms for small and medium-sized businesses;
- incentive mechanisms for innovative product developers and manufacturers (tax incentives);
- conditions that stimulate improving the educational level of employees.

Determining the priority areas for the development of the energy sector, planning, organization and funding of R&D in European countries is carried out, as in the US, through public-private partnerships [4]. The division of responsibility for determining the R&D areas is shown below for Germany (Fig. 2).

The Federal Government identifies the priorities for development. The Energy Research Program is developed under the guidance of the Federal Ministry of Economics and Technology (BMWi).

Private companies are bidding for receiving state grants with co-financing of the research with the involvement of educational and research organizations. The responsibility for holding competitive tenders and allocating funds rests with agencies in the relevant areas: the German Research Foundation (DFG), the German

Energy Agency (DENA), the Federal Office for Radiation (BfC), etc.

3) China.

Since 1999, China has been implementing a state policy for industry modernization and technological development. In particular, the Program for the Technological Development of Enterprises has been adopted, aimed at increasing the profitability and adaptability of industries to the market economy conditions.

Developers and manufacturers of new machinery and technology have been offered a set of financial mechanisms, including direct government investments, state loans, investments of local governments, relevant industries and enterprises, preferential bank lending (the State Development Bank of China). Priority is given to investment projects with a long production cycle. Particular attention is paid to facilitating direct foreign investment for reforming and technological upgrade of the industry.

A number of measures are aimed at ensuring cooperation in the research sector. In particular, research centers have been exempted from paying duties for imported equipment and from sales tax in technology transfer, specialized investment funds for supporting scientific activities have been established.

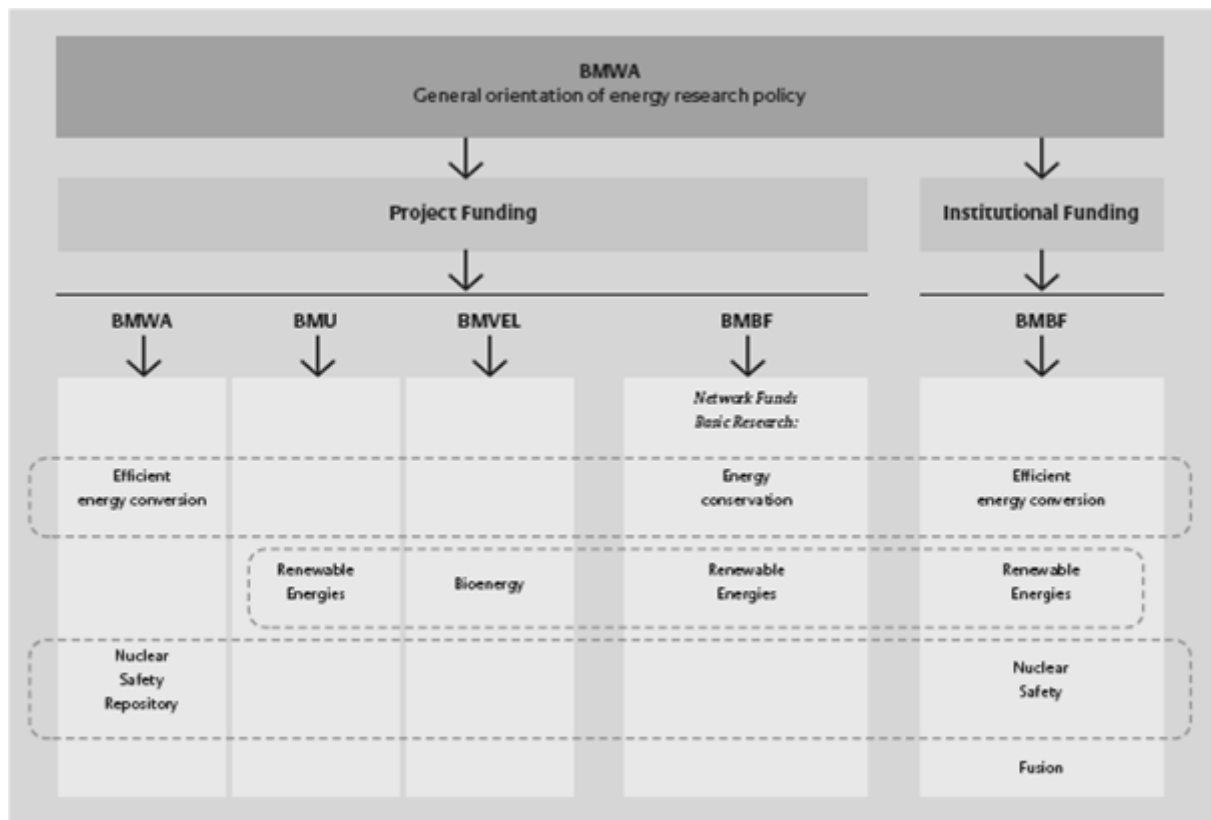


Fig. 2. R&D funding model in Germany

Source: BMWA – Federal Ministry of Economics and Labor; BMU – Federal Ministry of the Environment, Nature Conservation and Nuclear Safety; BMVEL – Federal Ministry of Consumer Protection, Food and Agriculture; BMBF – Federal Ministry of Education and Research.

In addition, when innovative companies are created at the expense of Chinese investors, restrictions are removed for individuals to acquire shares in the authorized capital of these companies [3].

Fiscal policy mechanisms include exemption from value added tax and customs duties on imported equipment and technologies for projects involving foreign capital; the state can also provide guarantees for foreign investment in projects approved by the government and appraised by state experts.⁹

In order to reduce the debt ratios of enterprises, there is an opportunity of «debt transformation into a share», which means that asset management is temporarily transferred to experts of a commercial bank.

The Foreign Trade Law of the People's Republic of China stipulates that the state uses such forms of export support as export credits, VAT refunds and other measures stimulating the

development of foreign trade, including support for the activities of the Chinese Committee for the Promotion of International Trade, establishing exporters' associations, foreign trade development funds, etc. In order to protect domestic manufacturers, China uses almost all available means used by other countries (regulation of customs duty rates, import quotas and licensing, temporary or complete bans on the import of goods, the institute of special importers, imposition of anti-dumping duties, etc.).

In accordance with the Regulation of the People's Republic of China on the export and import of goods, the state performs insurance of export credits, provides information services to support enterprises in world markets. In particular, free information services are provided (MVES of the PRC), databanks of the enterprises have been established to use the information by partners abroad, assistance in defending interests in conducting anti-dumping investigations abroad and applying discriminatory measures against Chinese manufacturers has been provided.

⁹ 2014 Global R&D forecast. Battelle, R&D Magazine. December 2013. URL: <http://www.battelle.org>

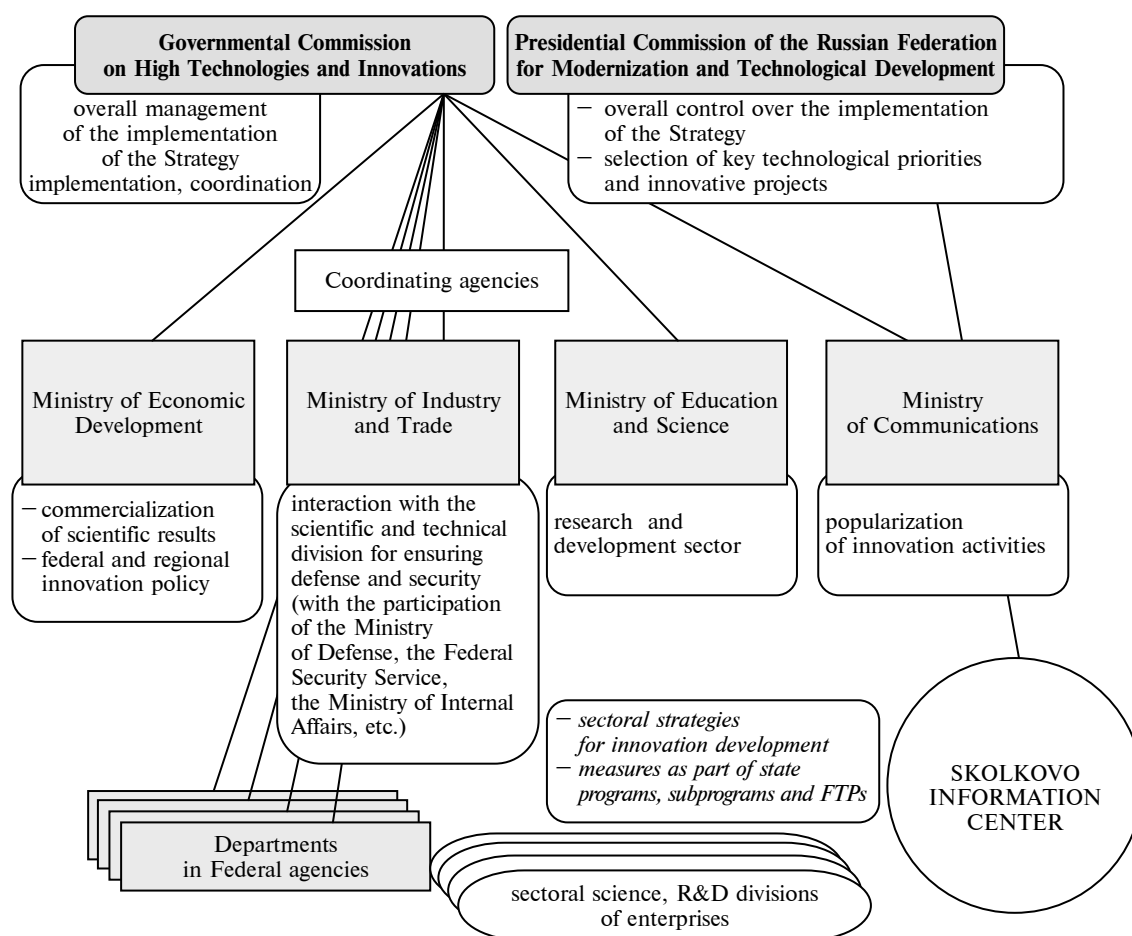


Fig. 3. System of government innovation management in Russia

4) Russia.

To date, a system of direct and indirect stimulation of innovation has been established in the Russian Federation. The mechanisms of direct stimulation are: budgetary funding of science, selection of priority areas of development (programs, strategies), government contracts, public procurement, subsidies and guarantees to private banks, creation of consortia, engineering centers, clusters, scientific and technological parks, science cities, etc. Tax preferences for participants of innovative activity (establishing the tax base and granting tax privileges), customs regulation, involvement of the existing industrial and innovation infrastructure in the economic circulation on the basis of industrial clusters are indirect support mechanisms.

The system of ensuring innovation at the state level is a multi-level system for determining the areas, funding and control of the participants of the process (Fig. 3).

There is a number of normative and legal acts regulating innovative activity (first of all, in companies with state participation), as well as determining the procedure and amount of research funding. In order to form a competitive and efficiently functioning sector of applied research and development, a list of research and development topics listed in the Federal Target Program «R&D for priority areas of the development of the science and technology complex of Russia for 2014–2020» has been established for each development area.¹⁰ The annual amount of funding for the program's activities is more than 25 billion rubles.

To stimulate investment activity in Russia, legislative acts establishing a new mechanism, a

¹⁰ О федеральной целевой программе «Исследования и разработки по приоритетным направлениям развития научно-технологического комплекса России на 2014–2020 годы: Пост. Правительства РФ № 426 от 21.05.2013 г. URL: <https://www.consultant.ru>

special investment contract, have been adopted.¹¹ The contract guarantees to the investor for the entire validity period:

- stable conditions for doing business (provided that the investors fulfill their obligations);
- tax privileges and relief from payment of customs charges;
- preferential lease terms payment for public and municipal property use;
- conclusion of long-term government contracts with an industrial enterprise as a single supplier.

There is a well-known positive experience of using such a mechanism in China. In 1991–1998, the annual volume of investments grew more than tenfold, from \$4.4 to \$45.5 billion.

Some other financial and regulatory measures to stimulate innovation are also being implemented. For example, in order to involve the existing industrial and innovation infrastructure of enterprises with a common industry affiliation or with common points in the production and technological cycle in the economic turnover, a legislative basis for the creation of industrial clusters has been created at the state level.¹² The associations included in the Register of Industrial Clusters of the Ministry of Industry and Trade of Russia have the right to receive public support for reimbursement of a fraction of the costs when implementing joint projects.¹³

The mechanisms for venture funding of projects are a separate category. Government involvement in providing venture funding of projects in the Russian Federation has been implemented since 2013 through 53 foundations and federal development institutions (the Skolkovo Foundation, the Assistance Foundation and the Internet Initiatives Development Foundation). The Russian Venture Company acts as the state investor and coordinator.

¹¹ O promyshlennoi politike v Rossiiskoi Federatsii: Feder. zakon RF № 488-FZ ot 31.12.2014 g. URL: <https://www.consultant.ru>; O spetsial'nykh investitsionnykh kontraktakh dlia otidel'nykh otraslei promyshlennosti: Post. Pravitel'stva RF № 708 ot 16.07.2015 g. URL: <https://www.consultant.ru>

¹² O promyshlennykh klasterakh i spetsializirovannykh organizatsiakh promyshlennykh klasterov: Post. Pravitel'stva RF № 779 ot 31.07.2015 g. URL: <https://www.consultant.ru>

¹³ Ob utverzhdenii Pravil predstavleniia iz federal'nogo biudzheta subsidii uchastnikam promyshlennykh klasterov na vozmeshchenie chasti zatrat pri realizatsii sovместnykh projektov po proizvodstvu promyshlennoi produktsii klastera v tseliakh importozameshcheniia: utv. Post. Pravitel'stva RF № 41 ot 28.01.2016 g. URL: <https://www.consultant.ru>

Analysis of the experience of applying the proposed mechanisms in research and development allows to identify a number of areas that require adjustments and revisions of approaches. A significant amount of funding for research and production companies with government involvement with limited subsidies and concessional lending to private entities are among the most significant ones. Taking into account the specifics of the Russian market of manufacturers and developers of power generating equipment, this approach leads to insufficient funding for projects in critical areas of the economy in conditions of stagnation and a drop in demand for products.

Results of the study

1. We have analyzed the foreign experience of state regulation of innovative activity in the field of power engineering.

2. We have considered the mechanisms of state influence on innovation activity in the Russian Federation in the case of the energy sector and identified the priority areas for development.

Conclusions. Analysis of global trends in the organization of funding for technological projects and introduction of new technologies has shown that the principle of independent provision of innovative activity in power engineering by private investors is a common myth. State support of knowledge-intensive industries is carried out in all technologically advanced countries. As a rule, the mechanism of public-private partnership is applied at various stages of development of technical units. The forms of funding are different: direct investments in research through authorized organizations (foundations, laboratories, research centers), direct funding for works (grants, concessional lending), tax and customs privileges, identification of priority areas for technological development, mechanisms to secure and protect intellectual rights, information and organizational support for innovative enterprises.

In Russia, to date, a system of state support and regulation of innovation activities has been established, which is widely used in the field of power engineering among others. The existing regulatory framework fixes the priority areas of industrial development, elements of the state infrastructure, as well as mechanisms for direct and indirect funding of research and development.

In the future, it would be appropriate to consider the ways of developing methods for assessing the effectiveness of funding innovation in public-private partnerships.



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Статья поступила в редакцию 15.01.2018

DOI: 10.18721/JE.11206
UDC 338.49

INFRASTRUCTURE OF THE NENETS AUTONOMOUS DISTRICT AND ITS INFLUENCE ON THE REGIONAL EXTERNAL ECONOMIC ACTIVITY

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Steady development of Russian regions largely depends on the level of regional foreign economic activity, which is primarily determined by the state of the infrastructure of the region itself. This study answers the question of the impact that the infrastructure of the Nenets Autonomous District exerts on the regional foreign economic activity and assesses the role of infrastructure in the economic development of the region as a whole. At the beginning of the study, we have analyzed the main problematic aspects of the development of the region, which include, in particular, weak and underdeveloped infrastructure, a poor network of regional roads, a low supply of population and businesses with electricity and communication services. The same problems may determine low production efficiency in the region, which ultimately, together with the foreign economic activities, will determine the standard of living in the Nenets Autonomous District. The study presents a number of infrastructure factors, such as the length of roads, inland waterways, investment in fixed assets, domestic expenditure on research and development, per capita income of the population, the volume of heat energy provided, the freight turnover of the region, the volume of telecommunications services provided, as well as the gross regional product of the Nenets Autonomous District; these factors are considered as exogenous in the model. The three main indicators of the region's foreign economic activity that are exports, imports and foreign investment act as endogenous factors in the model. Based on statistical data for 2005–2015, the regression equations are constructed and the obtained dependences are analyzed. The method of constructing ADL models is applied in the study, which implies the influence of the above factors not only for the corresponding period, but also for previous periods. The resulting model equations can be used to create a strategy for the development of the region, as well as for forecasting macroeconomic processes. The main impact of infrastructure factors is on investment flows, while the impact of these factors on the flow of exports and imports is very insignificant.

Keywords: external economic activities of a region; factors of infrastructure; export-oriented approach; Nenets Autonomous District

Citation: S.A. Chernogorskiy, G. Sorokozherdyev, M. Pakhomova, Infrastructure of Nenets Autonomous District and its influence on the regional external economic activity, St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 62–69. DOI: 10.18721/JE.11206

ИНФРАСТРУКТУРА НЕНЕЦКОГО АВТОНОМНОГО ОКРУГА И ЕЕ ВЛИЯНИЕ НА ВНЕШНЕЭКОНОМИЧЕСКУЮ ДЕЯТЕЛЬНОСТЬ РЕГИОНА

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Развитие российских регионов во многом зависит от уровня развития региональной внешнеэкономической деятельности, последняя во многом определяется состоянием инфраструктуры самого региона. Данное исследование отвечает на вопрос о

влиянии инфраструктуры Ненецкого автономного округа на развитие сферы ВЭД и оценивает роль инфраструктуры в экономическом развитии региона в целом. В начале исследования анализируются основные проблемные моменты развития региона, к которым можно отнести слабое развитие инфраструктуры, редкую сеть автомобильных дорог, низкую обеспеченность населения и бизнеса электроэнергией и услугами связи. Этими же проблемами во многом обуславливается низкая эффективность производства, что в конечном итоге совместно с внешней торговлей региона определяет уровень жизни в Ненецком автономном округе. Приводится целый ряд факторов инфраструктуры, таких как протяженность автомобильных дорог, внутренних водных путей, грузооборот, инвестиции в основной капитал, внутренние затраты на научные исследования и разработки, среднедушевые доходы населения, объем отпуска тепловой энергии, грузооборот региона, объемы оказываемых услуг связи, а также валовый региональный продукт Ненецкого автономного округа – эти факторы в модели являются экзогенными. Три основных показателя ВЭД региона – экспорт, импорт и иностранные инвестиции выступают в модели в качестве эндогенных. На основании статистических данных за период 2005–2015 гг. строятся регрессионные уравнения и анализируются полученные зависимости. Применен метод построения ADL-моделей, который подразумевает влияние вышеуказанных факторов не только за соответствующий период, но также и за предшествующие периоды. Полученные уравнения модели могут быть использованы при создании стратегии развития региона, а также для прогнозирования макроэкономических процессов. Основное влияние факторы инфраструктуры оказывают на инвестиционные потоки, при этом влияние указанных факторов на потоки экспорта и импорта весьма незначительное.

