

Strategic management of small innovative enterprises at russian universities: History, experience, current state, and prospects

Gestión estratégica de pequeñas empresas innovadoras en universidades rusas: Historia, experiencia, estado actual y perspectivas

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ABSTRACT:

The aim of the article is to present the results of sociological research into the experience and prospects of strategic management of small innovative enterprises at Russian higher education institutions. The article analyzes statistics and effectiveness of Russian and foreign innovative enterprises, describes their specific features and problems, presents the contents of the systems of strategic management of innovative activity, legal and organizational support of this social phenomenon. The Soviet traditions of record keeping and implementation of new knowledge into production are highlighted and compared with the modern practices in Russia and other countries. The authors substantiate the direct correlation between the effectiveness of innovative activities conducted by enterprises at higher education institutions and the degree of their incorporation into the traditional production of the corresponding region. The article outlines the prospects for small innovative enterprises at Russian higher education institutions against the backdrop of the evolving digital economy and development of electronic information systems.

Keywords: strategic management, small innovative enterprise, education

RESUMEN:

El objetivo del artículo es presentar los resultados de la investigación sociológica sobre la experiencia y las perspectivas de la gestión estratégica de pequeñas empresas innovadoras en las instituciones de educación superior rusas. El artículo analiza las estadísticas y la eficacia de las empresas innovadoras rusas y extranjeras, describe sus características y problemas específicos, presenta los contenidos de los sistemas de gestión estratégica de la actividad innovadora, el apoyo legal y organizativo de este fenómeno social. Las tradiciones soviéticas de mantenimiento de registros y la implementación de nuevos conocimientos en producción se destacan y comparan con las prácticas modernas en Rusia y otros países. Los autores fundamentan la correlación directa entre la efectividad de las actividades innovadoras realizadas por las empresas en instituciones de educación superior y el grado de su incorporación a la producción tradicional de la región correspondiente. El artículo describe las perspectivas de las pequeñas empresas innovadoras en las instituciones de educación superior rusas en el contexto de la evolución de la economía digital y el desarrollo de los sistemas de información electrónica.

Palabras clave: gestión estratégica, pequeña empresa innovadora, educación

1. Introduction

Nowadays the countries that have developed and are implementing strategic planning of scientific activity prove to be more successful than others. For example, analysis of scientific literature shows that up to 90% of gross domestic product (GDP) growth in the USA is provided by innovative knowledge and technologies. The share of high-technology products in the Russian GDP amounts only to 3% (Russian statistics yearbook, n.d., p. 468).

Observation shows that modern management of innovative activity at Russian higher education institutions and specialized organizations does not lead to the desired effect.

It is assumed (**the hypothesis of the research**) that only strategic management of small innovative

enterprises at higher education institutions will allow implementing results of scientific work conducted by research staff members of these institutions quickly and effectively.

It is a well-known fact that scientific achievements that introduce systematic changes in social development are the result of an effort undertaken by fundamental science. The main task of applied spheres is to speed up the implementation of new knowledge into various systemic elements of the society. International practice testifies that creative, initiative and entrepreneurially inclined people, who formed work collectives analogous to small innovative enterprises (SIEs) traditionally set up at various scientific and educational organizations and research-and-production complexes, have always been and remain an integral component encouraging implementation of applied knowledge.

Strategic management represents science-based complex work aimed at the assessment of the situation, goal setting, forecasting, planning and programming of SIE development in Russia (Federal law of the Russian Federation no. 172-FZ, 2014).

Analysis of the current state of the SIEs scope of activity (higher education institutions infrastructure, research and development, requirements of the market) shows that there are still resources and room for improvement in the quality of strategic management of the innovative activity in Russia.

2. Methods

Theoretical and methodological background to this article is represented by theories of strategic management of development and implementation of innovations; theories about the history of education in Russia; provisions of the theory of social management; results of economic, political and geopolitical research, motivation theories, etc.

In the course of the study of the essence, subject matter and practices involved in the process of management of SIEs at higher education institutions in Russia, theoretical methods (analysis, synthesis, comparison, analogy, induction, deduction, idealization, modeling) and empirical methods (survey, expert review, documents analysis, biographical method, observation, secondary analysis of humanities research findings and others), as well as SWOT and PEST methods of analysis, were used to ensure accuracy and verification of the findings. An integrated approach involving systematic, structural and functional analysis has been employed in the paper.