Ключевые слова: внешнеэкономическая деятельность региона; факторы инфраструктуры; стимулирование экспорта; Ненецкий автономный округ

Ссылка при цитировании: Черногорский С.А., Сорокожердьев К.Г., Пахомова П.М. Инфраструктура Ненецкого автономного округа и ее влияние на внешнеэкономическую деятельность региона // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 62–69. DOI: 10.18721/JE.11206

Introduction. The Nenets region is located in the north of the East European Plain, most of the region lays beyond the Arctic Circle. There is only one major settlement in the region, the city of Naryan-Mar, one urban-type settlement (Iskateley settlement) and 42 rural settlements. The region is rich in natural resources.¹ The Nenets Autonomous District has large reserves of crude oil, gas, copper and diamonds, whereas some of the deposits are still not fully explored. The region looks attractive for investors and it is striving to improve the basic indicators of social and economic performance.

The relevance of the research topic is based on the fact that foreign economic activity is an extremely important factor of social welfare and favorable investment climate not only in the region itself, but also in the country [1]. The role and significance of Russian regions as the subjects of international economic activities has recently increased and the local governments become

more engaged in foreign economic activity, supporting foreign business in their territories, helping regional enterprises to enter foreign markets, creating conditions for effective foreign economic activity. The infrastructure of the region exerts some serious influence on foreign economic activity of the region. The estimation of that influence makes up the core of the study.

Works of many authors are dedicated to the problems of infrastructure. For instance, Smirnova [2] conducts functional analysis of the regional infrastructure in various aspects and also clarifies the concept of infrastructure. Ilchenko and Abramova [3] assess the infrastructural potential of the region in the context of further economic development. Ref. [4] by the same authors focuses on the infrastructural development in small towns. Some researchers examine the development of certain aspects of infrastructure, in particular, Ref. [5] describes the mechanisms for improving the transport infrastructure [5]. Some works research various problematic aspects of regional infrastructure that need a whole set of measures to resolve them, see [6]. Some studies

¹ Regionalnyy portal Nenetskogo avtonomnogo okruga. URL: www.info83.ru

explore the influence of regional infrastructure on the overall economic development. For example, in [7], the authors perform the analysis of possible directions of activity which are closely connected to the infrastructure of the region.

Considerable importance for regional foreign-economic development can be attributed to territorial advantages: proximity to the markets and natural resources. The infrastructure, the auxiliary and main production facilities also play an important role in the economic development of the region.

Larionova [8] suggests that the main factors of foreign economic activity in the region should be assessed with the following system of indicators: increase (reduction) of regional import-substituting industries; growth rate of the GRP; increase (decrease) in the number of jobs; increase (decrease) of budget revenues; the influence on the living standards of the population; increase (decrease) of investments in fixed assets due to changes in the capacity of the domestic market.

Chelnokov, Gerasimov and Bykovsky [9] proposed the so-called enlarged model of the regional economy. Unlike the models where the region acts as a single structured object, the proposed model focuses on the mechanism of economic relations between various subjects of the regional economy. The considered regional macro-model is a certain compromise between the complexity and cumbersomeness of the real model of regional functioning and the need for a clear structure of basic relationships within the regional economic mechanism.

In general, all the models have common features that make it possible to identify the sequence of actions in assessing the external economic relations of a region:

- 1) calculation of the main indicators of foreign economic relations of the region;
- 2) assessment of foreign economic activity of the region on the basis of the calculated indicators;
- 3) calculation of the main indicators of regional economic development;
- 4) Identification of the features of regional economic development;
- 5) analysis of the impact of foreign economic relations on the economic development of the region.

The purpose of the study is to analyze the infrastructure of the Nenets Autonomous District

and to quantify its impact on foreign economic activity in the region.

The methodology of the study. The study develops an autoregressive model with a distributed lag (ADL-model). The model represents the dependencies of the endogenous indicators of the regional external economic activity on the exogenous infrastructural factors.

Experimental or computational study. The main indicators that characterize the regional external economic activity are the exports and imports.

Table 1

**Foreign trade of the Nenets.
Autonomous District in dynamics, 2005–2016**

	Regional exports, mln. USD	Regional imports, mln. USD
2005	12.9	1.5
2006	1.2	1.6
2007	228.7	7.6
2008	316.8	4.6
2009	73.4	0.2
2010	2343.8	3.9
2011	3364.3	0.9
2012	1396.3	2.3
2013	1458.2	1.8
2014	1653.4	0.7
2015	1892.4	2.0
2016	2134.7	0.7

Source: Federal Statistics Service. URL: www.gks.ru

The exports of the Nenets Autonomous District significantly prevail over its imports. Prior to 2011, the situation was rather uncertain, but since 2012 the volume of exports has become more stable.

Characterizing the infrastructure of the region, we can conclude that the infrastructure of the region is very poorly developed. Firstly, the length of the regional road network is only 366 km and the network has no connection to the network of public roads of Russia. Secondly, with an extensive coastal line over 3000 km, there are no large ports in the district. Moreover, there is no railway communication in the region, with air transport playing the key role. Thus, having analyzed the foreign economic activity and the infrastructure

of the region, we can identify the main problems of the Nenets Autonomous District:

1) underdeveloped infrastructure: lack of roads, railways, low power supply and low level of communication services;

2) small regional population, which means small permanent workforce who mainly work mainly on a rotational basis;

3) low-level of diversification of economic activity. The region largely depends on the supply of goods from other regions, whereas the delivery of goods is hampered by the poor transport infrastructure;

4) low efficiency of production and small percentage of the population with higher education.

Development of the region during the forecasted period means achievement of sustainable long-term socio-economic growth, with consideration of the mutual interests of governmental institutions, civil society, the oil and gas industry and the indigenous population, based on increased compatibility of economic activities with environmental safety. Further development of the natural resource base and active connection to Russia's transport, transit and export corridors will open up new opportunities related to the development of new fields and development of the transport and logistics infrastructure, including the activation of traffic along the Northern Sea Route.

The basis of the study is the question of assessing the infrastructural impact on the regional external economic activity. The impact will be assessed with an application of economic and mathematical modeling based on ADL-models, that is, autoregressive distributed lag models. The general methodology of the time series analysis is presented in [10]. The application of the method to economic processes has some specific features and is based upon several important principles [11]. The similar approach is used in the works researching regional development of the Russian Arctic [12–14].

The aim of the model is to evaluate the effect of exogenous indicators on endogenous ones. Exogenous indicators are indicators that characterize the regional infrastructure and human activities. Endogenous indicators are the main indicators of external economic activity of the region.

In order to evaluate the regional external activity, we will take exports, imports and inflow of foreign direct investment into the region. From the point of view of the chosen strategy, the goal is to attract investments to the region and at the same time to improve the infrastructure,

which in many cases slows down not only foreign economic activity but the socio-economic development of the region as a whole. The model can be described with the help of the resulting indicator Y^3 that is the development of external economic activity of the Nenets Autonomous District. In general, development of foreign economic activity of the region can be represented by three endogenous variables:

Y_t^{31} is the exports of goods and services of the Nenets Autonomous District during the period t ,

Y_t^{32} is the imports of goods and services of the Nenets Autonomous District during the period t ,

Y_t^{33} is the foreign direct investments in the region during the period t .

The exogenous variables selected for analysis are as follows:

Y_{t-i}^{21} is the gross regional product (GRP), mln. RUR, for the period $t-i$;

Y_{t-i}^{22} is the R&D expenditures, mln. RUR, for the period $t-i$;

Y_{t-i}^{24} is the per capita income of the population (RUR per month) for the period $t-i$;

X_{t-i}^{11} is the thermal energy sold to all consumers, thousand Gcal, for the period $t-i$;

X_{t-i}^{12} is the cargo turnover, mln. tons per km, for the period $t-i$;

X_{t-i}^{13} is the investments in fixed assets made by organizations with participation of foreign capital, mln. RUR, for the period $t-i$;

X_{t-i}^{25} is the internal waterways during the period $t-i$;

X_{t-i}^{26} is the length of the roads for the period $t-i$;

X_{t-i}^{29} is the communication services rendered to the population, per capita, RUR, for the period $t-i$;

In the course of the research, the following axioms were formulated:

Y_t^{31} is the exports of goods and services of NAD, depends on Y_{t-i}^{21} , Y_{t-i}^{22} , Y_{t-i}^{24} , X_{t-i}^{25} , X_{t-i}^{26} , X_{t-i}^{11} , X_{t-i}^{12} .

Y_t^{32} is the imports of goods and services of NAD, depends on Y_{t-i}^{21} , Y_{t-i}^{22} , Y_{t-i}^{24} , X_{t-i}^{25} , X_{t-i}^{26} , X_{t-i}^{11} , X_{t-i}^{12} , X_{t-i}^{13} .

Y_t^{33} is the foreign direct investments in the region, depends on Y_{t-i}^{22} , Y_{t-i}^{24} , X_{t-i}^{25} , X_{t-i}^{26} , X_{t-i}^{29} , X_{t-i}^{11} , X_{t-i}^{12} , X_{t-i}^{13} .

Table 2

Endogenous and exogenous variables of the model

Endogenous variables	Exogenous variables								
Y_t^{31}	Y_{t-1}^{31}	Y_{t-i}^{21}	Y_{t-i}^{22}	Y_{t-i}^{24}	X_{t-i}^{25}	X_{t-i}^{26}	X_{t-i}^{11}	X_{t-i}^{12}	
Y_t^{32}	Y_{t-1}^{32}	Y_{t-i}^{21}	Y_{t-i}^{22}	Y_{t-i}^{24}	X_{t-i}^{25}	X_{t-i}^{26}	X_{t-i}^{11}	X_{t-i}^{12}	X_{t-i}^{13}
Y_t^{33}	Y_{t-1}^{33}	Y_{t-i}^{22}	Y_{t-i}^{24}	X_{t-i}^{25}	X_{t-i}^{26}	X_{t-i}^{29}	X_{t-i}^{11}	X_{t-i}^{12}	X_{t-i}^{13}

Source: calculations of the authors.

Table 3

The correlation matrix for the first equation

		Y_{t-1}^{31}	Y_{t-1}^{21}	Y_{t-1}^{22}	Y_{t-1}^{24}	X_{t-1}^{25}	X_{t-1}^{26}	X_{t-1}^{11}	X_{t-1}^{12}
Y_{t-1}^{31}	Pearson Correlation	1	,758	,667	,644	-,292	,450	-,630	,526
	Significance		,007	,025	,032	,384	,165	,043	,096

Source: our calculations.

The first equation of the model in general form goes as following:

$$Y_t^{31} = Y_{t-1}^{31} + Y_{t-i}^{21} + Y_{t-i}^{22} + Y_{t-i}^{24} + X_{t-i}^{25} + X_{t-i}^{26} + X_{t-i}^{11} + X_{t-i}^{12}.$$

The second equation of the model in general form goes as following:

$$Y_t^{32} = Y_{t-1}^{32} + Y_{t-i}^{21} + Y_{t-i}^{22} + Y_{t-i}^{24} + X_{t-i}^{25} + X_{t-i}^{26} + X_{t-i}^{11} + X_{t-i}^{12} + X_{t-i}^{13}.$$

The third equation of the model in general form goes as following:

$$Y_t^{33} = Y_{t-1}^{33} + Y_{t-i}^{22} + Y_{t-i}^{24} + X_{t-i}^{25} + X_{t-i}^{26} + X_{t-i}^{29} + X_{t-i}^{11} + X_{t-i}^{12} + X_{t-i}^{13}.$$

The data on the relevant variables for the period from 2005 to 2015 were collected. For the calculations.² All calculations were carried out in the SPSS software. Let us explain the step-by-step algorithm for obtaining the first equation of the model. Two other equations were obtained similarly.

The first step is to check the endogenous variable for autocorrelation³ with the Box-Ljung

test. We need to determine the required lag for the variable. The study showed that the strongest significance of the indicator goes with a lag of one year. As the lag increases, the significance of the data reduces. Accordingly, the endogenous variable with a one-year lag is taken in the model.

The next step in the analysis is construction of a correlation matrix with the variables of the model. According to the matrix, the gross regional product (Y_{t-1}^{21}) exerts the greatest impact on the regional exports (Y_t^{31}). The impact of other indicators is not that high. In order to make up a model, only the variables with correlation coefficient of 0.6 and above were selected. Therefore, the variables Y_{t-1}^{22} , Y_{t-1}^{24} , X_{t-1}^{11} will also be selected as influencing factors (see Tab. 3).

Next, the appropriate lags are selected for the influencing factors. The selection is carried out with the correlation coefficients. According to the calculations, the variables Y_{t-1}^{21} and Y_{t-1}^{22} have a stronger influence on the endogenous variable with a one-year lag, while the other two influencing factors show the best results for the zero-lag. Hence, the first equation of the model in the structural form can be represented as follows:

$$Y_t^{31} = a_0 + a_1 Y_{t-1}^{31} + a_2 Y_{t-1}^{21} + a_3 Y_{t-1}^{22} + a_4 Y_t^{24} + a_5 X_t^{11}.$$

The coefficients of the regression equation are calculated in the SPSS software (see Tab. 4).

² Ofitsial'nyi internet-resurs Minekonomrazvitiia RF. URL: <http://orv.gov.ru/regions/details/58>; Statisticheskaiia informatsiia po NAO. URL: <http://knoema.ru/atlas/Russian-Federation/Nenets-Autonomous-District>

³ S.K. Antipov, Statistika. Metody analiza problem mirovoi ekonomiki: ucheb. posobie, St. Petersburg, Izd-vo Politekhn. un-ta, 2012.

Table 4

Coefficients for the equation of the first model equation

	<i>Coefficients</i>	<i>Std.error</i>	<i>t-statistics</i>	<i>P-value</i>	<i>Low 95 %</i>	<i>Upper 95 %</i>
Y-intercept.	11938,53	10121,7	1,179499	0,303561	−16163,8	40040,87
Variable 1	−0,72049	0,606047	−1,18884	0,300256	−2,40315	0,962164
Variable 2	0,077421	0,036235	2,136651	0,099461	−0,02318	0,178025
Variable 3	−40,1828	55,47822	−0,7243	0,508978	−194,215	113,8494
Variable 4	−0,15433	0,085177	−1,81185	0,144237	−0,39082	0,082162
Variable 5	−30,959	30,31	−1,021	0,36	−115	53,21

Source: our calculations.

Table 5

The variance analysis of the first equation

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	8841998	1768400	3,052374	0,15106
Residual	4	2317409	579352,2		
Total	9	11159407			

Source: the data we have compiled.

After the performed calculations it is possible to make up the equation:

$$Y_t^{31} = 11938.53 - 0.72Y_{t-1}^{31} + 0.07Y_{t-1}^{21} - 40.18Y_{t-1}^{22} - 0.15Y_t^{24} - 30.96X_t^{11}.$$

According to the obtained equation, all the variables except GRP affect the regional exports negatively. The impact of the selected factors seems to be insignificant, which may be due to the fact that NAD exports are mainly influenced by factors not related to the regional infrastructure.

The analysis also involves checking the first equation for significance using the Fisher test (see Tab. 5).

The significance of the equation is confirmed by the Fisher criterion, according to the table, $F > \text{Significance } F$, which confirms that the model is accurate.

The second and third equations of the model are obtained in a similar manner, with the same methods. According to the correlation matrix, the indicator of imports of goods and services of the NAD (Y_t^{32}) is influenced by X_{t-1}^{11} which is the thermal energy sold to consumers and X_{t-1}^{13} which is the investments in fixed assets made by organizations with participation of foreign capital.

After carrying out of the correlation analysis, we get the equation in the structural form:

$$Y_t^{32} = a_0 + a_1Y_{t-1}^{32} + a_2X_{t-1}^{11} + a_3X_{t-1}^{13}.$$

After the calculations, we obtain the second equation:

$$Y_t^{32} = -16.13 - 0.78Y_{t-1}^{32} + 0.05X_{t-1}^{11} + 0.0002X_{t-1}^{13}.$$

Now we consider the third equation of the model. According to the correlation matrix, the variable Y_t^{33} is influenced by the following exogenous factors:

Y_{t-i}^{22} is the R&D expenditures, mln RUR, for the period $t-i$;

Y_{t-i}^{24} is the income of the population per capita (RUR per month) for the period $t-i$;

X_{t-i}^{25} is the internal waterways during the period $t-i$;

X_{t-i}^{26} is the length of the roads for the period $t-i$;

X_{t-i}^{29} is the communication services rendered to the population, per capita, RUR, for the period $t-i$;

X_{t-i}^{12} is the cargo turnover, mln tons per km for the period $t-i$;

After evaluating the correlation matrix and choosing the lags for the ADL-model, we obtain the structural form of the third equation:

$$Y_t^{33} = a_0 + a_1Y_{t-1}^{33} + a_2Y_{t-2}^{22} + a_3X_{t-1}^{25} + a_4X_{t-2}^{26} + a_5X_{t-2}^{29}.$$

After the calculation of the coefficients we get the third equation of the model:

$$Y_t^{33} = -3072151 + 0.6Y_{t-1}^{33} + 14.73Y_{t-2}^{22} + 7783.9X_{t-1}^{25} - 386.25X_{t-2}^{26} - 972.9X_{t-2}^{29}.$$

As a result, the model of the infrastructural influence on the external economic activities of the NAD can be represented as follows:

$$\begin{cases} Y_t^{31} = 11938.53 - 0.72Y_{t-1}^{31} + 0.07Y_{t-1}^{21} - \\ - 40.18Y_{t-1}^{22} - 0.15Y_t^{24} - 30.96X_t^{11}, \\ Y_t^{32} = -16.13 - 0.78Y_{t-1}^{32} + 0.05X_{t-1}^{11} + 0.0002X_{t-1}^{13}, \\ Y_t^{33} = -3072151 + 0.6Y_{t-1}^{33} + 14.73Y_{t-2}^{22} + \\ + 7783.9X_{t-1}^{25} - 386.25X_{t-2}^{26} - 972.9X_{t-2}^{29}. \end{cases}$$

The results and discussion. The obtained system of equations allows finding the dependence of external economic activity on the factors of regional infrastructure. Low import figures for the region can explain the obtained equation. In general, we can conclude that regional imports are not subject to significant influence of the infrastructural factors. The flows of foreign direct investment are much more dependent on the infrastructure than the export-import ones. The main stimulating effect for the FDI is provided by the R&D expenditures and by internal waterways. Because of road infrastructure of the region is isolated from the Russian road network, a negative coefficient was obtained for X_{t-2}^{26} .

The scientific novelty of the study is in clarification of the current trends in the dynamics of external economic activity of the

Nenets Autonomous District. The results of these studies can be used for creating a strategy for the regional development, as well as for the medium-term forecasting purposes.

Conclusions. In the course of the study, the external economic activity of the Nenets Autonomous District was analyzed and the main problematic aspects of the regional infrastructure were identified.

The main infrastructural factors influencing and determining the regional foreign trade activities were considered. Indicators characterizing the development of foreign economic activity were chosen, namely, they are the volume of exports, imports and direct foreign investments in the region.

A system of three equations, each of them modeling the dependence of foreign economic activity on the influencing factors, was obtained. The infrastructural factors primarily impact investment flows. The influence of the factors on the export-import flows has turned out to be insignificant. It is likely that external trade is primarily determined by non-infrastructural variables that were not considered in the study.

The obtained dependencies can be used not only in forecasting of macroeconomic processes for the region for the next decade up to 2030, but also for the development of the regional economic strategy.

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Статья поступила в редакцию 20.02.2018

DOI: 10.18721/JE.11207
UDC 657

THE GENESIS OF ACCOUNTING AND ANALYTICAL SUPPORT FOR MANAGEMENT OF REVENUES AND EXPENDITURES OF ECONOMIC AGENTS IN THE RETAIL SEGMENT OF THE CONSUMER MARKET

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Functioning of economic entities in the retail segment of the consumer market is accompanied by the revenue and expenditure management system. Modern conditions of functioning in Russia, make new demands on the quality of data supply to the retail business, on the basis of which management decisions are made. Accounting and analytical support of income and expenditure is one of the most important areas that allow to generate data in accordance with the information needs of the management of an economic entity. The main idea of the scientific research is to analyze the historical impact of the economic and accounting thoughts on the formation of attitudes and the determination of the essential characteristics of accounting and analytical support of revenues and expenses of the economic entity of the retail segment of the consumer market of the new Russia. The methods proposed in this research are methods of analysis, synthesis, comparison, group and generalizations. It is considered the incremental development of accounting thought in respect of accounting and analytical support for the control mechanism of income and expenses of the economic entity of the retail segment of the consumer market. The stages of formation and development of accounting and analytical support as an economic category are identified. Given the author's interpretation of the main aspects of the perspective development of accounting and analytical support of revenues and expenses of the economic entity of the retail segment of the consumer market. Compared the theoretical foundations and approaches to defining the essential characteristics of accounting and analytical support for income and expenses. Author's concept of the content of accounting and analytical provision of income and expenditure in economic entities of the retail segment of the Russian consumer market are presented. It is analyzed the complex of problematic issues of methodological character, which had an effective impact on the establishment of modern accounting systems of economic entities of the retail segment of the consumer market. It is designed methodological approaches to the organization of the work of economic activity in the current conditions of management, which makes it possible to improve the effectiveness of management decisions.

Keywords: entities of the retail segment of the consumer market; accounting and analytical support; revenues; expenses and results of operations

Citation: N.S. Necheukhina, O.V. Mustafina, The genesis of accounting and analytical support for management of revenues and expenditures of economic agents in the retail segment of the consumer market. St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 70–80. DOI: 10.18721/JE.11207

ГЕНЕЗИС УЧЕТНО-АНАЛИТИЧЕСКОГО ОБЕСПЕЧЕНИЯ УПРАВЛЕНИЯ ДОХОДАМИ И РАСХОДАМИ ЭКОНОМИЧЕСКИХ СУБЪЕКТОВ РОЗНИЧНОГО СЕГМЕНТА ПОТРЕБИТЕЛЬСКОГО РЫНКА

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Функционирование экономических субъектов розничного сегмента потребительского рынка сопровождается системой управления доходами и расходами. Современные условия функционирования экономических субъектов в России предъявля-

ют качественно новые требования к информационному обеспечению розничного торгового бизнеса, на основе которого принимаются управленческие решения. Учетно-аналитическое обеспечение доходов и расходов — это одно из важнейших направлений, позволяющих в настоящее время сформировать данные в соответствии с информационными потребностями управления экономическим субъектом. Цель исследования — проведение анализа исторического влияния экономико-учетной мысли на формирование взглядов и определения сущностных характеристик учетно-аналитического обеспечения доходов и расходов в экономических субъектах розничного сегмента потребительского рынка новой России. Исследование проводилось с помощью методов анализа, синтеза, сравнения, группировки и обобщения. Рассмотрено поэтапное развитие учетной мысли в отношении учетно-аналитического обеспечения механизма управления доходами и расходами в экономических субъектах розничного сегмента потребительского рынка. Выделены этапы становления и развития учетно-аналитического обеспечения как экономической категории. Дана трактовка основных аспектов перспективного развития учетно-аналитического обеспечения доходов и расходов в экономических субъектах розничного сегмента потребительского рынка. Сопоставлены теоретические основы и подходы к определению сущностных характеристик учетно-аналитического обеспечения доходов и расходов. Представлена концепция содержания учетно-аналитического обеспечения доходов и расходов в экономических субъектах розничного сегмента потребительского рынка России. Проанализирован комплекс проблемных вопросов методологического характера, что оказало воздействие на создание современных учетных систем экономических субъектов розничных сегментов потребительского рынка. Разработаны методологические подходы к организации экономической деятельности в современных условиях хозяйствования, позволяющие повысить эффективность принимаемых управленческих решений. Учетно-аналитическое обеспечение доходов и расходов экономических субъектов розничного сегмента потребительского рынка позволяет эффективно реализовать основные функции управления, но существует оправданная и обоснованная необходимость продолжать исследования в данном направлении.

Ключевые слова: экономический субъект розничного сегмента потребительского рынка; учетно-аналитическое обеспечение; доходы; расходы; результат деятельности

Ссылка при цитировании: Нечеухина Н.С., Мустафина О.В. Генезис учетно-аналитического обеспечения управления доходами и расходами экономических субъектов розничного сегмента потребительского рынка // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 70–80. DOI: 10.18721/JE.11207

Introduction. Economic subjects of a retail segment of the consumer market are the steadiest against risks of development of branches of the Russian economy today. Despite the challenges in Russian economy, they remain leaders in employment of the population, performing important economic and social functions, acting as a sales channel for manufacturers of consumer goods (economic subjects of food, nonfoods and agricultural producers). A large number of economic subjects of the retail segment of the consumer market and their enterprise initiative stimulate the development of internal production in rather difficult economic conditions of Russia. They provide growth of internal production and GDP of Russia, thus promoting expansion of channels of retail sale. The modern unstable and changing economic environment of Russia and uncertainty increase the importance of adopting effective administrative solutions of the economic subjects of retail segments of the consumer market

promoting dynamic development in using modern management tools including accounting and analysis systems [3, 17].

Accounting and analysis systems allow to gain competitive advantages by creating an effective control system. The main components of effective dynamic development are the income and expenses which need to be planned, controlled, competently reflected in accounting and reporting according to standards of the current legislation and IFRS. Comparison of the income and expenses determines the financial result of activity, as these two components need effective management. Despite the available western (international) and Russian practice of modern innovative methods and instruments of management increasing the efficiency, introducing accounting and analysis systems in the process of managerial decision-making of economic subjects of retail segments of the consumer market remains today an urgent and debatable issue for theorists, analysts and practitioners.

Genesis of accounting and analysis systems, development of theory and practice is a rather interesting direction of study in the field of economic knowledge at all levels. The need for research is primarily due to the social and economic importance of economic subjects of retail segments of the consumer market for the economy of any country. Despite different operating conditions, experience in management of significant components of activity of branch economic subjects is necessary for development of the general theory, methodology and practice of financial and economic management. We have carried out sufficient research into the present stages of formation and development of accounting and analysis systems as an economic category in Russia and world practice.

Research of stages of formation and development of economic thought on accounting and analysis in Russian and foreign practice. Successful and effective functioning of economic subjects of retail segments of the consumer market in modern unstable conditions depends on the efficiency of activity, strategic administrative decisions and innovative tools of financial management.

Genesis of conceptual and theoretical approaches of effective management of production and economic activities includes using accounting and analysis systems in achieving the set of current and strategic tasks. Since the 1990s, western theorists and practitioners carried out major studies in this field. Norton developed a system of the balanced indicators which is used by world and Russian leaders in practice of financial and economic activity.

Norton and Kaplan's book «The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment» considering the principles of organizing effective production and economic activity focused on development strategy based on the balanced scorecard system (BSC) was translated into Russian in 2001.

The BSC system was studied and introduced into practice in foreign companies by John Kelly (Crown Castle International), Janice Koch (AT&T Canada), Lauren Keller Johnson (Ingersoll-Rand), Julie A. Chesley (National Reconnaissance Office), Ann Field (Trammell Crow), James Creelman (BT Worldwide), Craig Naylor (DuPont Engineering Polymers), etc. [7–9].

The leaders of the companies that achieved fairly good results shared practical experience in implementing the BSC with David Norton and Robert Kaplan (the experience of the leading leaders of western companies is summarized in the Balanced Scorecard Report journal), this is a unique experience of companies in the public and private sectors of the economy that managed to achieve high performance results focused on strategic development.

Unique achievements of financial management became available to the Russian audience of top managers (practitioners) and researchers (theorists) when collection of examples of effective use of the BSC was published. The first edition was intended for top and middle managers of Russian enterprises introducing strategic management in the practice of financial control. The main financial component is profit, and its main components are income and expenses. Strategic objectives of foreign companies in the financial component are governed by the strategy of income growth through functions of management and price. New indicators and instruments of increasing efficiency were needed for introducing strategic management and making effective decisions. Such tools as management accounting, budgeting and controlling were used to take into account the components of increasing profitability in the financial component.

Administrators of economic subjects of retail segments of the consumer market in USSR used «Methodological recommendations for analysis and development of plans of gross revenue, distribution costs and profit in the trade of the system of the district consumer union» for financial and economic management as early as in 1982. Later, in 1988, basic provisions on the organization of cost accounting in consumer cooperation and the recommendations about conducting internal self-supporting cost accounting in trade and public catering were developed, recommendatory materials were published at the boundary of reorganization of planned economy (1998–2002): methodical recommendations about transition of the enterprises of consumer cooperation to internal self-financing; methodical recommendations about conducting management accounting in structural divisions of self-financed consumer societies; methodical recommendations about increasing the material interest of workers of consumer cooperation in the end results of activity.

For improvement of scientific thought, foreign experience was used and components were determined: strategic and operational planning, financial planning, analysis and controlling. It can be concluded from the above that due to the transition from command system of management to economy of the developed capitalism there was a need of formation of theoretical bases of accounting and analysis systems (AAS) and formation of the corresponding conceptual views.

At an initial stage, heated discussion of the need of application of AAS for domestic economic science was conducted and approaches of theoretical justification were considered. Comparing the chronology of views of scientific economists, four main stages of formation and development, methodology and practice of the studied category can be described for this for category.

1 stage: (early 1990s) formation of theoretical bases and categories such as management accounting, budgeting, analysis, controlling and formation of the corresponding conceptual views and approaches in foreign theoretical thought.

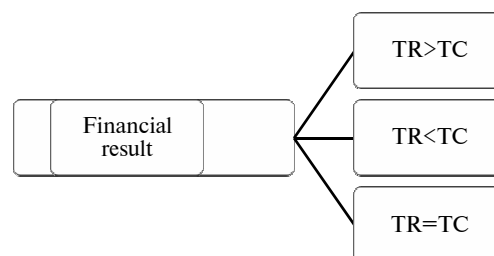
2 stage: (mid-1990s) development (practical experience of use by the foreign companies) and justification of the methodological principles of functioning of the main economic categories such as income, expenses and profit.

3 stage: (late 1990s and early 2000s) reconsideration of theoretical and methodical bases of effective system of financial management, development and justification of new properties, signs and conceptual views of development of registration systems taking into account the changing needs of users of economic and registration information for Russia.

4 stage: (since 2010) justification of the need of application of AAS, differentiation of the scope of AAS, development of a set of techniques of improvement of the theory and practice of AAS in relation to branch economic subjects (the enterprises and the organizations).

Next, we investigate the genesis of researchers' thought on economic category of AAS. Proceeding from the scope of our research and branch specifics, we can confidently claim that the object of AAS are the income and expenses of the economic subject of the retail segment of the consumer market. The income and expenses, according to Norton, are the main financial component, since the comparison of

the income with expenses defines the main indicator on the basis of which it is possible to judge the performance (see Figure).



Options of comparison of income and expenses

According to PBU 9/99 «The income of the organization», the income of the organization is the increase in economic benefits as a result of received assets (in cash or other property) and (or) repayments of obligations, leading to increase in the capital of this organization, except for deposits of participants (owners of property).¹

PBU 10/99 «Expenses of the organization» defines that expenses of the organization are the reduction of economic benefits as a result of disposal of assets (in cash, other property) and (or) emergence of obligations, leading to reduction of the capital of this organization, except for reduction of deposits made by the decision of participants (owners of property).¹

There is a need of AAS for income and expenses of economic subjects of the retail segment of the consumer market. Building the chronology of research of stages of formation and development of the AAS concept as an independent economic category, we can note that this aspect was first discussed in Russian scientific literature in 2001 (Tab. 1).

According to Berezina, accounting and analysis systems are a special system of tools and methods of conducting accounting allowing to form an information resource for management of activity of the commercial organization [4].

Babkov understands accounting and analysis systems as collection, accumulation and processing of registration information [2].

¹ The order of the Ministry of Finance of the Russian Federation of 06.05.1999 No. 32n (an edition of 06.04.2015) «About the adoption of the Accounting regulation «Income of the Organization» of PBU 9/99» (It is registered in the Ministry of Justice of the Russian Federation 31.05.1999 No. 1791).

Ismailova claims that accounting and analysis systems are systems allowing to collect necessary information on the results of the movement of financial streams, financial stability, solvency, the status of property and capital [7].

Kirichenko understands accounting and analysis systems as the data directed on

increasing the efficiency of functioning of the economic subject on the basis of optimization of accounting and analysis of the chosen key indicators of activity, such as expenses and prime cost, and elimination of information deficiency on this basis in adoption of effective administrative decisions [12].

Table 1

Genesis of Substantial Understanding of the Concept of AAS

Author, period	Author's treatment of the concept
V.V. Rodkina 2001	AAS can be defined as an interactive structure which includes the personnel, the equipment and procedures united by the information stream used by logical management for planning, regulation, control and analysis of functioning and development of the enterprise [16]
I.V. Alekseeva 2002	AAS is a set of registration information and analytical data obtained on its base promoting adoption of tactical and strategic decisions [1]
L.V. Popova, V.G. Maslov, I.A. Maslova 2003	AAS in the broadest sense is a system which is based on the accounting information including operational data and using statistical, technical, social and other types of information for economic analysis [14]
I.Z. Pizengolts 2003	AAS as an integrated system including both direct accounting and planning, control, the analysis of the enterprise's performance for adoption of administrative decisions on production improvement, decrease of expenses and improvement of financial results of the enterprise's performance ²
N.A. Tychina 2009	AAS is the unity of systems for accounting and analysis which are united by information streams for management of economic processes during the choice (or realization) of directions of sustainable development [17]
T.V. Shimokhanskaya 2011	AAS is understood as an information system consisting of interconnected subsystems: accounting; financial management; administrative (production) control; tax accounting; reporting; made for various users; analysis of financial and economic activity and financial analysis of reporting [21]
I.N. Kirilov 2012	AAS represents a system of data collection, providing a group of registration information needed by the management, drawing up accounting reports. Analytical accounting allows to detail data on an object in monetary and (or) natural value [13]
L.E. Basovsky 2013	AAS consists in implementation of registration and analytical procedures in real time, identification of deviations from the planned indicators and use of the received results for adoption of administrative decisions [4] ³
E.V. Savvateev 2014	AAS is a complex mechanism which unites processes of accounting and economic analysis for the purpose of creating information support allowing to form objective information according to interests of users and the direction of development of branch ⁴

Author's systematization of views of AAS.

S o u r c e : The order of the Ministry of Finance of the Russian Federation of 06.05.1999 No. 32n (an edition of 06.04.2015) «About the adoption of the Accounting regulation «Income of the Organization» of PBU 9/99» (It is registered in the Ministry of Justice of the Russian Federation 31.05.1999 No. 1791).

² **M.Z. Pizengolets**, Accounting in agriculture. Accounting management accounting. Accounting (financial) reports. 4 prod. T. 2. Ch.2. Ch.3, Moscow, Finance and statistics, 2003.

³ **L.E. Basovsky**, Modern strategic analysis, Moscow, Infra-M. 2013.

⁴ **E.V. Savvateev, V.V. Rokotyanskaya, O.V. Moshchenko, T.A. Vlasenkova**, Ekonomik, the organization, marketing bases in processing industry: Studies, a grant. Under a general edition of E.V. Savvateev, Moscow, Infra-M, 2014.

Rebezha defined accounting and analysis systems as a set of tools and methods of accounting and analysis allowing to form an information resource of budgeting for determining the relationships of cause and effect arising in process of management of expenses and maintenance of stable functioning of the economic system of corporate education and its objects in the future [15].

Detailed chronological research of the researchers' positions on the genesis of the AAS concept allowed to establish various points of view; taking them into account, we are inclined to claim there is currently no unanimity of views concerning AAS in modern Russian methodology and practice, except for unanimity in adoption of administrative decisions.

This assertion is because the AAS is considered from various aspects and branch features of economic subjects.