3. Results

Strategic management on the socially-traditional level has existed ever since the human society first appeared. Many studies (Demchenko, Gostev, 2014; Gostev, 2018; Tyrko, Gostev, 2018; Shtchepansky, Gostev, Turko, 2016) have proved that, for example, at the end of the 19th century, a Russian peasant had higher chances of going to university compared with his English or French counterparts. Development of higher technical education was under the personal control of Tsar Nicholas II, who issued corresponding decrees and invested some funds of his own into this sphere. He founded several universities, a number of institutes, and set up new departments in existing universities. At the turn of the 20th century, Russia "left behind the Western European courtiers in terms of the number of higher education institutions and between 1904 and 1914 became the world leader in technical education (along with the USA), having surpassed Germany" (Demchenko, Gostev, 2014, p. 10). It proves that the organization of strategic management of the Russian education system used to be optimal and successful. By the beginning of 1917, there were 12 Imperial Universities functioning in Russia, five of which were established in the first years of the reign of Alexander I (beginning of the 19th century). Results of the conducted analysis of scientific literature (Demchenko, Gostev, 2014; Tyrko, Gostev, 2018; Shtchepansky, Gostev, Turko, 2016) lead to the conclusion that by the beginning of the 18th century, prototypes of SIEs were established within Russian universities. They represented technical research units, experimental laboratories dealing with organic and analytical chemistry, astronomical observatories, etc. Research activity in such institutions was carried out by professors, teachers and students. Russian education practice of the end of the 19th century encouraged the emergence of organizations that became prototypes of modern research and development institutions: Arminov Brothers Petrographic Institute, P.P. Palminsky "Surface and Subsoil Resources" Institute, Moscow Institute of Experimental Medicine (where I.P. Pavlov worked). At the same time, industrial laboratories and bureaus were purposefully established (Obukhov and Putilov plants) (Gostev, 2018, p. 166), which is indicative of the effectiveness of the Russian strategic management of scientific innovative activity at that period in history. Thus, such activity is common socio-economic practice, which has never stopped, but succeeds only when state strategic management thereof is organized. One example of large-scale activity aimed at establishing a scientific educational center is St. Petersburg Polytechnic University, which was founded in 1902. At that time, the complex was located in a spacious place and included academic blocks, workshops, dormitories, and a canteen. This long-standing educational tradition has been preserved in Russia and nowadays it is undergoing further development. For instance, the center has recently been expanded and now includes a technological institute where research of 3D printing is carried out (Gostev, 2018, p. 168).

Results of innovative activity (RIA) at manufacturing plants were improved by efficiency experts and inventors, whose activities were regulated by another strategic document — the Decree "Regulation on Inventors" issued by the Council of People's Commissars of RSFSR June 30, 1919. As a result of its implementation, by 1932, the All-Soviet Union Voluntary Society of Innovators and Inventors had been formed, and on May 10, 1934, the All-Union Central Executive Committee adopted the resolution "On supporting the development of inventions and

innovations at plants" in order to make the provisions of strategic management more specific.

Over the years following World War II, the number of such specialists (innovators and inventors) started growing due to "strengthening of the ties between innovators and inventors, on the one hand, with scientists working at higher education institutions, on the other hand" (Chernyavskii, 1954, p. 18).

By incorporating the consistency principle into strategic management, the political administration of the USSR provided the establishment of the mechanism of cooperation between industrial enterprises and research and development institutions. As a result, the network of sectoral research institutions existing at that time was able to provide RIA for industrial enterprises located in any region of the country, which, naturally, encouraged an increase in the rate, quality, and quantity of consumer goods production and speeded up development of new equipment and technologies.

The system of research-and-production organizations consisted of subdivisions that dealt with applied research and development work and implementation of results thereof into production within actual industries, while cross-sectoral research and technology centers provided cross-sectoral integration of science into production. They included specialized research-and-development institutes, pilot-production plants and project bureaus. The main task performed by these centers was to align the economic interests of all parties involved in the whole innovative process and provide the concentration of material and non-material resources in priority areas.

The USSR strategic management also involved the establishment of territorial production complexes (TPCs). The theoretical justification of this economic phenomenon was suggested in the 1940s by the Russian economic geographer N.N. Kolosovskiy (1891–1954). Even at that time, a TPC was understood as a set of closely located technologically interrelated industrial, scientific and educational enterprises (an aluminium plant, a fuel and petrochemical refinery plant, a hydroelectric power station, a research and development institute, a higher education institution, etc.). Obviously, such organizations (clusters) showed not only the synergistic effect but also optimization of such system properties as high organization, integrativeness, emergence, integrity, divisibility, communicativeness, hierarchy, multifunctionality, flexibility, adaptability, reliability, security, structuredness, dynamics, etc. Many higher education and research and development institutions conducted direct cooperation with production enterprises (Following in the footsteps of the best production workers, 1950, p. 23). At Altai Krai enterprises, 13,700 innovators put forward 28,360 suggestions with a conventional economy of 97 mln rubles (Chernyavskii, 1954, p. 18).