Let us give a more precise definition to the category discussed, considering researchers' positions on the concept of accounting and analysis systems and the lack of a consensus, taking into account branch specifics of economic subjects and at the level of general definitions, in particular: management of the economic subject; cost management; management of the income; management of profit; management of innovative development; management of the capital, etc. In our opinion, the basic treatment of the concept has to be based on the most widespread view taking into account the arising requirements of management, in our case it is the income and expenses.

Describing the main components of the AAS: the accounting software supported by different types of accounting; analytical software used to organize collection, registration, systematization, grouping and synthesis of information, taking into account practical experience and theoretical development, in our opinion, it is necessary to understand AAS of income and expenses as a complex mechanism unifying the processes of accounting and management control, economic analysis, planning, budgeting and control for the purpose of information support of management of income and expenses, which allows to form objective and comprehensive information on the performance of an economic subject of the retail segment of the consumer market, and to refine or develop the administrative decision directed at increasing the competitive advantages and efficiency of business.

Results of the study and development of authors' thought. Generalizing the results of the above study of genesis of economic thought on AAS, we draw a conclusion that the leading scientific economists and practitioners in the field of financial management state their points of view and visions on the essence and the maintenance of AAS, and also on the places and roles in financial management (management). Tracing the genesis of economic thought on the studied issue, we can notice the need for developing the methodology and conceptual foundations of formation of AAS depending on the object of financial management and the branch it belongs to. This is due to the lack of consensus in economic thought. This tendency of different views and opinions of AAS is explained by existence of various conditions of management, level of development of the issue, object of financial management and branch specifics. Therefore, we can confidently state that there is no uniform understanding of AAS as an economic category.

Increase of management efficiency of the economic subject of the retail segment of the consumer market is a complex problem of financial management and the corresponding AAS. In relation to economic subjects of the retail segment of the consumer market and object of financial management which the income and expenses are, we can allocate the BSCS components which are conceptual foundations of the AAS. In our opinion, for all economic subjects of the retail segment of the consumer market, the priority is the strategic direction of maximizing the income and minimizing the expenses, which is caused by interests of owners of the business. In the accounting model, the cost of the economic subject of the retail segment of the consumer market is defined by the model (formula 1) [8]:

$$SV = P/E \cdot EPS, \quad (1)$$

where SV is the share price for shareholders (owners of business);

P/E is the coefficient of the ratio of the price of a share and earning per share;

EPS is the earning per share.

The cost of the economic subject of retail trade can increase, at the expense of increase in profit or a positive increment of the ratio of the price and profit, which promotes growth of a

share price. Realization of the strategy focused on profitability assumes business development (expanded reproduction), this circumstance defines the need to estimate and control the risks of activity, namely: risks of consumers (solvency of consumers and satisfaction of demand for goods); market risks; risks of partnership; risks of strategic planning and budgeting; risks in the field of financial and administrative accounting of production and economic activity. In view of the lack of uniform conceptual and methodological foundations, let us describe the AAS of income and expenses taking into account the strategy of development focused on increasing the profitability as:

the integrated system (complex) of interconnected system indicators connected among themselves by information streams (about income and expenses) of their processing and analysis, reflected in accounting and reporting, system planning and budgeting, and controlling at each stage of implementation of strategic administrative decisions.

AAS should be based on qualitative information support and be guided by accounting (financial) reports which provide standard instructions of the Russian Federation and IFRS. For development and adoption of strategic administrative solutions, AAS of income and expenses should be used for forming and executing strategic initiatives of financial managers, by providing necessary information for assessment and analysis of indicators of profitability of business. For achieving the goals set and its intended purpose, the AAS of income and expenses has to perform the general registration functions, provide reporting information, analyze it and control the planned strategic parameters set by BSC of the economic subject of the retail segment of the consumer market.

For ensuring possible implementation of the AAS of income and expenses of economic subjects of retail segments of the consumer market concerning strategic administrative decisions developed for expanded reproduction, we offer using the experience of actuarial accounting, i.e., the accounting focused on the IFRS and expressing interests of owners or investors. Actuarial accounting is directed at forming an image of market appeal of the economic subject of retail trade. Allocation of accounts of operating

and financial activities, financial results is offered as actuarial accounts. Information is registered in actuarial accounts by means of double record and descriptive record (Tab. 2). The main object of accounting within AAS of income and expenses for strategic administrative decisions, in our opinion, is the reasonable plan (budget). For implementation of the concept of strategic management of the economic subject of the retail segment of the consumer market, income, expenses and financial result should be allocated, generalized and compared for each strategic administrative decision.

For this purpose, AAS should include the option of grouping and synthesis of income, expenses and results for each administrative decision and business process. It is necessary to carry out system monitoring of indicators, to reveal the deviations and factors affecting the change of certain BSC parameters. All registration information on BSC indicators is integrated with the information of strategic initiatives and interested parties, it allows to develop in detail the strategic administrative decision made proceeding from the maintenance of the generated cost.

The offered methodology of AAS of income and expenses is aimed at integrated formation and submission of registration information on the generated economic cost in the course of implementation of the administrative decision by the economic subject of the retail segment of the consumer market. Implementing the offered AAS methodology in practice should allow to increase the quality of the strategic administrative decisions made, which should in turn increase the efficiency of business processes and financial performance.

The obtained results: To summarize all of the above for generalizing the experience and developing the methodology of accounting and analysis systems of income and expenses of retail segments of the consumer market, we have discussed the following:

1) the genesis of accounting and analysis systems is primarily supported by the experience and practice of representatives of the western scientific community and business elite who estimated the main financial categories, such as budget, controlling, management accounting, income and expenses in strategic company management;

Table 2

System of balance accounts for accounting and analysis systems of income and expenses of economic subjects

Module	Category	Section	Subgroups of accounts	Accounts	Order of recording the information	Compliance of the reporting	Definition of result
Accounts of cumulative financial result	Operational activities	Operational profit (loss)	Operational income	Result of operational activities	Simple record based on cost drivers forecast reflecting the data for: expected and the post-forecast periods. Double record in the presence of a detailed business plan	Actuarial report on cumulative profit	Operational profit – Net financial consumption = Cumulative financial result
			Operational expenses	Result of operating activities			
	Financial activity	Net financial consumption (income)	Financial income	Result of financial activity			
			Financial expenses	Result of financial activity			
Accounts of free cash flow	Operational activities	Free cash flow from the standpoint of operational activities	-	Free cash flow	Simple record of the interrelation of accounts based on a formula for calculating the size of the free cash flow	Actuarial balance of economic cost of the organization	$OP = \Delta X_{\eta} OA = \text{Result}$
	Financial activity	Free cash flow from the standpoint of financial activity	-	Free cash flow			$X_{\eta} \Phi P - \Delta X_{\eta} \Phi O + D - \Delta X_K = \text{Result}$

The table is compiled by us.

2) despite the absence of the general concept of accounting and analysis systems, the developed and tested balanced system of indicators is not only a tactical or operational estimation system but also a means of strategic management which has also found practical application in Russian management of economic subjects;

3) formation and development of accounting and analysis systems is still at the stage of research and development of the general conceptual and methodical foundations in modern Russia.

Directions for further studies. Development of market relations in Russia, unstable financial and economic situation, an insufficient skill level of financial managers implies that adaptive AAS of economic subjects of the retail segment of the consumer market has to be organized and introduced. In this regard, it is particularly important to determine the main criteria of activity, define the functions and problems of AAS.

The main objective of AAS within the BSC (for income and expenses in our case) is

achieving the interrelation of the tools used during the development and adoption of strategic administrative decisions. AAS of income and expenses has a logical sequence of actions (Tab. 3).

The initial stage of formation of AAS of income and expenses within the implementation of the methodology we have offered is collection of information about the income and expenses in the system of financial and management accounting. The information is then recorded in financial and administrative accounts (in sub-accounts by type of income and expenses for each assortment group). The following stage of AAS is the systematized group of information on income and expenses. Each economic subject can analyze the income and expenses in the retrospective, operational and strategic directions. All of the above promotes the development and adoption of competent strategic administrative decisions which directly or indirectly affect the income and expenses of economic subjects of retail trade.

Table 3

Algorithm of formation of AAS of income and expenses by an economic subject of retail segment of Russian consumer market

Accounting unit	Analysis unit
Recognition and initial registration of the facts of emergence of income and expenses (according to Russian and international financial reporting standards)	Analysis of validity of primary registration information on income and expenses
Display of information in accounting, managerial and actuarial accounts	Analysis of registration information using various methods of comparison
Grouping and generalization of information in summary records (according to Russian and international financial reporting standards)	Synthesis of analytical information and formation of reports
Synthesis of registration information on income and expenses, formation of reports (according to Russian and international financial reporting standards)	Analysis of implementation of strategic administrative decisions. Definition of the BSC characterizing business processes

Accounting and analysis systems for income and expenses of economic subjects of the retail segment of the consumer market allow to effectively implement the main functions of management, but today there is a justified and reasonable need to continue studies in this direction:

- to develop the common conceptual position and methodology of practical realization at the branch level, that is to say, a complex of theoretical and methodological, organizational and technical provisions on improving accounting and analysis systems;
- to substantiate and to test in practice the main components and elements of the balanced

scorecard system for branch economic subjects of retail segments of the consumer market from the standpoint of accounting and analysis systems.

Implementing the methodology we have offered on AAS for income and expenses of retail segments of the consumer market should resolve the problematic issues of AAS regarding: purposeful selection and aggregation of accounting and managerial information that should increase the significance of the estimation of analytical components (income, expenses, financial results); delegation of powers to particular employees (financial managers), which should narrow access for users.

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Статья поступила в редакцию 25.02.18

DOI: 10.18721/JE.11208
UDC 658.5

MANAGEMENT OF ADDED VALUE IN ENGINEERING BUSINESS: PROCESS APPROACH AND TOOLS

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In this article engineering business is considered as the cycles of converting manufacturing capital and innovation capital of enterprises into monetary capital. The conversion cycles are implemented by organizing the production based on market relation within technological stages being the zones of financial responsibility (liability); by using the management accounting system forming the organization of production in monetary equivalent and the innovation activity ensuring the equality of product value and its market price. The relevance of the research topic is determined by the necessity to create motivating system of innovation activity in engineering enterprises. Our aim is to ensure a continuous growth of market innovation added value of products. The main task is to develop tools for managing a basic operation cycle converting manufacturing capital into monetary capital in the form of products whose consumer properties are competitive and for managing an innovation cycle converting an income producing idea into market added value. As the investigation method we used the process approach in the formation of operation and innovation cycles parameters. As a result, the integrated mathematical model has been created that allows designing operation and innovation cycles; developing a management accounting system and on this basis to implement product and technological innovations. Studying conversion operation cycles of several engineering business enterprises allows us to formulate necessary requirements to the organization of production. Consumer properties and technological costs of final products should be formed by being transferred within technological stages being at the same time the zones of financial liability. Management accounting should ensure the equilibrium of operation basic and innovation cycles converting manufacturing and innovation capital into monetary capital and market added value of products respectively. To motivate innovative activity it is necessary to personalize intangible assets that guarantee market added value. Subsequent research will focus on the design, development and implementation of management accounting systems for manufacturing-technological systems to manage innovation processes ensuring market added value of each technological stage and final products.

Keywords: basic operation cycle of converting manufacturing capital into competitive products; innovation cycle of converting innovation capital into market added value; management accounting system; transferring technological costs and market value within technological stages, zones of financial liability

Citation: A.N. Shichkov, N.A. Kremlyova, A.A. Borisov, Management of added value in engineering business: process approach and tools, St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 81–91. DOI: 10.18721/JE.11208

УПРАВЛЕНИЕ ДОБАВЛЕННОЙ СТОИМОСТЬЮ В ИНЖЕНЕРНОМ БИЗНЕСЕ: ПРОЦЕССНЫЙ ПОДХОД И ИНСТРУМЕНТЫ

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Инженерный бизнес определён в исследовании как циклы конверсии производственного и инновационного капитала предприятия в денежный капитал. Операционный цикл реализуется путём организации производства на основе рыночного уклада

между технологическими переделами, являющимися зонами финансовой ответственности, использования системы управленческого учёта, формирующей организацию производства в денежном эквиваленте, и инновационной деятельности, обеспечивающей равенство стоимости продукта и его рыночной цены. Актуальность темы исследования определяется необходимостью разработки мотивированной системы инновационной деятельности в инженерном предприятии. Целью исследования является обеспечение непрерывного роста рыночной добавленной стоимости продуктов производства. Основная задача при этом — создание инструментов управления базовым операционным циклом конверсии производственного капитала в денежный капитал в форме продуктов, потребительские свойства которых являются конкурентоспособными и для управления циклом конверсии доходной идеи в рыночную добавленную стоимость. Использован процессный подход в формировании параметров операционного и инновационного циклов. Создана интегрированная математическая модель, позволяющая проектировать операционный и инновационный циклы, разрабатывать системы управленческого учёта и осваивать на их основе продуктовые и технологические инновации. Исследование операционных циклов конверсии различных предприятий инженерного бизнеса позволило сформулировать необходимые требования к организации производства. Потребительские свойства и технологические затраты конечного продукта должны быть сформированы путём трансферта по технологическим переделам, являющимся в то же время зонами финансовой ответственности. Управленческий учёт должен обеспечить равновесие операционного базового и инновационного циклов конверсии производственного и инновационного капитала в денежный капитал и рыночную добавленную стоимость продукции соответственно. Чтобы мотивировать инновационную деятельность, необходимо персонализировать нематериальные активы, которые гарантировали рыночную добавленную стоимость. Последующие исследования будут сфокусированы на проектировании, создании и освоении систем управленческого учёта производственно-технологических систем для управления инновационными процессами, обеспечивающими рыночную добавленную стоимость каждого технологического передела и конечного продукта.

Ключевые слова: базовый операционный цикл конверсии производственного капитала в конкурентоспособную продукцию; инновационный цикл конверсии инновационного капитала в рыночную добавленную стоимость; система управленческого учёта; трансферт технологических затрат и рыночной стоимости по технологическим переделам, являющихся одновременно зонами финансовой ответственности

Ссылка при цитировании: Шичков А.Н., Кремлёва Н.А., Борисов А.А. Управление добавленной стоимостью в инженерном бизнесе: процессный подход и инструменты // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 81–91. DOI: 10.18721/JE.11208

Introduction. By definition engineering business is a manufacturing technological and marketing activity in which engineering creativity based on scientific theoretical and practical knowledge in the field of organization of production, management accounting and innovation allows business to continuously manufacture and sell goods [1–8].

The performance of a manufacturing technological system increases by improving assets. Basic assets of engineering business enterprises are manual assets. Mechanical drive attached to technological equipment in the form of James Watt's steam engine (1769) added tangible assets to manual assets and allowed increasing business performance. In the 1960s intangible assets were added to engineering business. The use of three assets in the organization of production added management accounting and innovation activity. In this case, the organization of production is an

integrated set of controlling tools. It means that if the integrated set of tools includes the organization of production, management accounting and innovation activity, this complex is the controlling system of engineering business enterprises.

At present there is no clear understanding of the concept «controlling». To formulate the concept of controlling, we have studied the definitions of this term by different authors. According to Ivashkevich, «controlling is the system of managing the process of achieving final goals and outcomes of the company's activity» [9, 10]. Karminsky defines controlling as «a new management concept generated by the practice of joint management» [11, 12]. At the heart of this new concept of system management of the organization there is the desire to ensure the successful functioning of an enterprise in the long term.

According to the modern approach (Han [13]), controlling can be interpreted as information support focused on the results of enterprise management. Orekhovsky regards controlling as the achievement of goals of the organizational system. Smirnov C.A. believes that controlling is a system of managing the achievement of goals of an enterprise. According to Utkin and Myrnyuk [14], controlling is the concept of effective management of the enterprise ensuring its stable existence on the market. Maier [15] considers controlling as a leadership concept for effective management of the enterprise and ensuring its long-term existence. Gradov and Kusun define controlling in a broad sense as a system of ensuring the survival of an enterprise at the stages of strategic and tactical management.

Definitions of the concept «controlling» are the following: management system of the process of achieving final goals; practice of joint management; system management of the organization; information support focused on the results of enterprise management; organizational system; stable existence on the market; effective management; survival of an enterprise at the stages of strategic and tactical management.

As a result, the definition of this concept is the following: **controlling** is an integrated set of management systems and information support of organization focused on survival and stable existence on the market at the stages of strategic and tactical management and on achieving the final goals of an enterprise.

In Russia, the interest in controlling appeared at the beginning of the 1990s, when the economy finally consolidated both legal and market principles of economic management. The evolution of views on controlling in Russia can be presented as follows [16–19]:

- 1991–1995, controlling is similar to cost accounting;
- 1996–1997, controlling is understood as accounting of costs and benefits;
- 1998–2000, controlling of budgeting, operational planning and costs management;
- since 2000, there has been a predominant understanding of controlling as a provider and interpreter of information for management, as well as the coordinator of operational activities of an enterprise.

The Union of controllers was established in 2000 as a unifying form of interaction between theorists and practitioners involved in controlling.

Since 2001, the Union has been publishing the journal «Controlling».

Controlling is a philosophy and a way of thinking of managers focused on the efficient use of resources and development of enterprises in the long term. Thus, the task of controlling as a science is to develop the theory, methods and instruments of management from different perspectives.

Our subsequent research will aim at the creation of a mathematical model [20, 21] integrating three components of controlling: organization of production management; management accounting system and innovation management where operation of production management balances demand and supply of products; innovation management balances product cost and its demand and market value; management accounting system implements organization of production, management and innovation management in monetary equivalent.

Designing the market parameters of engineering business. The main condition of successful engineering business is to manufacture only products that will be sold well. Each manufacturing technological system of any engineering business has its characteristic in the form of function $f(GW)$, where G is the production volume and W is the unit costs. Therefore, the first stage of designing an engineering business is designing the business characteristic.

1. Parametrical equation of business characteristic.

Demand and supply of engineering business are described by multiplying two variables: production volume G , product units/time units, and units costs W , rub/product units. The graphical interpretation of function $f(GW)$ is the parabola in rectangular coordinates. Fig. 1 presents the algorithm of designing the business characteristic $f(GW)$.

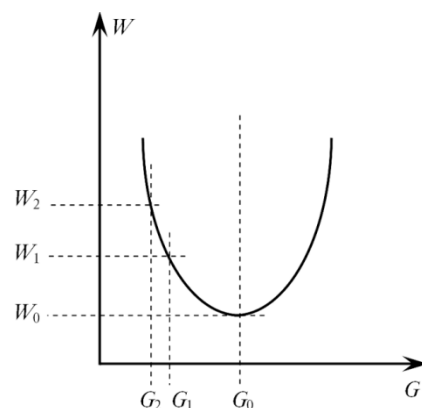


Fig. 1. Designing the algorithm of the business characteristic $f(GW)$

The field of changing parameters of demand and supply is $\min G_2$, G_1 , $\max G_0$ and W_2 , W_1 , W_0 , respectively, where:

$$W_0 = \frac{(4ac - b^2)}{4a}; \quad (1)$$

$$G_0 = -\frac{b}{2a}. \quad (2)$$

The system of equations describing the constant coefficients a , b , c in the equation of the parabola is the following:

$$\begin{cases} W_1 = aG_1^2 + bG_1 + c, \\ W_2 = aG_2^2 + bG_2 + c, \\ W_0 = aG_0^2 + bG_0 + c. \end{cases} \quad (3)$$

The solution of the equation results in obtaining the controlling equation by changing the variables $W_0 \div W_2$ and $G_0 \div G_2$,

$$W = aG^2 + bG + c. \quad (4)$$

The basic parameters of business G_0 and W_0 are obtained from dependences (1) and (2). Business performance T_0 , rub/hour is determined by the dependences,

$$\begin{cases} T_0 = \frac{G_0 W_0}{R_0}, \\ R_0 = \frac{G_0 W_0}{T_0}, \\ R_0 T_0 = G_0 W_0, \end{cases} \quad (5)$$

where R_0 , hour/year is the annual resource of working time. Constant R_G , hour/year is the annual resource of useful life of fixed assets and intangible assets. In this case, manufacturing technological processes will be balanced and all kinds of wear (technological, functional and economic) will be planned.

2. The structure of 'novelty' of products and technologies consists of two parts. In the first part of the novelty, parameters and properties of products and technologies are described as close to their prototypes. In the second part of the novelty, after the phrase «differing in ...», additions and changes determining the novelty are given. It means that the structure of innovation activity and the structure of engineering business consist of two parts: basic and innovation. Basic operation cycle

manufactures products in a manufacturing technological system and innovation cycle converts income-generating ideas into market added value.

Mathematical model of operation and innovation cycles in vector form. The structural model of engineering business is considered in the form of two cycles:

2.1. Operation cycle of converting the manufacturing capital of a manufacturing technological system into monetary capital in the form of a competitive product.

2.2. Innovation cycle of converting the innovation capital into monetary capital in the form of products having competitive advantages.

The mathematical model of each cycle is a system of two balance equations.

The first equation of an operation cycle is a balance equation of basic manufacturing capital Q_{bmc} including technological costs C_{tc} and the main funds in the form of depreciable and taxable fixed assets U_{fa} . In turn, technological costs C_{tc} is an integrated set of direct manufacturing costs C_{dmc} , and manufacturing (business) waste costs C_{mwc} . As for C_{dmc} , it is the sum of material costs C_{mc} , other costs C_{oc} , and minimal labor payment costs $\min C_{lpc}$.

Normalization of direct costs during manufacturing of products leads to simultaneously developing and increasing manufacturing waste. The fact is that the initial material comes to the manufacturing technological system in the wholesale form; therefore, manufacturing waste arises in the manufacturing process. In this case, innovation activity of production personnel is excluded. If a manufacturing technological system is a technological stage with market cost and at the same time is a zone of financial liability, the reduction of manufacturing waste is motivating.

$$Q_{bmc} = C_{dmc} + C_{mwc} + \min C_{lpc} + U_{fa}. \quad (6)$$

The second equation of an operation cycle is the balance equation of monetary capital in the form of competitive products manufactured in the technological system of the enterprise. Monetary capital (market basic cost) V_{bsv} is equal to the sum of direct manufacturing costs in products C_{dmc} , manufacturing waste C_{mwc} and net income D_0 .

Net income D_0 of a basic operation cycle includes: value added tax $N_{vat} = 0.18V_{sv}$, where V_{sv} is the sum of the basic sales value V_{bsv} and the

added value V_{asv} ; fixed assets tax $N_{fat} = 0.02U_{bfa}$, where U_{bfa} is the balance cost of fixed assets; capitalization for business owners C_{cbo} . As a rule, the capitalization rate of business is more than the bank capitalization and it equals 10 %; depreciation of fixed assets is, for example, $0.03U_{bfa}$ and manufacturing waste is C_{mwc} . The efficiency of technological innovations is estimated by decreasing the rate of manufacturing waste in net income.

$$V_{bsv} = C_{dte} + D_0 = C_{dmc} + C_{mwc} + N_{vat} + N_{fat} + C_{cbo} + C_{dfa}. \quad (7)$$

The first equation of an innovation cycle is the manufacturing capital including the costs in the form of the labor payment C_{lp} with all payments that are related to labor payment and the main funds in the form of intangible assets amortization U_{ia} . The value of intangible assets is determined only by the market added value, therefore, intangible assets are the objective reality and do not depend on whether they are on the balance sheet of the company or not.

Balance equation of manufacturing capital in an innovation cycle has the form:

$$Q_{imc} = C_{lp} + U_{ia}. \quad (8)$$

The second equation of the monetary capital of an innovation cycle is equal to the sum of added value V_{mav} , net profit P_0 with tax on the operation profit N_{opt} and the amortization of intangible assets C_{aia} .

Balance equation of monetary capital in a conversion operation cycle has the form:

$$V_{mav} = C_{lp} + P_0 + N_{opt} + C_{aia}. \quad (9)$$

Parameters of an operation cycle and an innovation cycle are the monetary flows vectors. Dependences (6,7) and (8,9) are presented in the form of two vector equation systems.

The system of vector equations describing a conversion operation cycle has the form:

$$\begin{cases} \vec{Q}_{bmc} = \vec{C}_{tc} + \vec{U}_{fa}, \\ \vec{V}_{bmc} = \vec{C}_{dmc} + \vec{C}_{mwc} + \vec{D}_0. \end{cases} \quad (10)$$

$$\vec{V}_{bmc} = \vec{C}_{dmc} + \vec{C}_{mwc} + \vec{D}_0. \quad (11)$$

The system of vector equations describing a conversion innovation cycle has the form:

$$\begin{cases} \vec{Q}_{ic} = \vec{C}_{lp} + \vec{U}_{ia}, \\ \vec{V}_{isv} = \vec{V}_{amv} + \vec{P}_0 + \vec{C}_{aia} + \vec{N}_{opt}. \end{cases} \quad (12)$$

$$\vec{V}_{isv} = \vec{V}_{amv} + \vec{P}_0 + \vec{C}_{aia} + \vec{N}_{opt}. \quad (13)$$

Only equilibrium processes can be graphically interpreted in any coordinate system. Therefore, the graphical interpretation of equilibrium conversion operation and innovation cycles in vector form can be presented in Fig. 2. In this case the vector triangle 1-2-3 performs as a coordinate system.

The sum of collinear vectors 1-5 and 5-2 is, respectively, the sum of innovation Q_{imc} (8) and basic Q_{bmc} (6) manufacturing capital. Similarly, the sum of collinear vectors 1-6 and 6-3 are added V_{asv} (9) and basic sales value V_{bsv} (7). Each of these vectors is a sum of two orthogonal vectors.

Vector Q_{imc} is equal to the sum of vectors 1-4 (labor payment costs C_{lp}) and vectors 4-5 (intangible assets U_{ia}).

Vector Q_{bmc} is equal to the sum of vectors 5-7 (technological costs C_{tc}) and vectors 7-2 (fixed assets U_{fa}).

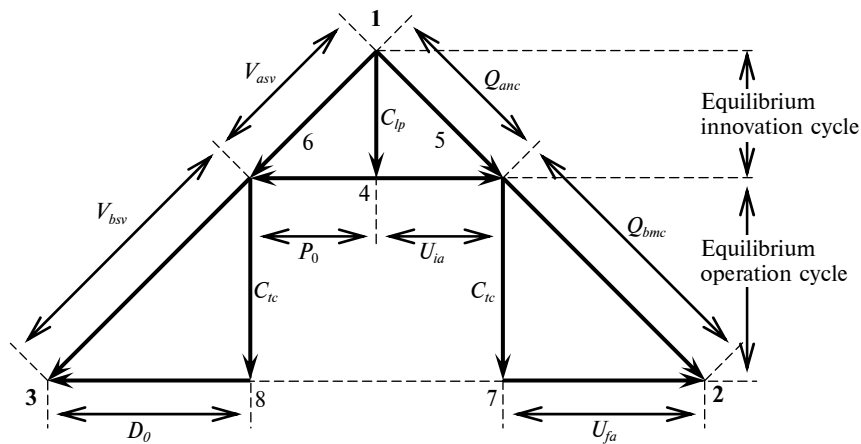


Fig. 2. Equilibrium conversion operation and innovation cycles in vector form

Vector V_{asv} is equal to the sum of vectors 1-4 (labor payment costs C_{lp}) and vectors 4-6 (net profit P_0).

Vector V_{bsv} is equal to the sum of vectors 6-8 (technological costs C_{tc}) and vectors 8-3 (net income D_0).

Management accounting and innovation activities support the equilibrium parameter of basic and innovation cycles.

It should be borne in mind that operation and innovation cycles are closed; therefore, all the parameters of cycles in innovation projects change at the same time.

The efficiency of engineering business is determined by the ratio of innovation and operational (basic) cycles.

The ratio of operation (basic) and innovation cycles should be equal to unity. A ratio exceeding unity is only possible in excise business. The enterprises that do not use management accounting have only the operation cycle. In this case market labor payment is compensated by not paying taxes. The fact is that the current manufacturing technological system cannot ensure these processes' metrology and, therefore, cannot implement management accounting.

Mathematical model of the operation and innovation cycles in variables: performance T and entropy S . The graphical interpretation of operation and innovation cycles in a vector coordinate system does not allow evaluating the changes of business performance. To fulfill this task, we describe the equation systems (10-13) in other parameters such as performance T , rub/hour and entropy S , hour/year.

$$\begin{cases} Q_{bmc} = T_{tc} R_0 + T_{fa} R_G, \\ V_{bmc} = T_{tc} R_0 + T_{fa} R_0, \end{cases} \quad (14)$$

$$\begin{cases} Q_{ic} = T_{sv} R_0 + T_{tc} R_G, \\ V_{isv} = T_{sv} R_0 + T_{tc} R_0. \end{cases} \quad (15)$$

$$\begin{cases} Q_{ic} = T_{sv} R_0 + T_{tc} R_G, \\ V_{isv} = T_{sv} R_0 + T_{tc} R_0. \end{cases} \quad (16)$$

$$\begin{cases} Q_{ic} = T_{sv} R_0 + T_{tc} R_G, \\ V_{isv} = T_{sv} R_0 + T_{tc} R_0. \end{cases} \quad (17)$$

Fig. 3 presents equilibrium operation and innovation cycles converting manufacturing and innovation capital into monetary capital in the form of the sum of basic sales value V_{bsv} and added market value V_{amv} . The abscissa axis presents the change of entropy S , hour/year and the ordinate axis presents the process of performance T , rub/hour. The field of rectangle

1-2-3-4 is the equilibrium conversion of operation (9-2-6-8) and innovation (8-5-4-7) cycles. Business efficiency is determined by the ratio of these cycles.

The processes and parameters of conversion operation cycles in engineering business are the following:

1. The process of forming the manufacturing capital of a basic conversion operation cycle. The process of forming the basic manufacturing capital Q_{bmc} of a basic conversion operation cycle consists of two processes: forming fixed assets 9-2 and forming technological costs 2-6.

The first process is the process of forming fixed assets U_{fa} . This is the process of setting up technological machines and equipment (tangible assets). Fixed assets are a taxable and depreciable part of main funds.

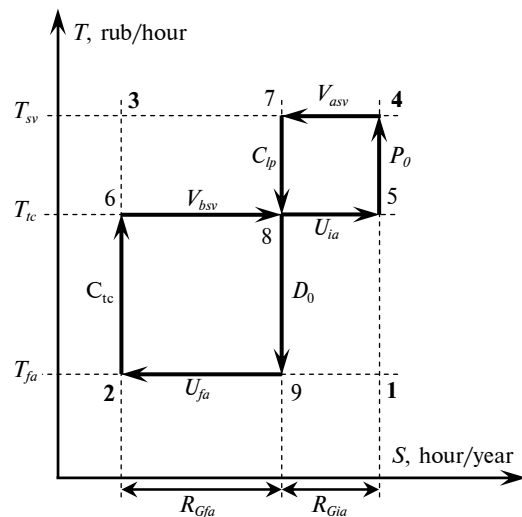


Fig. 3. Equilibrium conversion operation and innovation cycles in the coordinate system of performance T and entropy S

The second process is the process of forming technological costs 2-6 which in a basic cycle are equal to the sum of material costs C_{mtc} , other costs C_{otc} and minimal labor payment costs $\min C_{lpc}$.

2. The process of forming basic monetary capital V_{bsv} of a basic operation cycle consists of two processes: manufacturing products in a manufacturing technological system 6-8 and selling products by the marketing division of an enterprise.

Market added value of a basic operation cycle is the depreciation of intangible assets during their useful life. Therefore, the value of

depreciable intangible assets is included in the value of fixed assets and is not the result of innovation activity.

This process of forming basic monetary capital consists of a manufacturing technological process converting technological costs C_{tc} into products whose the consumer properties allow receiving monetary capital equal to C_{tc} and the process of selling goods which allows forming net income D_0 .

In the basic monetary capital net income 8-9 includes: value added tax N_{vat} , with the tax rate ψ_{vat} , fixed assets tax N_{fat} , with the tax rate ψ_{fat} , fixed assets depreciation C_{dfa} , where the fixed assets depreciation rate is minimal $\alpha_{dfa}=0.03$. As a rule, the depreciation rate of fixed assets should be more than the tax rate of fixed assets. Net income of a basic operation cycle includes net profit with the operation profit tax P_{bo} for business owners. The net income of a basic operating cycle includes all business waste C_{bw} .

3. The process of forming the manufacturing capital of an innovative operation cycle.

As in the first case, the process of forming the manufacturing capital in an innovative operation cycle Q_{imc} consists of two processes: the process of forming intangible assets U_{ia} whose cost is equal to market added value and the process of forming manufacturing costs C_{ilp} in the form of personalized labor payment with all payments attributable to labor payment.

4. The process of forming monetary capital in an innovation operation cycle. This process consists of two processes: forming added value and forming net profit with all payments related to personalized labor payment.

Dynamic mathematical model of operation and innovation cycles. All the processes in operation and innovation cycles are dynamic processes. To study these processes, we suggest a mathematical model in the form of differential equations system.

$$\left\{ \begin{array}{l} dQ_{mc} = dQ_{bmc} + \sum_{n=1}^m dQ_{amcn}, \end{array} \right. \quad (18)$$

$$\left\{ \begin{array}{l} dV_{sv} = dV_{bsv} + \sum_{n=1}^m dV_{asvn}, \end{array} \right. \quad (19)$$

where dQ_{bmc} is the basic manufacturing capital converted into the basic monetary capital dV_{bsv} as produced and sold goods with a market cost;

$\sum_{n=1}^m dQ_{amcn}$ is the sum of added innovative manufacturing capital in different technological

stages converted into monetary capital in the form of the sum of added market value $\sum_{n=1}^m dV_{asvn}$.

We may write the equations (18) and (19) in the full form, where:

1) the process of forming basic manufacturing capital dQ_{bmc} consists of the process of forming tangible assets in the form of fixed assets differential dU_{fa} and the process of forming technological costs in the form of the constant of production volume multiplied by units costs differential $G_0 dW = dC_{bmc}$;

2) the process of forming added value of the manufacturing capital in each technological stage (m) is presented in the form of the sum of the processes of forming intangible assets in the form of dU_{ia} and the process of forming labor payment in the form of the constant of production volume multiplied by unit costs differential $G_0 dW = dC_{alp}$;

3) the process of forming basic monetary capital dV_{bmc} consists of the manufacturing technological process equal to the constant of production volume multiplied by unit costs differential $G_0 dW$ and the process of forming sold goods and net income. This process is presented in the following mathematical form: $W_0 dG = dD_{b0}$;

4) the process of forming added monetary capital in each technological stage (m) is based on implementing productive and technological innovations. Similar to basic monetary capital, added monetary capital consists of added value and net profit including all payments related to labor payment. This process is presented in the following mathematical form:

$$\left\{ \begin{array}{l} dQ_{mc} = (dU_{fa} + G_0 dW)_{bmc} + \\ + \sum_{n=1}^m (dU_{ia} + G_0 dW)_{amcn}, \end{array} \right. \quad (20)$$

$$\left\{ \begin{array}{l} dV_{sv} = (G_0 dW + W_0 dG)_{bsv} + \\ + \sum_{n=1}^m (G_0 dW + W_0 dG)_{asvn}. \end{array} \right. \quad (21)$$

The system of equations (20) and (21) describes the operation cycle of converting manufacturing capital into monetary capital in the form of produced and sold goods with a market cost. We multiply and divide all members of the equations by the corresponding performance.