Analysis of the Soviet experience in strategic management of innovative activity and interpretation of the basic scientific statements about society management has shown that the laws necessary for SIEs functioning should be the following: 1) Correlation between the managing and managed systems of innovative activity. Such systems should have uniform structures and functional capabilities. 2) Necessary diversity of innovative activities. The diversity should be multifaceted and combine traditional and innovative technologies. 3) Unity and integrity of the system of innovative activity. Nowadays the number of degrees is restricted by various laws and regulations, customs, traditions, and beliefs. The balance of freedoms is important here. There is no doubt that organization of innovative activity is governed by the systematic laws of management: the more complex the object is, the more various the system of its regulation should be; the important (current) need for innovation should be satisfied by a special structure. These laws will be implemented if the principles of regulation of innovative activity are followed: scientificity, credibility, traditionalism (continuity), integrity, consistency, motivation, control and others.

Obviously, strategic planning (as an integral part of management) cannot be conducted without consideration of the conditions and factors influencing the activity of SIEs at higher education institutions. For example, according to the analysis of scientific sources (Andreev, Lukasheva, 2018; Andreev, Lukasheva, 2017; Demchenko, Gostev, 2014; Gostev, 2018; Turko, Fedorkov, 2018; Tyrko, Gostev, 2018; Shtchepansky, Gostev, Turko, 2016), in order to encourage scientific achievements and improve RIA, favorable external and internal conditions were created in the USSR. To be more precise, decisions about introducing innovations (inventions) were made by enterprise managers; funding of research and development activities was sufficient and timely; information about new engineering solutions was published and spread by the statistical digest "Nauchno-tekhnicheskii progress v USSR" ["Scientific and technological progress in the USSR"] and popular science journals, such as "Nauka i zhizn" ["Science and life"], "Znaniya – sila" ["Knowledge is power"] and others (Gostev, 2018, p. 165).

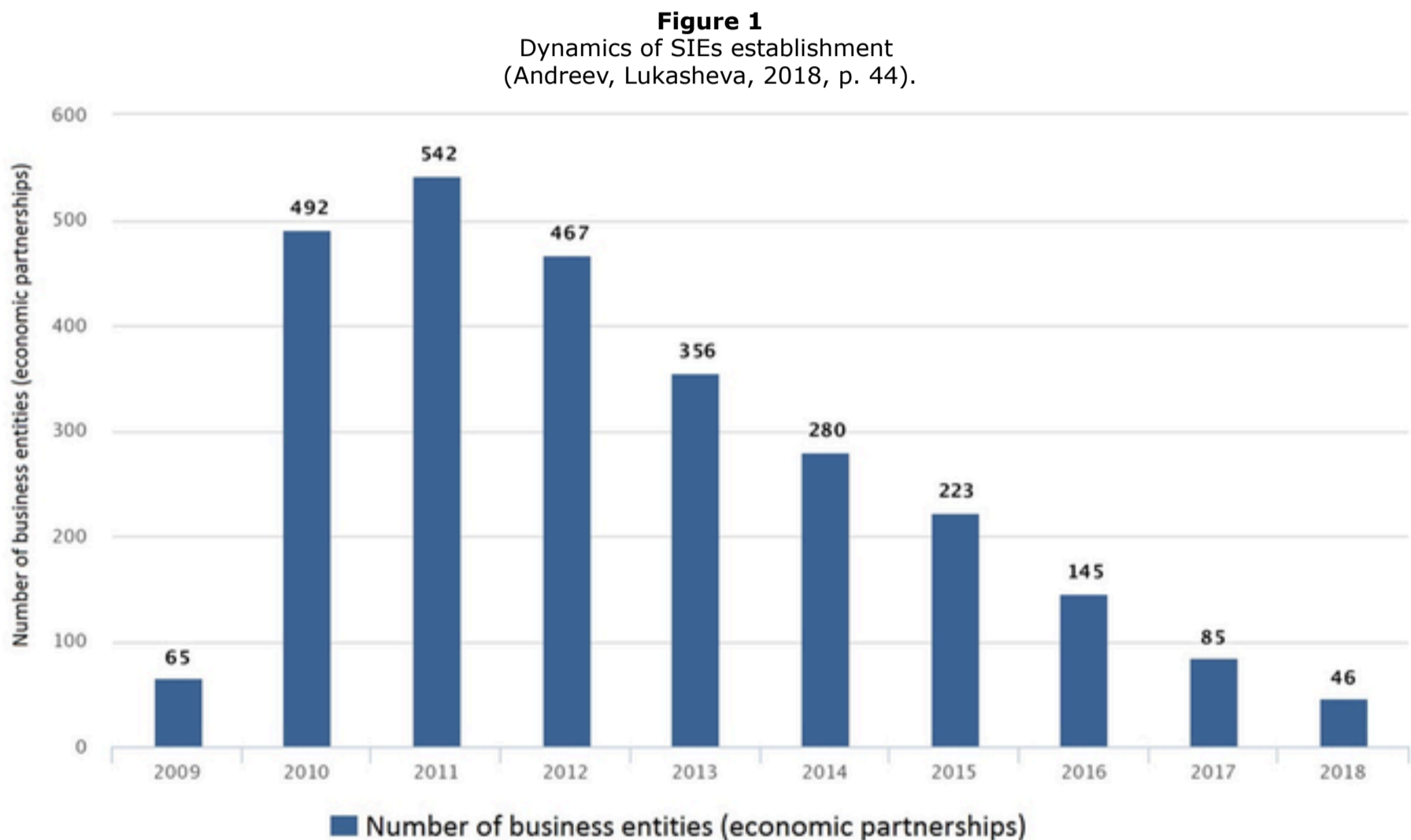
It is an undeniable fact that the management of activity conducted by SIEs at higher educational institutions cannot be effective without corresponding legal support. The legal framework of such organizations is represented by the following federal laws of the Russian Federation: no. 273-FZ "On education in the Russian Federation", no. 217-FZ "On amendments to certain legislative acts of the Russian Federation concerning creation by budgetary scientific and educational institutions of economic societies for the purposes of practical application (implementation) of intellectual activity results", no. 127-FZ "On science and the state scientific and technical policy", the Resolution of the Government of the Russian Federation no. 146 "On keeping the register of account notification of creation of economic societies set up by budgetary scientific and educational institutions of higher professional education, and the manner of its transfer to the bodies of control over the payment of insurance contributions" and other laws and regulations (Federal law of the Russian Federation no. 209-FZ, 2007; Federal law of the Russian Federation no. 217-FZ, 2009; Federal law of the Russian Federation no. 273-FZ, 2012; Federal law of the Russian Federation no. 172-FZ, 2014, Tax Code of the Russian Federation, n.d., Decree of the President of the Russian Federation no. 642, 2016, Resolution of the Government of the Russian Federation no. 550, 2009; Resolution of the Government of the Russian Federation

no. 219, 2010; Order of the Government of the Russian Federation no. 2036-r, 2013).

Some elements of foreign legislation can be used in order to improve the strategic management of SIEs in Russia. For instance, in the USA, which has proved to be an ideologist and leader of university entrepreneurship, the Bayh-Dole Act has been in force since 1980. In accordance with this act, universities, research organizations and other non-profit institutions received the right to own federal inventions, get income arising from patents and licenses and distribute profits in favor of inventors (Andreev, Lukasheva, 2017, p. 19). This act became a kind of "institutional model of the academic right to ownership", having provided universities not only with the right to own federal property but also allowing them to retain the status of non-profit organizations and receive tax privileges (Shtchepansky, Gostev, Turko, 2018, p. 47). This act unified the USA laws on patenting and licensing of inventions by universities and lead to the growth of the number of small and medium-sized enterprises (Turko, Fedorkov, 2018, p. 11). The process of establishing and closing down SIEs in the US universities is dynamic: the number of newly established SIEs per year amounts to 17–20% of the existing number of SIEs (Shtchepansky, Gostev, Turko, 2016, p. 48).

Assessment of the situation suggests that SIEs at higher education institutions in Russia are not as successful as those in Western European countries. According to the conducted analysis, from 2009 to 2017 over 2,500 SIEs were established in Russia, out of which 1,400 SIEs were set up by 77 universities (Andreev, Lukasheva, 2018, p. 42).