Each conversion operation cycle consists of four processes:

$$\left\{ \begin{aligned} T_{mc} \frac{dQ_{mc}}{T_{nc}} &= \left(T_{fa} \frac{dU_{fa}}{T_{fa}} + G_0 T_{tc} \frac{dW}{T_{tc}} \right)_{bmc} + \\ &+ \sum_{n=1}^m \left(T_{ia} \frac{dU_{ia}}{T_{ia}} + G_0 T_{lp} \frac{dW}{T_{lp}} \right)_{amcn}, \end{aligned} \right. \quad (22)$$

$$\left\{ \begin{aligned} T_{sv} \frac{dV_{sv}}{T_{sv}} &= \left(T_{tc} G_0 \frac{dW}{T_{tc}} + T_{D_0} W_0 \frac{dG}{T_{D_0}} \right)_{bsn} + \\ &+ \sum_{n=1}^m \left(T_{ia} G_0 \frac{dW}{T_{ia}} + T_{np} W_0 \frac{dG}{T_{np}} \right)_{asvn}. \end{aligned} \right. \quad (23)$$

As a result, we obtain the systems of equations in variables such as performance T and entropy S :

$$\left\{ \begin{aligned} T_{mc} dS(Q_{mc}) &= (T_{fa} dS(R_{U_{fa}}) + T_{tc} dS(R_W))_{bmc} + \\ &+ \sum_{n=1}^m (T_{ia} dS(R_{U_{ia}}) + T_{lp} dS(R_W))_{amcn}, \end{aligned} \right. \quad (24)$$

$$\left\{ \begin{aligned} T_{sv} dS(V_{sv}) &= (T_{tc} dS(R_W) + T_{D_0} dS(R_G))_{bsn} + \\ &+ \sum_{n=1}^m (T_{ia} dS(R_W) + T_{np} dS(R_G))_{asvn} \end{aligned} \right. \quad (25)$$

or

$$\left\{ \begin{aligned} T_{mc} dS(Q_{mc}) &= (T_{fa} dR_{U_{fa}} + T_{tc} dR_W)_{bmc} + \\ &+ \sum_{n=1}^m (T_{ia} dR_{U_{ia}} + T_{lp} dR_W)_{amcn}, \end{aligned} \right. \quad (26)$$

$$\left\{ \begin{aligned} T_{sv} dS(V_{sv}) &= (T_{tc} dR_W + T_{D_0} dR_G)_{bsn} + \\ &+ \sum_{n=1}^m (T_{ia} dR_W + T_{np} dR_G)_{asvn}. \end{aligned} \right. \quad (27)$$

We integrate the parameters in a closed cycle. An integral over a closed contour is equal to zero according to the property of parameters.

$$\left\{ \begin{aligned} T_{mc} \oint dS(Q_{mc}) &= \left(T_{fa} \int_0^{R_G} dR_{U_{fa}} + T_{tc} \int_0^{R_0} dR_W \right)_{bmc} + \\ &+ \sum_{n=1}^m \left(T_{ia} \int_0^{R_{ia}} dR_{U_{ia}} + T_{lp} \int_0^{R_{ia}} dR_W \right)_{amcn} = 0, \end{aligned} \right. \quad (28)$$

$$\left\{ \begin{aligned} T_{sv} \oint dS(V_{sv}) &= \left(T_{tc} \int_0^{R_0} dR_W + T_{D_0} \int_0^{R_0} dR_G \right)_{bsn} + \\ &+ \sum_{n=1}^m \left(T_{ia} \int_0^{R_{ia}} dR_W + T_{np} \int_0^{R_{ia}} dR_G \right)_{asvn} = 0. \end{aligned} \right. \quad (29)$$

As a result, we obtain the equilibrium property of operation and innovation cycles.

$$\left\{ \begin{aligned} (T_{fa} R_G + T_{tc} R_0)_{bmc} + \sum_{n=1}^m (T_{ia} R_{ia} + T_{lp} R_{ia})_{amcn} &= 0, \quad (30) \\ (T_{tc} R_0 + T_{D_0} R_0)_{bsn} + \sum_{n=1}^m (T_{ia} R_{ia} + T_{np} R_{ia})_{asvn} &= 0. \quad (31) \end{aligned} \right.$$

The systems of dependences and equations describe the equilibrium of the processes in manufacturing and innovation cycles:

$$dQ_{amc} = dU_{ia} + (G_0 dW)_{lp}, \quad (32)$$

$$T_{amc} \frac{dQ_{amc}}{T_{amc}} = T_{ia} \frac{dU_{ia}}{T_{ia}} + T_{lp} \frac{G_0 dW}{T_{lp}}, \quad (33)$$

$$T_{amc} dS_{amc} = T_{ia} dS_{ia} + T_{lp} dS_{lp}, \quad (34)$$

$$S_{amc} = \frac{Q_{amc}}{T_{amc}} = \frac{U_{ia}}{T_{ia}} + \frac{G_0 W}{T_{lp}} = R_{Gi} + R_{0i}, \quad (35)$$

$$dS_{amc} = dR_{Gi} + 0, \quad (36)$$

$$Q_{mc} = (T_{fa} R_G + T_{ia} R_{Gi}) + (T_{tc} R_0 + T_{lp} R_{0i}), \quad (37)$$

$$Q_{mc} = U_{mf} + C_{tc}. \quad (38)$$

Organization of production and management accounting in engineering business. Fig. 4 presents a flowchart of the production organized based on transferring technological costs and consumer properties in the form of market value within technological stages that are also zones of financial liability.

Basic manufacturing capital Q_{bmc} is converted into monetary capital in the form of products being the first technological stage. Monetary capital in each technological stage is equal to the sum of basic sales value V_{bsv} and market added sales value V_{asv} . Finally, the product market value is equal to the sum of the basic sales value and the added market sales value from all technological stages.

This production organization in the form of monetary equivalent is the management accounting system.

Conclusions

1. The integrated set of added value tools in engineering business controlling includes:

- production organization by transferring technological costs and the products' consumer properties (market value) within technological stages that are at the same time the zones of financial liability;

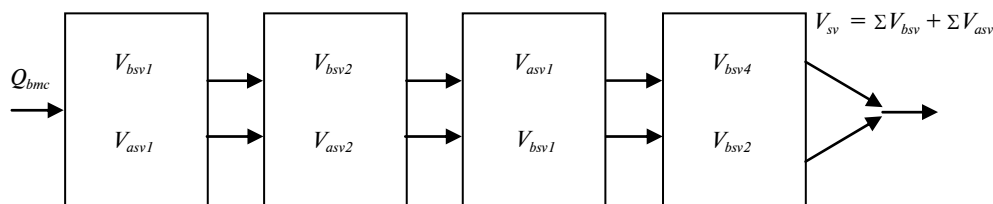


Fig. 4. Production organization and management accounting within the technological stages that are zones of financial liability

– management accounting system controlling the production organization in monetary equivalent;

– innovation activity by implementing product, technological and allocation innovations ensuring that the cost of manufactured products is equal to the market price.

2. Studies of the conversion operation cycles in engineering business allow us to formulate the following main properties:

2.1. Each technological stage should have market value. Only in this case the final product will have market cost.

2.2. Labor payment, net profit for dividends, amortization of intangible assets are in added value.

2.3. Added value of engineering business is a tendency to be equal to the basic cost of products manufactured in the operation cycle of an enterprise.

2.4. Management accounting system is the intellectual property of an enterprise.

2.5. Innovation can only be motivated by personalization of intangible assets.

The use of this integrated set of tools will ensure a continuous increase of the products' added value.

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Статья поступила в редакцию 04.02.18

DOI: 10.18721/JE.11209
UDC 338.1

APPROACH TO ASSESSMENT OF FINANCIAL STABILITY OF INDUSTRIAL ENTERPRISES AS A BASIS OF SUSTAINABLE DEVELOPMENT

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Management of sustainable development of industrial enterprises is the basis of the strategy of sustainable development of Russian economy. Industry is a strategically important sector, which makes it necessary to assess the sustainability of its development. The purpose of this study is to develop tools for assessing the financial stability as a basis of sustainable development of industrial enterprises (using the example of the manufacturing industry) that support the decision-making process. The sustainability depends on the financial status of industrial enterprises. A system of indicators for assessing the financial status of an industrial enterprise was formed. Each indicator was assigned a normative value reflecting the specifics of the industry. A toolkit for forecasting the indicators was created, based on the hypothesis that the level of financial stability is associated with a real option. The approach provides a finite number of states characterized by the ratio of these indicators. The whole set of possible outcomes can be divided discretely depending on the ratio of the studied indicators and their normative values. It is expedient to compare two graphic images: one reflecting the ratio of current indicators and one reflecting the ratio of future indicators. The formulated fixed descriptions of the octant are recommendations for making managerial decisions and serve as tools for the executive staff of the enterprise. The formulated approach is aimed more at assessing sustainability in the short term, as it describes two conditions of financial stability of the enterprise. In this case, development is also characterized by a vector of dynamics of the studied indicators. The distinctive features of the proposed toolkit are as follows: the possibility of obtaining specific recommendations based on assessing the sustainability of the enterprise; the ability to qualitatively evaluate the vector of sustainable development of the enterprise taking into account the external environment, the dynamics of the industry and the current and forecast the financial status of the enterprise; the ability to customize the parameters of the toolkit by changing the regulatory indicators, the depth of retrospection of accounting and financial reporting data, which allows the manager to adapt the toolkit for different categories of tasks and users. However, it is necessary to take into account the limitations of the developed toolkit that can form the basis for further research: the specifics depends on the manufacturing industry, which necessitates industrial diversification of the toolkit; further formalization of the tool by finding approaches to estimating the probability of the sustainable development scenario; taking into account the time factor in the model and constructing a vector of sustainable development.

Keywords: financial stability; sustainable development; industry; octant; financial state; real option

Citation: N.S. Lukashevich, E.A. Konnikov, Approach to assessment of financial stability of industrial enterprises as a basis of sustainable development, St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 92–100. DOI: 10.18721/JE.11209

О ПОДХОДЕ К ОЦЕНКЕ ФИНАНСОВОГО СОСТОЯНИЯ ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ КАК ОСНОВЫ УСТОЙЧИВОГО РАЗВИТИЯ

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Управление устойчивостью развития предприятий является основой стратегии устойчивого развития экономики России. Системообразующий характер промышленности порождает необходимость оценки устойчивости ее развития. Цель исследования — разра-



ботка инструментария оценки финансового состояния как основы устойчивого развития промышленного предприятия (на примере обрабатывающей промышленности), обеспечивающего поддержку принятия управленческих решений. Устойчивость развития промышленности зависит от финансового состояния промышленных предприятий. Сформирована система индикативных показателей оценки финансового состояния промышленного предприятия, каждому из показателей присвоены нормативные значения, отражающие отраслевую специфику. Сформирован инструментарий прогнозирования индикативных показателей, который базировался на гипотезе, согласно которой уровню финансовой устойчивости промышленного предприятия присущи свойства реального опциона. Подход обеспечивает конечное число состояний, характеризующихся соотношением данных показателей. Все множество возможных исходов можно разделить дискретно в зависимости от отношения исследуемых показателей и их нормативных значений. Рациональным для восприятия является сопоставление двух графических изображений: отражающего соотношение текущих показателей и отражающего соотношение будущих показателей. Сформулированные фиксированные описания октанта являются рекомендациями к принятию управленческих решений и служат инструментами управленческого аппарата предприятия. Сформулированный подход в большей степени направлен на оценку устойчивости в краткосрочной перспективе, так как описывает два состояния финансовой устойчивости предприятия. В данном случае развитие также характеризуется вектором динамики исследуемых показателей. Отличительными особенностями предложенного инструментария являются: возможность качественно оценить вектор устойчивого развития предприятия с учетом внешней среды, динамики отрасли и текущего и прогнозного финансового состояния предприятия; возможность настраивать параметры инструментария за счет изменения нормативных показателей, глубины ретроспекции данных бухгалтерской и финансовой отчетности, что позволяет адаптировать инструментарий для различной категории решаемых задач и пользователей. Необходимо учитывать ограничения разработанного инструментария, которые могут стать основой для дальнейших исследований: отраслевая специфика определяется обрабатывающей промышленностью, в связи с чем возникает необходимость отраслевой диверсификации инструментария; целесообразным является дальнейшая формализация инструментария за счет поиска подходов к оценке вероятности сценария устойчивого развития предприятия; учет фактора времени в модели и построение вектора устойчивого развития.

Ключевые слова: устойчивое развитие; промышленность; октант; финансовое состояние; реальный опцион

Ссылка при цитировании: Лукашевич Н.С., Конников Е.А. О подходе к оценке финансового состояния промышленных предприятий как основы устойчивого развития // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 92–100. DOI: 10.18721/JE.11209

Introduction. Management of sustainable development of industrial enterprises is the basis of the strategy of sustainable development of Russian economy. Nowadays, despite the emerging concept of post-industrial economy, industry is still the backbone of Russian economy [5]. The total share of industrial enterprises at the end of 2014 was 23.87 %, and its gross value added was 29.3 % at the end of 2014. The strategically important nature of industry gives reason to assess the sustainability of its development. One of the most significant indicators in this case is the industrial production index. The industrial production index reflects the change in the value created in the production process as a result of real (physical) growth (decrease) in the release of goods, performance of work and the provision of services.¹ Fig. 1 shows the dynamics of this indicator from 1992 to 2015.

¹ The official statistical methodology for calculating the index of industrial production (approved by the order of the Federal State Statistics Service No. 301 of May 8, 2014).

It is clear that in 2015 this indicator fell to a level comparable with that of 2009. In addition, a steady decline of this indicator has been observed since 2010. This dynamics indicates a decline in the level of production and, consequently, a certain degradation of the Russian industry. This statement correlates with the dynamics of depreciation of fixed (production) assets, which has been steadily increasing since 2012.

The manufacturing industry was selected for the study. Bankruptcy of the representatives of the given branch leads to the release of demand in their respective market sectors, which creates opportunities for increased imports or level of monopolization [12]. Despite technological diversity, a significant proportion of industries is characterized by high asset turnover (particularly inventory) and the need for urgent and absolute liquidity, which makes the factor structure of the models for evaluating the financial state an important subject.

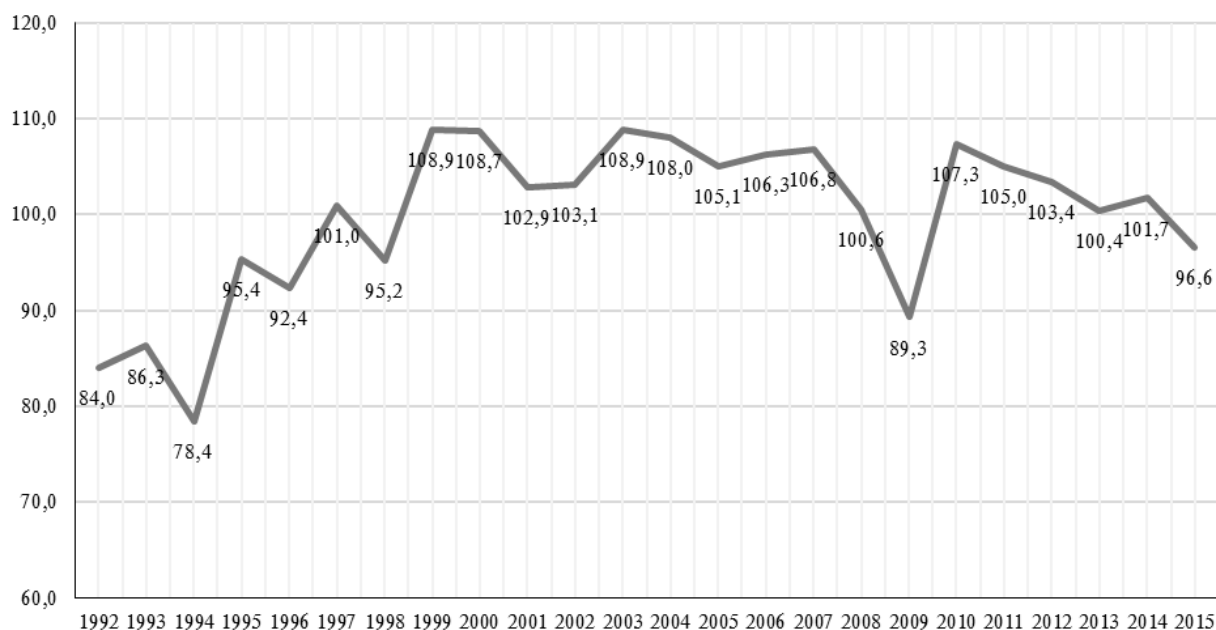


Fig. 1. Dynamics of industrial production index (1992–2015)

The goal of this study is to develop the tools for assessing financial stability as a basis of sustainable development of industrial enterprises (using the example of the manufacturing industry) that support the decision-making process.

The methodology and results of the study. There are many articles considering the analysis of problems and assessment of sustainable development of enterprises [1–4, 7, 13, 15, 16, 18, 20]. For example, Ref. [18] devised and tested a methodology for assessing the sustainability of the development of industrial enterprises by using a generalized indicator. Ref. [20] constructed the economic and mathematical models for planning the sustainable development of industrial enterprises for two types of markets: stable and dynamically changing. The methodological principles of sustainable development of industry and economy are laid down in [16].

In our opinion, the sustainability of the industry depends on the financial state of industrial enterprises. To confirm this assertion, the current study analyzes the correlation between the dynamics of the number of financially insolvent enterprises and the dynamics of the index that objectively reflects the state of the manufacturing industry, for example, using the official statistics on the volume of shipped goods of own production. A significant correlation coefficient value amounted to -0.738 .

We can assume that the tools for assessing the sustainability of industrial enterprises should be based on the models for evaluating financial stability. There are many methods and models for evaluating the financial state of the company; the accuracy of classification and applicability of these models and methods was analyzed in many articles [8–10, 19].

In most articles, researchers based on the collected financial statements of small enterprises (for some industries) to test traditional models of bankruptcy diagnostics of, finding a strong variation of bankruptcy probability estimates. The models of bankruptcy probability estimates based on the traditional ratio analysis may help in diagnosing the financial state, however, with some significant reservations: 1) not only the formally obtained indicator, but a combination of factors (both quantitative and qualitative) that may affect the financial state should be considered; 2) the choice of the model has to take into account the industry specifics of the enterprise; 3) the methodology of evaluation should primarily use such indicators as the level of gearing (debt-to-equity ratio), current assets and current liabilities.

Since none of the classic rating models take into account the characteristics of the external environment in the estimations or use a specialized forecasting method, the scenarios for

sustainable development of the enterprise are constructed by extrapolation.

The following system of indicators has been formed for assessing the sustainability:

- asset turnover ratio for estimating the level of business activity of the enterprise;
- current liquidity ratio for estimating the solvency level of the enterprise;
- ratio of own and borrowed capital for estimating the gearing level.

Each of the indicators in the constructed system yielded lower values for financially insolvent enterprises than for solvent ones, and, according to the review of the literature we have performed [8-10], can be used for estimating the potential bankruptcy of an enterprise.

Current indicators cannot predict the financial strength of the organization with a sufficient degree of probability. The future level of indicators can be predicted identically to calculation of the future option price. It is proposed to use Black-Scholes model as a method of calculation. This approach was proposed and substantiated in [11, 17].

This model was chosen because it allows to take into account the fluctuations of the underlying asset, which in this case is the level of indicators. Moreover, the risk-free interest rate expressing the minimum level of profitability is used within the framework of this model. In real market conditions the inflation indicator determines the minimum level of profitability. Consequently, the price growth index for the goods produced or sold by the enterprise can act as a risk-free interest rate. The mathematical model has the following form [17]

$$C = \frac{SN(d_1)}{Ee^{-rN(d_2)}},$$

$$d_1 = \frac{\frac{\ln S}{E} + \left(r + \frac{\partial^2}{2}\right)}{\partial},$$

$$d_2 = d_1 - \partial,$$

where C is the forecast value of the indicator; S is the numerator (revenue; equity; working capital assets); E is the denominator (total assets; short-term liabilities; loan capital); r is the rate of return (price index); ∂ is the variance of indicator values; $N(d)$ is the cumulative (standard) normal probability distribution; d_1 and d_2 are the standardized normal variables.