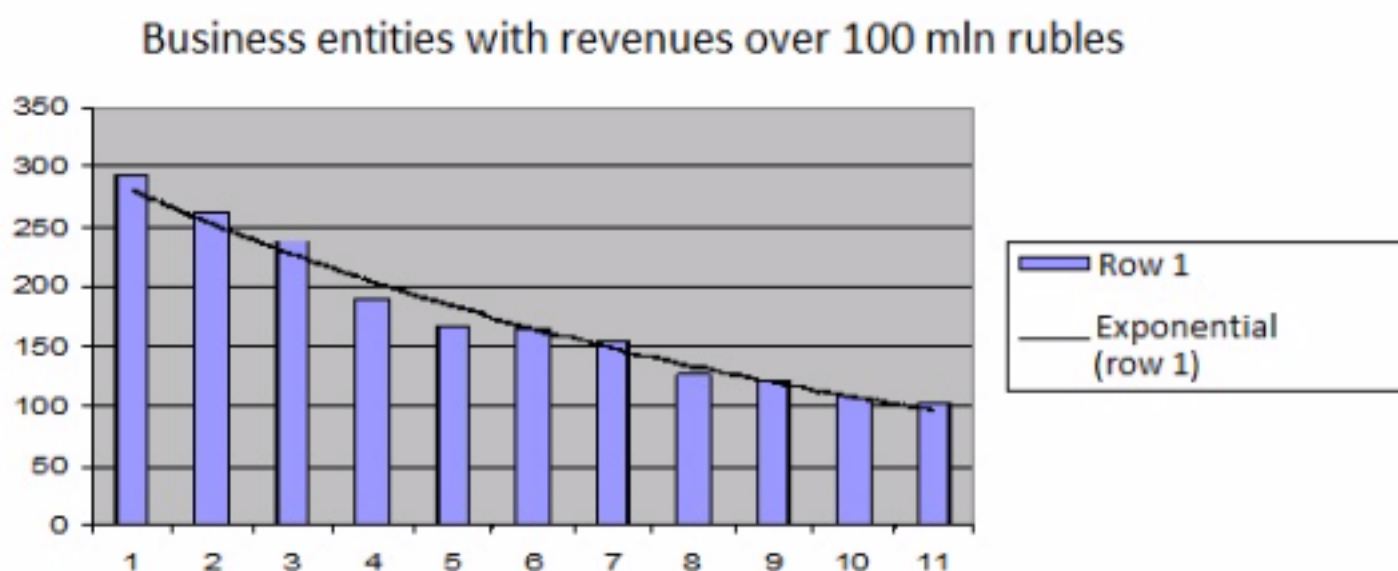
Figure 1 shows that the biggest number of such organizations was established in 2011, and in the following years, this indicator went down.



Analysis of efficiency demonstrated by university SIEs has shown that only 300 out of 1,400 enterprises produced income over 1 mln rubles. (It indicates that innovations are implemented primarily in the territorial environment surrounding the corresponding higher education institution.)

Figures 2, 3, and 4 show three groups of SIEs according to their revenues: over 100, from 25 to 100 and from 1 to 25 mln rubles.

Figure 2
Business entities breakdown by performance in the leading group
with revenues over 100 mln rubles (Andreev, Lukasheva, 2017, p. 19).

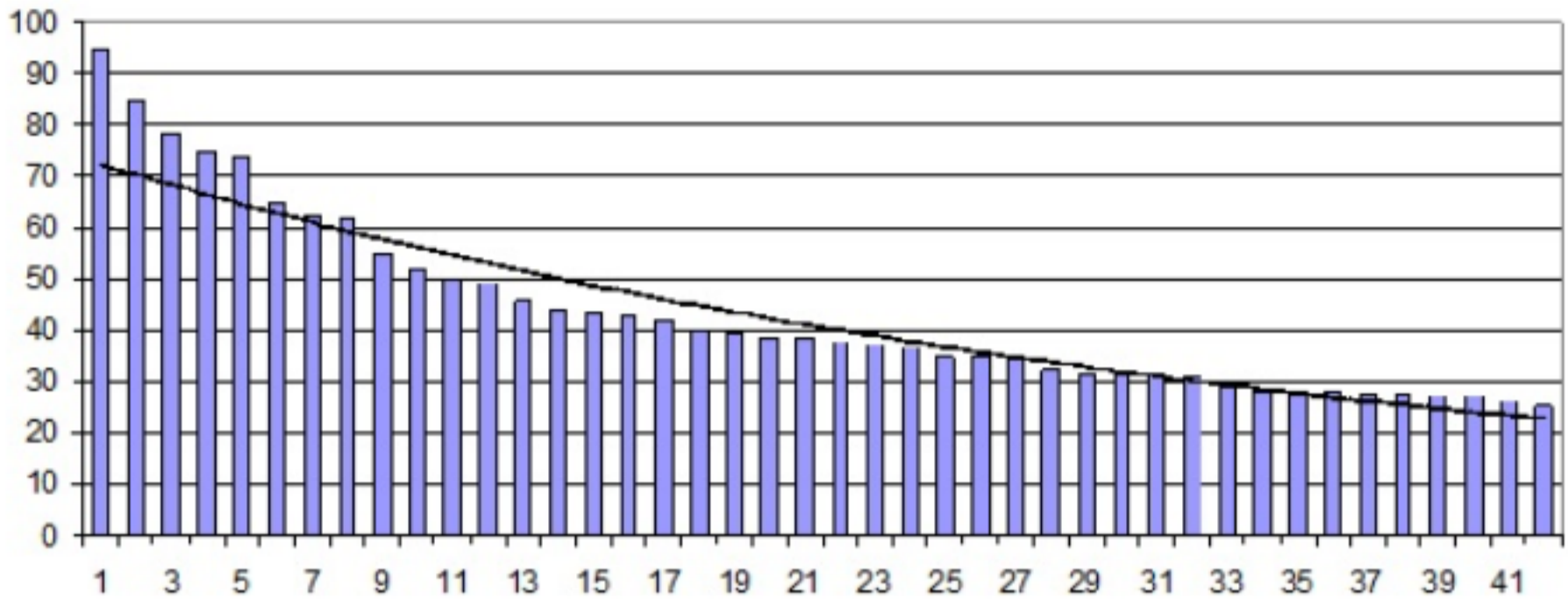


This group includes 11 SIEs. Tyumen Industrial University SIE is not represented here since its revenue (1,527 mln rubles) distorts visualization of the bar chart.

Figure 3

Breakdown of business entities with revenues over 50 mln rubles by their performance (Andreev, Lukasheva, 2018, p. 25].

Business entities with revenues from 25 to 100 mln rubles

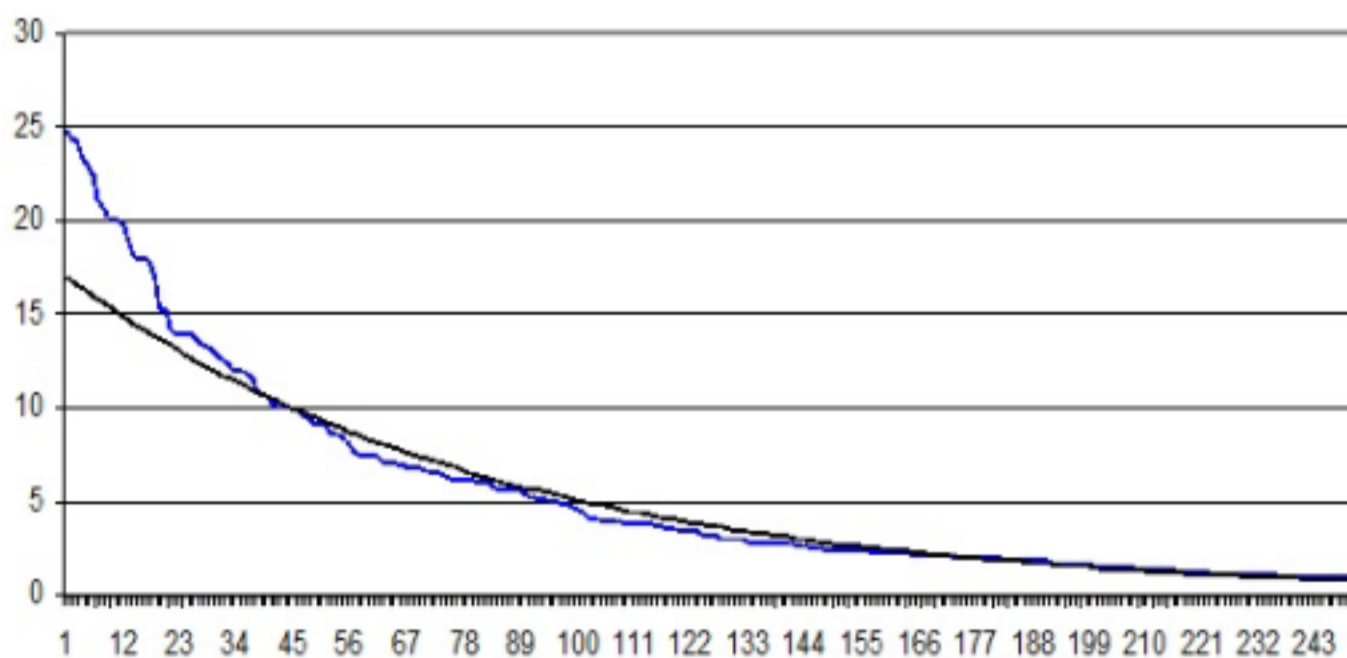


The total number of SIEs with revenues from 25 to 100 mln rubles is about 40, while the number of those with revenues from 1 to 25 mln rubles is nearly 250.