According to the model, the external environment is estimated through the indicator of potential profitability (price index) and the risk indicator (of coefficient variance). It is important to determine the number of years for which the accounting data have to be analyzed. This parameter is necessary for determining the level of risk of deterioration of financial state within the framework of forecasting the indicator values under consideration. The price index reflects the minimal growth in profitability in the industry during the current period.

Assessment of risk of losing financial stability of the industrial enterprises is primarily aimed at identifying the current levels and predicting the future levels of the indicators. The transition from estimating the values to making recommendations based on these values will enable a shift from the concept of financial state to the concept of sustainable development. This transition is due to the fact that the vectors of the changes in the key financial indicators can describe the sustainable development of industrial enterprises in a simplified form. The sustainable development (or degradation) of an industrial enterprise could be characterized by the relationship between these vectors for a certain period.

If these vectors are represented in the form of a time series of relative indicators characterizing the change of some characteristic of the financial state of the enterprise, and the derivative functions describing this time series will be greater or equal to zero that means that the enterprise is developing steadily. Otherwise, there has been a steady degradation of the enterprise. Thus, the variance of values plays a considerable role in each time series. Significant fluctuations of a negative nature mean that the development of the enterprise cannot be described as stable. Consequently, the sustainability of the enterprise for a certain period can be characterized by the following elements: functions describing the dynamics of the parameters and their variances (fluctuations). Sustainable development reflects the dynamics taking into account the external environment instead of a momentary state.

The assessment of sustainable development of an industrial enterprise in the short-term period is significantly different, since a time series consisting of two indicators (values) is statistically insignificant. The developed approach is aimed rather at assessing sustainability in the short-term

period, as it describes two conditions of financial stability of the enterprise. In that case, a vector of the dynamics of the indicators under consideration also characterizes sustainable development.

The approach operates with the data of the current and future periods, therefore, the current and future level of financial state is characterized by an identical (in terms of content) set of indicators. Since this technique implies correlating identical indicators and their normative values, sustainable development can be characterized by three relationships:

- ratio of the current and the future level of asset turnover and its normative value;
- ratio of the current and the future level of current liquidity and its normative value;
- ratio of the current and the future level of ratio of own and borrowed capital and its normative value.

The normative values of the indicators are determined empirically for each industry (based on statistics) and can be adjusted depending on the category of enterprise, industry, risk preferences, decision-making process in the company and other factors. Based on cluster analysis, a method was developed for finding the 'average' (normative) recommended values of financial indicators for different groups (clusters) of organizations [19].

Thus, the formulated approach has a finite number of states characterized by a correlation of these indicators. The whole set of possible outcomes can be divided discretely depending on the ratio of the studied indicators and their normative values. The comparison of two graphic images reflecting the ratio of current indicators and reflecting the ratio of future indicators is rational for perception. The approach regards the financial stability of an industrial enterprise as a set of its three characteristics, expressed by three indicators. Therefore, the generated graphical toolkit assumes three dimensions. Each of the axes is divided by a perpendicular into two areas. This perpendicular is determined by the normative values of the indicators. Thus, each of the two graphic tools forms eight sectors that characterize one of the states of financial stability in the current or future period. Since the sectors are formed by dividing the space into three mutually perpendicular planes, from a geometric point of view they can be called *octants*.

Comparing the current and projected octants of financial stability allows to make a transition to the characteristic of sustainable development of the enterprise. Graphically, this comparison is possible by extending the formed axes to their negative areas, thus forming the same set of octants. Inserting the current octant of financial stability into area I (x is positive, y is positive, z is positive), and the octant of predicted financial stability into area VII (x is negative, y is negative, z is negative), we obtain a graphical tool reflecting the predicted change in financial stability for the current period.

If the dynamics is recorded discretely in accordance with the normative values, there are 64 states in total. Since each of the conditions is characterized by certain characteristics of both the external and internal environment of the enterprise, recommendations can be formulated regarding the decisions needed to improve the current situation and the possible change in the projected level of financial stability. Fig. 2 shows the octant of sustainable development.

The areas colored in red (dark gray) indicate the values below the normative ones. Green areas (gray) constitute the entire set of values of the studied indicators that are above the normative ones. Plotting the data on the axis of the octant generates new areas characterizing the current and projected level of financial stability of the industrial enterprise. These areas are colored in yellow (light gray). Current values of the studied indicators are denoted by the letters A , B and C , while their predicted values are denoted by A' , B' and C' . The point that characterizes the financial stability of an enterprise in the current or future period is the vertex of the formed parallelepiped, the diagonal to which can be drawn from point O .

According to the data of the example shown in Fig. 2, it can be seen that the current values of financial stability indicators of an enterprise exceed normative ones, which makes it possible to characterize the enterprise as financially stable. However, all predicted values of the considered indicators are below the normative ones, therefore, the enterprise (in accordance with the environmental conditions) will lose its financial stability in the forthcoming period. Consequently, in that case it is not a question of sustainable development, but of sustainable degradation of the enterprise

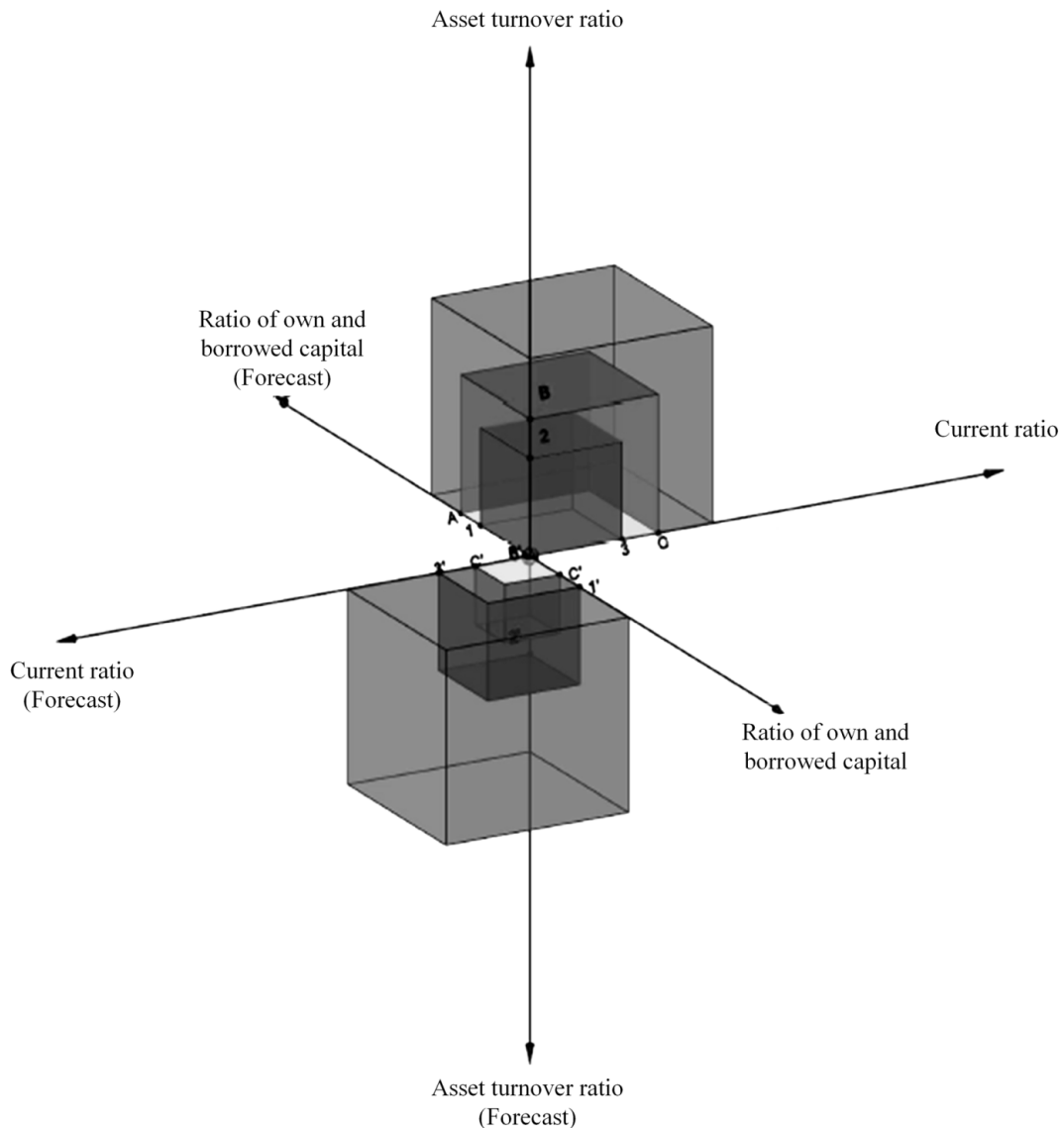


Fig. 2. Octant of industrial enterprise sustainability

The formulated recommendations can be divided into several groups taking into account the obtained state of sustainable development:

1. First-order recommendations. The enterprise should strengthen control and increase the level of current liquidity, the level of asset turnover and debt-to-equity ratio.

2. Second-order recommendations. The enterprise should increase revenues with a relatively smaller increase in current assets, reduce short-term and long-term liabilities and increase own capital.

3. Third-order recommendations. The enterprise should reduce the overall duration of the production cycle, improve the production technology and its

organization, reduce labor intensity at all stages of the production process, improve supply and demand conditions, improve the system of payment, reduce the share of profits directed at unproductive purposes, reduce the number of investment projects financed by borrowed capital, replace short-term loans attracted for investment purposes, minimize the stock of unfinished production, revalue non-current assets, sell parts of unclaimed non-current assets and increase the contributions of founders to the assets of the enterprise.

Thus, the applied graphic tool allows to characterize the level of stability of the development of an industrial enterprise and to formulate a set of recommendations for each state.

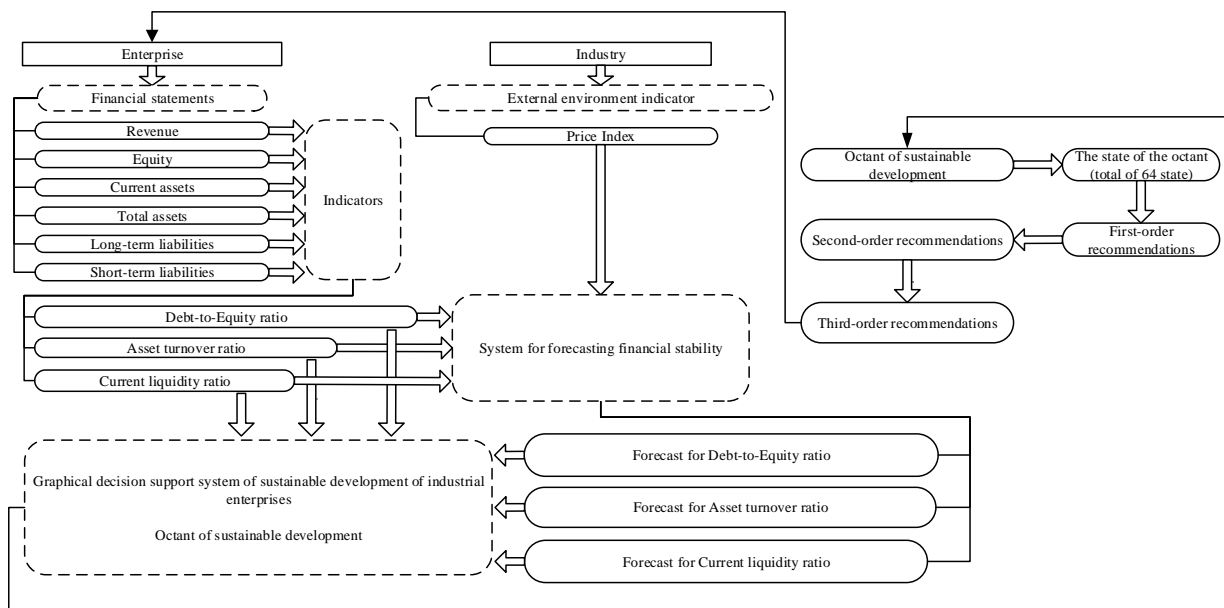


Fig. 3. Algorithm for assessment of sustainable development

The set of recommendations consists of four consecutive elements:

1. Description of the state of the octant. Description of the state of the octant. At this level, the sustainability of enterprise development is characterized by a description of the current and projected levels of financial sustainability.

2. First-order recommendations. The direction of increasing the stability of the enterprise within the context of considered indicators is specified.

3. Second-order recommendations. These recommendations are aimed at determining specific financial indicators of the enterprise, which require strengthening the control and effort towards increasing or decreasing these indicators quantitatively.

4. Third-order recommendations. These recommendations are final. Within this block, specific actions are taken to implement the second-order recommendations.

The formulated fixed descriptions of the octant are recommendations for making managerial decisions and serve as tools for decisions support. Fig. 3 shows the algorithm for developing recommendations for the sustainability of an industrial enterprise.

Conclusions. The practical importance of the developed approach is in solving the following tasks from the point of view of various users of the tool: 1) with respect to the debtors of the

enterprise, the toolkit allows assessing the risk of losing their financial stability; 2) with respect to the management of the enterprise, the toolkit allows obtaining a qualitative assessment of the vector of sustainable development and recommendations for developing the enterprise and minimizing the impact of crisis situations; 3) with respect to the banking sector, the toolkit can be the basis or an additional tool for credit risk assessment.

The distinctive features of the proposed toolkit are as follows: 1) the possibility of obtaining specific recommendations based on assessing the sustainability of the enterprise; 2) the possibility of qualitatively evaluating the vector of sustainable development of the enterprise, taking into account the external environment, the dynamics of the industry and the current and the predicted financial state of the enterprise; 3) visualization of the results, allowing to present the directions of changes graphically; 4) the possibility to customizing the parameters of the toolkit by changing the regulatory indicators, the depth of retrospection of accounting and financial reporting data, which allows to adapt the toolkit for different categories of tasks and users.

However, it is necessary to take into account the limitations of the developed toolkit, which can form the basis for further research: 1) the specifics is determined by the manufacturing industry, which necessitates industrial diversification of the toolkit; 2) further formalization of the tool



by finding approaches to estimating the probability of the sustainable development scenario; 3) taking into account the time factor in the model and constructing a vector of sustainable development; 4) expansion of the

pool of factors by adding factors that are non-financial in nature to the toolkit.

Грант Президента Российской Федерации для государственной поддержки молодых российских ученых – кандидатов наук, проект МК-1822.2017.6.

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Статья поступила в редакцию 01.11.17

DOI: 10.18721/JE.11210
UDC 08.00.05

RESTRUCTURING OF A LEGAL ENTITY BY SPIN-OFF AND CREATION OF SUBSIDIARY ENTERPRISES AS BUSINESS DEVELOPMENT

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The article considers the problem of business restructuring through reorganization of commercial corporate organizations in the form of spin-off and creation of subsidiary economic companies. The analysis showed that the choice and appropriateness of restructuring methods is not obvious (in some cases it is preferable to reorganize the legal body in the form of a spin-off, and in some to establish a subsidiary). We have discussed the issues of the authorized capital formed by the legal entity, the fair distribution of assets and liabilities between the reorganized and newly created entities. These issues are considered for the main organizational and legal forms of entrepreneurial activity that are commercial corporate organizations, primarily for the most common of them, limited liability companies (LLCs). The advantages and disadvantages of each of the mechanisms were discussed. These mechanisms or their elements are often confused in practice and even in publications, so we have deemed it necessary to understand what the spin-off of a company means in reorganization, and what is the creation of a subsidiary economic company, and also to compare them and give recommendations on their application. The article systematizes the goals of restructuring, provides a comparative description of these methods of restructuring and recommendations for their application. One of the most urgent problems of reorganization of companies in the form of spin-off is considered, i.e., the formation of authorized capital of the newly created company. The issue of forming authorized capital during spin-off reorganization is the most common organizational and legal form for limited liability companies (LLCs), which by various estimates account for more than 90 % of all commercial organizations in Russia. The main focus was on the difference in restructuring of an LLC by creating subsidiaries and spin-off reorganization, options for forming the authorized capital of the newly created companies, the distribution of rights and obligations between the reorganized and established companies. The results obtained in this study will allow entrepreneurs to understand the problem, make the right decision when choosing the method of restructuring, avoid mistakes in the reorganization primarily when forming authorized capital and distributing the rights and obligations that may affect taxation and relationships with counterparties and founders. Tax officers and auditors can use the recommendations in the paper to understand what to focus on during inspections of reorganized and established economic societies.

Keywords: business restructuring; reorganization by spin-off; subsidiary enterprise; authorized capital

Citation: A.A. Zakirova, V.A. Dubolazov, Restructuring of a legal entity by spin-off and creation of subsidiary enterprises as business development, St. Petersburg State Polytechnical University Journal. Economics, 11 (2) (2018) 101–108. DOI: 10.18721/JE.11210

РЕОРГАНИЗАЦИЯ ЮРИДИЧЕСКИХ ЛИЦ В ФОРМЕ ВЫДЕЛЕНИЯ И СОЗДАНИЕ ДОЧЕРНИХ ПРЕДПРИЯТИЙ КАК СПОСОБЫ РАЗВИТИЯ БИЗНЕСА

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Рассматривается проблема реструктуризации бизнеса путем реорганизации коммерческих корпоративных организаций в форме выделения и создания дочерних хозяйственных обществ. Анализ показал неочевидность вопросов выбора способа рест-

руктуризации бизнеса (т. е. когда лучше реорганизация юридического лица в форме выделения, а когда учреждение дочернего предприятия), их целесообразность. Рассмотрены дискуссионные вопросы формирования уставного капитала создаваемых юридических лиц, справедливого распределения активов и пассивов между реорганизуемым и вновь создаваемыми юридическими лицами. Эти вопросы рассмотрены для основных организационно-правовых форм предпринимательской деятельности — коммерческих корпоративных организаций, в первую очередь, для наиболее распространенных из них — обществ с ограниченной ответственностью. Рассмотрены преимущества и недостатки каждого из механизмов. На практике и в публикациях часто эти механизмы или их элементы путают, поэтому возникла необходимость разобраться, что такое выделение хозяйственного общества при реорганизации, а что — создание дочернего хозяйственного общества, сравнить их и дать рекомендации по применению. Систематизированы цели реструктуризации, даны сравнительная характеристика указанных способов реструктуризации и рекомендации по их применению. Рассмотрена одна из наиболее актуальных проблем реорганизации хозяйственных обществ в форме выделения — формирование уставного капитала создаваемого общества. Вопрос его формирования при реорганизации в форме выделения рассмотрен для наиболее распространенной организационно — правовой формы корпоративных коммерческих организаций — для обществ с ограниченной ответственностью, которые по различным оценкам составляют в России свыше 90 % всех коммерческих организаций. Главное внимание уделено различию реструктуризации таких обществ путем создания дочерних предприятий и реорганизации в форме выделения, а также вариантам формирования уставного капитала вновь созданных обществ, распределения прав и обязанностей между реорганизуемым и создаваемыми хозяйственными обществами. Полученные результаты позволят предпринимателям понять проблему, принять правильное решение при выборе способа реструктуризации, избежать ошибок при реорганизации, в первую очередь, при формировании уставного капитала и распределении прав и обязанностей, которые могут сказаться на налогообложении и взаимоотношениях с контрагентами и учредителями; налоговикам и аудиторам подскажут, на что надо обратить внимание при проверках реорганизованных и созданных хозяйственных обществ.

Ключевые слова: реструктуризация бизнеса; реорганизация в форме выделения; дочернее предприятие; уставный капитал

Ссылка при цитировании: Закирова А.А., Дуболазов В.А. Реорганизация юридических лиц в форме выделения и создание дочерних предприятий как способы развития бизнеса // Научно-технические ведомости СПбГПУ. Экономические науки. 2018. Т. 11, № 2. С. 101–108. DOI: 10.18721/JE.11210

Introduction. Nowadays, especially in the current financial and economic crisis, many legal entities (LEs) use various methods of restructuring the business, including by reorganizing the LE in the form of spin-off or establishing subsidiaries in order to develop and improve their performance.

This problem has been given much attention in legislation, judiciary decisions, in publications of researchers [1–3] such as Vertakova, Baranova, Fertseva, Isaeva, Sozinova and many others. Their analysis shows that the choice of the way to restructure the business and its appropriateness is not obvious. There is also much discussion around the issues of forming authorized capital of the newly created LEs.

Goal of the study. The goal of this article is to analyze restructuring methods (reorganization by spin-off and creation of subsidiary enterprises), determine the best way of restructuring for limited

liability companies as the most popular commercial structure. We have also analyzed the methods of creating authorized capital of new enterprises (for limited liability companies) and distributing assets and liabilities between the participants of restructuring.

Methodology of the study. The main goal of any business restructuring is improving the efficiency, which is achieved by business development, strengthening the company's positions on the market, cost cutting, reallocation of corporate control, etc. It is sometimes necessary to break up the corporation into smaller units at a certain level of its development [4].

The general goals of business restructuring by spin-off or creating subsidiary enterprises are:

promotion to other markets under a new name (promotion of a new brand);

elimination of secondary activities in order to increase the specialization of the LE;

rapid adaptation to the changing conditions of local markets, the possibility to influence them quickly;

creation of a group of LEs from one company, each acting independently, the failures of one LE may be compensated by the successes of others;

optimization of management and financial and economic activities by transforming the structural divisions of the reorganized LE into independent ones, strengthening the responsibility and motivation of their management and the entire team in improving their performance;

reduction of tax payments through various taxation systems (simplified taxation, uniform tax on imputed income, unified agricultural tax) for different types of established LEs, as well as through registration of the LEs in regions with preferential taxation;

tendency towards independence among the participants of the LE;

distribution of business between disagreeing or even mutually hostile participants of the LE;

withdrawal of assets from the LE in the interests of the main participants or top managers seeking independence;

creation of LEs unburdened with debts of the LE being reorganized;

protection from hostile takeover: a business distributed between LEs which engage in different types of activities is much more difficult to take over than one LE.

Sometimes unethical entrepreneurs use business restructuring for default on commitments by [5]:

withdrawal of the most liquid assets or disproportionate distribution of assets and liabilities in the course of reorganization, transfer of liabilities provided only by illiquid assets and accounts receivable to the newly created LEs;

transfer of liabilities and illiquid assets to which the bankruptcy procedure will be applied in the future to the newly created LE, in order to avoid the bankruptcy of the entire LE;

allocation of liquid assets of the LE for subsequently selling them through selling the newly established LEs;

tax evasion or unjustified reduction of taxes.

There are two ways of creating a new company: during restructuring of a legal entity by spin-off and by creating subsidiary enterprises. The latter is not restructuring because the

subsidiary company does not obtain any rights and obligations of the main enterprise.

Both of these methods have their advantages and disadvantages. These mechanisms or their elements are often confused in practice, and in publications, so we consider it necessary to understand what is the spinoff of a company in reorganization, and what is the creation of a subsidiary company; we are also going to compare these methods and give recommendations on their application.

1. The common trait of both restructuring methods is that they result in the emergence of two or more new independent companies which have their own property and management bodies, are liable for debts by their property, have rights and duties, etc. Subsidiary enterprises are not liable for debt of the parent company like enterprises created during reorganization by spin-off are not liable for debt of the reorganized company.

There are also some differences between these methods. A reorganized company is not liable for debt of the enterprises created during reorganization by spin-off [6], but the parent company is liable for debt of subsidiary enterprises together with them, if these debts appear in the line of duty, or if the subsidiary enterprise is out of business by fault of the parent one. The parent company is also liable for debt of subsidiary enterprises if it took part in making the decision (item 2 section 67/3 of the Civil Code of the Russian Federation as amended by the Federal Law no. 99 of 05.05.2014).

The reorganized company can give up its liability to the new company created by spin-off. In this case a new company is liable to former creditors of the reorganized company [7]. Both of these companies are also liable to former creditors of the reorganized company if the creditors demanded to accelerate the fulfilment of obligations or discharge of obligation and payment of damages but their demand was not satisfied (item 3 section 60 of the Civil Code of the Russian Federation). This applies to the case when it is impossible to identify the liability cessionary or when assets and liabilities were shared in bad faith and it lead to violation of the creditors' interests (item 5 section 60 of the Civil Code of the Russian Federation).

Summarizing the above, creating subsidiary enterprises is more advantageous than reorganization

by spin-off from the standpoint of transfer of rights and obligations.

2. The next common point is the transfer of assets by the restructured company to new companies in both methods [8].

The parent company is the unique founder of the subsidiary and creates its authorized capital with own property, getting liability rights in return. In this case the net value of assets and liabilities of the founder is permanent.

The parent company transfers a part of its assets to its subsidiary company and accounts for it as financial investment in authorized capital [9]. In case of reorganization by spin-off the balance sheet accounts of the reorganized company are cut by the transfer deed. This can spoil the image of the reorganized entity and cause suspicion among contractors about the deterioration of its financial situation.

Summarizing the above, creating subsidiary enterprises is more advantageous than reorganization by spin-off from the standpoint of investment potential and capitalization growth [10].

3. A subsidiary company is not liable for the debts of the parent company. The latter does not cut its debts, and this impairs the financial stability of the company. In the other method, the reorganized company transfers both rights and liabilities, including a part of receivables and payables, to the new company by the transfer deed.

There are no requirements and recommendations regarding the value of the transferred to the new company. However, the debts to the state budget and non-budgetary foundations of taxation and revenue are not transferred (item 8 section 50 of the Tax Code of the Russian Federation).

From the standpoint of allocation of receivables and payables, reorganization by spin-off is more advantageous than creating subsidiary enterprises.

4. Companies created by spin-off are connected to each other and, as a rule, have no interest in offering assistance to each other [11]. The parent and the subsidiary companies are a group of connected legal entities which help each other in different legal, economic and investment issues, which increases the stability of all companies in the corporate group.

Summarizing the above, creation of subsidiary enterprises is more advantageous than reorganization by spin-off.

5. The decision to reorganize the company by spin-off is made by its participants who have both common and preference stocks. In a limited company, the decision is made by a general shareholder meeting where s voters made such a decision. In a limited liability company, this decision is made by all participants unanimously.

In the reorganization process, it is necessary to inform the Federal Tax Service, which makes a note in the National Register of Legal Entities, and the creditors, make an announcement in mass media and on the Internet, send the data on the activities of legal entities to the unified federal register of information . It is not necessary in case of creation of a subsidiary company [12].

Creation of a subsidiary company is a unilateral contract and can be made by the decision of executive office or board of management, except for the case when the deal is very large. There is no transfer act in the process. The parent company does not transfer any rights and liabilities to its subsidiary.

Summarizing the above, creation of subsidiary enterprises is more simple and less expensive than reorganization by spin-off.

6. Shareholders who voted against the reorganization of the public company or did not vote at all can demand that the company buy out their shares by real cost or be shareholders of each of the new companies [13]. In a limited liability company, the decision about reorganization must be made unanimously.

Restructuring by spin-off is simpler, as shareholders of the parent company cannot demand for their stocks to be bought out. Majoritarian participants keep their influence in the subsidiary through the main company.

7. Shareholders of a subsidiary are participants of the parent company. Therefore, when distributing the net profit of a subsidiary, only the parent company will receive dividends, and its participants receive only dividends of the parent company, if such dividends are generated. In case of spin-off, participants of the reorganized company can have shares in authorized capital of the new company. That is why reorganization by spin-off is more advantageous than creation of subsidiary enterprises, especially for minority participants. While a parent company can sale its shares of authorized capital of the subsidiary to any parties, including its participants, but the



participants of the parent company do not have any preferential rights in buying the shares.

8. Participants of a company organized by spin-off can keep their rights to run the new companies only if the company charter, approved by the shareholders' general meeting of the reorganized company, allows it. Participants of the parent company can keep controlling the subsidiary companies through introducing their own representatives into their management bodies.

From the standpoint of conflict resolution between business partners, reorganization by spin-off is better than the creation of subsidiary enterprises. It is really difficult to solve some problems in a corporation with parent and subsidiaries companies [14].

In general, the method or restructuring depends on the specific situation.

There are several types of reorganization, they are split-up, spin-off, takeover, merger and reformation. Many specialists we agree with consider that spin-off is the most complicated form, especially forming the authorized capital, distribution of assets and liabilities between reorganized and new companies. There are some variants of forming authorized capital of a new company created by spin-off. The same cannot be said for other form of reorganization.

Let us consider the formation of authorized capital for a limited liability company created by spin-off. Limited liability companies make up about 90 % level of all commercial companies. The result of reorganization of a limited liability company by spin-off is the creation of one or several new companies which gain some rights and liabilities according the transfer deed. The reorganized company continues to operate (item 4 of section 58 of the Civil Code of the Russian Federation, item 1 of section 55 of Federal Law about the Limited Liability Company).

There are some legal restrictions about the creation of authorized capital. Its value cannot be less than 10,000 rubles, net assets of the company must be more than its authorized capital.

Authorized capital of a new company is paid by the founders. Asset holdings of the company created by spin-off are formed from the assets of the reorganized company according to the transfer deed [15]. There is no connection between the transfer of assets by way of

succession and forming the authorized capital of the company created by spin-off [16].

The current legislation forbids any pays for the shares in authorized capital in case of reorganization. It is incorrect to say that the authorized capital of the company created by spin-off is paid by the participants of the reorganized company. The result of spin-off is the creation of a new independent company without any assets of the reorganized company [17]. If the founder decides to form authorized capital of the subsidiary using the property of the reorganized company and this property is transferred as payment for this capital without any changes in the authorized capital of the reorganized company, this transfer of property is a financial investment of the reorganized company and share capital payment of a new company (item 39 of Practice Advisory of formation of financial statements during reorganization (approved by the Order of the Ministry of Finance of the Russian Federation No. 44n of 20.05.2003)).

The main options of forming the authorized capital of a limited liability company created by spin-off are:

1. Authorized capital of the company created by spin-off is formed by reducing the capital of the reorganized company. The value of participants' shares in the capital of the reorganized company stays the same but its nominal cost is changed. In this case it is possible to convert the shares from the capital of the reorganized company to the capital of new company proportional or in a different way according to the decision about reorganization.

2. Authorized capital of the new company is created from the capital share of a specific participant. The other part of the capital is divided between other participants. It leads to a reduction in the capital of the reorganized company. This way is suitable for business separation between partners, for example, when one of the participants of the reorganized company converts their share to the share of the new company and stops being a participant of the reorganized company.

3. One part of capital of the new company is assigned to the reorganized company and other parts are shared between its participants. It is possible to assigned the whole authorized capital to the reorganized company.

4. Authorized capital of the new company is created by an internal fund without the capital of the reorganized company, that is, retained earnings and added capital. This way, the participants of the reorganized company become the participants of the new company. The reorganized company can take a stake in the new company.

The process of forming the authorized capital in such a way is the following. Firstly, the capital of the reorganized company is expanded by retained earnings and/or added capital, which increases the nominal share cost of the reorganized company by its own capital. After that, the additional share of capital of the reorganized company is added to the capital of the new company and shared between the participants of the reorganized company. As a result, they keep their shares in the reorganized company and get additional shares in the new company. Participants of the new company do not make any contributions and get shares free of charge.

In case of a limited liability company, this process is simpler without the stage of increasing the authorized capital by adding the company's equity. A part of the capital of the reorganized company is turned over to the new company by the transfer deed and moved to its authorized capital. The results of these two variants are the same but the second way does not include the time-consuming and costly procedures of making the decision about changing the authorized capital at a general meeting, notarization, posting the news in mass media, making the changes to the articles of association and the Uniform State Register of Legal Entities, etc.

Shares of the company reorganized by spin-off which are converted to the shares of the new company are not transferred to the new company and compensated immediately upon conversion. It leads to capital reduction of the reorganized company at the moment of creation of the new company. The equity capital of the company created by spin-off is formed by reduction of the capital of the reorganized company.

It is often necessary to revalue the assets for making the additional capital before the reorganization [18].

The authorized capital of the company created by spin-off is made up not of the costs of the property the company obtained by the transfer deed but of the part of the own assets of the reorganized company which was transferred

to the new company [19, 20]. For this reason, if the net asset value of the new company is more than its authorized capital, this difference is retained earnings (accumulated losses) in the opening balance.

It is recommended to form a transfer deed in the end of the financial reference period (year) or at the date of interim accounting reports (quarter, month) on estimation of the property and liabilities transferred by the reorganized company.

According to the Letter of The Ministry of Economic Development and Trade D28i-2105 of 21.07.2015, in case of reorganization of a legal entity in the form of separation, the work experience and the goodwill that can be used for public procurement purposes cannot be transferred to a legal entity created as a result of such reorganization.

Making the decision about reorganization of a limited liability company by spin-off, its general meeting approves the conditions for it, the composition of the founding members of the new company which can include some or all participants of the reorganized company, the value of the authorized capital, the share size of the participants, the procedure for forming the authorized capital, the changes in the charter of the reorganized company (its new edition), the charter of the new company, its collegial and executive body, auditing committee, the transfer deed with the distribution of property, rights and liabilities between the reorganized and new companies, etc.

It is necessary to inform the registration agency about the reorganization, reduction of the capital, changes in the charter, publish the decision in mass media, etc.

Incorporation of a legal entity created by spin-off is possible no sooner than the period of appeal of the decision about reorganization expires, which is 3 months after the note about reorganization has been submitted to the Uniform State Register of Legal Entities (i.4 a.57, i.1 a.60 of the Civil Code of the Russian Federation).

Reorganization by spin-off is considered to be carried out after the last new company created by this reorganization is incorporated (i.4 a.16 of Federal Law no. 129 of 08.08.2001).

Findings of the study.

1. We have performed comparative analysis of such restructuring methods as reorganization by spin-off and creation of subsidiary enterprises.



2. We have determined the criteria of suitability of each method.

3. We have analyzed the main methods of forming the authorized capital for limited liability companies.

Conclusion. We have studied reorganization of companies by spin-off (mainly limited liability companies) and creation of subsidiary companies according to the last changes in legislation. We have focused on the differences between restructurization of LLCs by creation of subsidiaries and reorganization by spinoff. We have determined and analyzed several criteria, such as investment potential and capitalization growth, allocation of receivables and payables, transfer of rights and obligations, conflict resolution between business partners. In general, the method of restructuring depends on the case.

We have also studied some variants of forming authorized capital, distribution of rights and liabilities between reorganized and new companies.

Our findings can help entrepreneurs to understand the problem, make the right decision about the method of reorganization, to avoid some problems when forming the capital and distributing the rights and liabilities which can have an adverse effect on taxation and relationships with contractors and founders; tax officers and auditors can use this information to understand what to focus on during inspections of reorganized and new companies.

Directions for future research. Directions for future research are issues connected with forming the authorized capital of a new legal entity created by all kinds of reorganization, distributing assets during separation, share conversion during all kinds of reorganization apart from reconstruction.

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Статья поступила в редакцию: 15.12.18

Научное издание

**НАУЧНО-ТЕХНИЧЕСКИЕ ВЕДОМОСТИ САНКТ-ПЕТЕРБУРГСКОГО ГОСУДАРСТВЕННОГО
ПОЛИТЕХНИЧЕСКОГО УНИВЕРСИТЕТА. ЭКОНОМИЧЕСКИЕ НАУКИ**

ST. PETERSBURG STATE POLYTECHNICAL UNIVERSITY JOURNAL. ECONOMICS

Том 11, № 2, 2018

Учредитель – Федеральное государственное автономное образовательное учреждение высшего образования
«Санкт-Петербургский политехнический университет Петра Великого»

Журнал зарегистрирован Федеральной службой по надзору в сфере информационных технологий и массовых коммуникаций
(Роскомнадзор). Свидетельство о регистрации ПИ № ФС77-52146 от 11 декабря 2012 г.

Р е д а к ц и я

д-р экон. наук, профессор *В.В. Глухов* – председатель редколлегии,
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E-mail: economy@spbstu.ru

Компьютерная верстка *Е.А. Корнуковой*

Лицензия ЛР № 020593 от 07.08.1997 г.

Подписано в печать 19.04.2018. Формат 60×84 1/8. Бум. тип. № 1.
Печать офсетная. Усл. печ. л. 13,75. Уч.-изд. л. 13,75. Тираж 1000. Заказ

Санкт-Петербургский политехнический университет Петра Великого.
Издательство политехнического университета,
член Издательско-полиграфической ассоциации университетов России.
Адрес университета и издательства: 195251, Санкт-Петербург, ул. Политехническая, д. 29.

УСЛОВИЯ ПУБЛИКАЦИИ СТАТЕЙ

в журнале «Научно-технические ведомости Санкт-Петербургского государственного политехнического университета. Экономические науки»

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