Figure 4

Breakdown of business entities with revenues from 1 to 25 mln rubles by their performance (Andreev, Lukasheva, 2018, p. 26).

Business entities with revenues from 1 to 25 mln rubles



The rest of enterprises totaling 1,100 units earn under 1 mln rubles per year, thus it can be assumed that their efficiency is low due to external conditions (see below, e.g. outflow of human resources and other reasons).

Apparently, variations in the performance of SIEs can be explained by a few major reasons:

- 1) Violations of basic laws and methods governing the management of innovative activity conducted by educational and scientific bodies.
- 2) Policies of regional authorities regarding SIEs.
- 3) Quality of SIEs managerial staff (including their IT competencies).
- 4) Level of economic development in the regions where establishing universities are located.
- 5) Traditions of entrepreneurial activities followed by population, etc.

In the course of the research, the following assumption was confirmed: the main potential of success (the level of revenues) which can be achieved by SIEs is determined by their incorporation into the production cycles of a certain sector of the economy. For example, LLC Research and Design Institute "Neftegazproekt" was established at Tyumen Industrial University. On July 1, 2011, the management of LUKOIL made a decision to entrust design and survey work to this higher education institution. The organization performs the full scope of tasks aimed at preparation of wells for drilling: develops drilling and field facilities construction projects, organizes public hearings on the location of drilling territories, draws up documents for Russia's General Board of State Expert Review (Glavgosexpertiza), etc. (Andreev, Lukasheva, 2017, p. 20). A similar monopolistic

niche in the sphere of road system maintenance in Moscow is occupied by Moscow Automobile and Road Construction State Technical University (MADI), which has three efficient SIEs, including MADI Technopark.

At Lomonosov Moscow State University, there are several successful SIEs:

- LLC Lomonosov Moscow State University Marine Research Center. The main function of this organization is providing scientific and technical services to the companies operating gas-condensate fields in the Arctic region.
- LLC Moscow State University Seismic Data Analysis Center.
- LLC Moscow State University Laboratory of Electron Accelerators, which develops and produces electron accelerators.
- Oil and Gas Research Center.

Sixteen SIEs at MSU are oriented towards the open market, only four out of which made profit in 2017.

Another leader in terms of established SIEs (31) is Reshetnev Siberian State University of Science and Technology. One of its structural units is R&P Small Satellites Center LLC, which produces spacecrafts and electronic equipment. Essentially, it is also a research and development enterprise, the subdivisions of which existed long before the modern legal framework regulating innovative activity emerged. Twenty-three SIEs acting based on this educational institution had no revenues in 2017.

4. Discussion

According to the conducted analysis, most SIEs have been established at industrial centers.

Studies of innovative activities at higher education institutions provide insight into the reasons for the slowdown in SIEs development. One of such reasons is of legal nature. For instance, the trend towards consolidation of universities suggested by the legislative bodies is counterproductive when it comes to the strategic development of SIEs. By now, 10 federal universities and 51 flagship universities have been established in Russia. (Meanwhile, in the USA 650 universities are engaged in the commercialization of research and development.) Experts from the Ministry of Education and Science of the Russian Federation believe that flagship universities have acquired the status of regional innovative and technological centers. At the same time, there are 943 city- and town-forming industrial companies in Russia. In fact, they ensure vital activity of 155 medium-sized (with a population of between 50,000 and 100,000 inhabitants) and small (with a population under 50,000 inhabitants) towns (Tyrko, Gostev, 2018). Besides, most working-age people living in such towns are specialists in certain production spheres. In these cities, it is still possible to conduct the whole sequence of an innovative process. For this end, it is necessary to restore research and development institutes, design bureaus, pilot plants, and testing facilities, as well as secondary and higher education institutions with corresponding profiles and specializations. Consequently, consolidation of universities (i.e., improvement of infrastructure) will not encourage the development of SIEs in the long-term perspective, since its main driver is the incorporation of educational structures into immediate production.

Results of the conducted analysis of foreign experience show that informal (civil institutional) level of management is preferred abroad to the administrative one. For example, Planck, Fraunhofer and Leibniz societies' centers for support of small businesses functioning at German higher education institutions are not government agencies, but they offer effective solutions to the strategic tasks of implementation of new knowledge by encouraging the establishment of innovative enterprises. Their main purpose is rendering services connected with consulting on the development of business plans, justification of the need for state and private investments, and the development of technologies aimed at the introduction of innovations. At the leading US universities, there are large national laboratories surrounded by a "belt" of small and medium-sized enterprises (SMEs). As a result of such policy, the activities carried out by SMEs constitute the major components of national economies (e.g., the USA and the UK). In these countries, the share of SMEs in the total number of companies amounted to 97.6% and 99.2% correspondingly in 2014. The SME sector in the UK included 4.8 mln enterprises, employment level in this sphere reached 78.6% of the economically active population (around 23 mln people), the turnover of small enterprises amounted to about 49% of the total turnover in the UK. Small enterprises implement about 64% of commercial innovations. In the EU countries, the share of SMEs in the total number of companies has reached 92.1% (Demchenko, Gostev, 2014; Gostev, 2018).

Strategic research with the help of SWOT and PEST methods of analysis suggests that scientific and technological progress in IT and effective management create an environment, which will allow Russia to join the list of the most economically developed countries, since these factors encourage establishment of a vertical structure of geographically distributed organizations belonging to main social institutions (such as economy or education).

Apparently, SIEs are going to grasp the newly available opportunities in the field of geographically distributed activities provided by information technologies, while usage of practices set by Western companies aimed at localization (consolidation) of research and production subdivisions will seemingly become outdated in the nearest future.

Such a conclusion should not raise much doubt at least due to the fact that electronic mass media, information systems and social networks accessed through the Internet have become a part of daily life of Russian people. For example, the share of people who used broadband access to the Internet amounted to 18.77% in 2017,

while by 2025, around 80% of the population of Russia will be using 5G technology. By that time, the mobile communications of the 5th generation will account for 20% of mobile connections. Besides, the Internet of things will spread based on 5G communication networks. Now, 35 mln people are registered in the electronic system of government and municipal services in Russia (Tyrko, Gostev, 2018). The volume of the Internet information and telecommunications network economy in Russia in 2017 exceeded 1.5 bln rubles (3% of the GDP), and the share of economy sectors depending on the Internet exceeded 19% (Shtchepansky, Gostev, Turko, 2016). Apparently, these and other facts led to the development and enactment of the Decree of the President of the Russian Federation of 9 May 2017 no. 203 on the Strategy for Development of Information Society in the Russian Federation 2017–2030 (Andreev, Lukasheva, 2017), one of the tasks set in which is the formation of the national digital economy that will automatically simplify the search for SIEs, taking part in such enterprises and distribution of their products.

5. Practical recommendations

1. To the Ministry of Education and Science of the Russian Federation:

to organize comprehensive studies of innovative activity in Russia, for which purpose the lines of research indicated in the passports of scientific specialties in the field of humanities should be specified;

to develop criteria and organize stable cooperation between educational institutions and corresponding specialized production enterprises, introduce this indicator into the system of accreditation standards;

to set up electronic information systems to support the functioning of SIEs.

2. To the Ministry of Economic Development of the Russian Federation and the Ministry of Education and Science of the Russian Federation: organize interaction and cooperation between production companies and educational institutions.

Findings of the research suggest that they do not contradict the major academic papers on strategic management of SIEs at higher education institutions, but complement and specify the existing theoretical statements, which were presented for evaluation to the experts of the humanities departments of Moscow State Linguistic University and the "Russian Federation Armed Forces Combined Arms Academy" Army Military Scientific Center; discussed at the XI International Research and Practice Conference "Production Management: Theory, Methodology, Practice" (Novosibirsk, December 7, 2017) and other scientific forums and received positive feedback.

6. Conclusion

Nowadays the growth of the GDP in the world economy is provided by new knowledge, the implementation of which is problematic without the usage of strategic management technologies oriented at innovative production organizations. Russia has centuries-long experience in this sphere, due to which fact it has been one of the world leaders throughout the last 3–4 centuries.

As a result of strategic planning in the USSR TPCs were created, which unified production forces, knowledge, production and various resources into a consolidated system.

Strategic management of SMEs in the USA is based on the informal component underpinned by proactivity of members of industrial associations.

The main reasons hindering the development of SIEs at higher education institutions are the following: violations of basic laws and methods governing strategic management of innovative activity conducted by educational and scientific bodies; low level of economic development in the regions where establishing universities are located; undeveloped traditions of entrepreneurial activities followed by population and others.

In the near future, electronic information systems will encourage activities conducted by SIEs.

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5. Scientific Research Institute – Federal Research Centre for Projects Evaluation and Consulting Services, Moscow, Russia

6. Scientific Research Institute – Federal Research Centre for Projects Evaluation and Consulting Services, Moscow, Russia
