Contemporary Models of Government-Backed Venture Project Funding

Svetlana V. Zemlyak, Svetlana Yu. Sivakova, Marina V. Shelomentseva, Vera V. Popova
Financial University under the Government of the Russian Federation
Smolensk, Russia

***Abstract*—The paper covers the issues of venture projects funding as development of the relevant funding vehicles is seen as one of the strategic benchmarks of Russian public policy in terms of innovations development and support. It reviews current methods used, their advantages and limitations. Methods employed include analysis of academic sources, comparative analysis, classification, data analysis etc. The goal is to provide review of foreign experience to analyze best practices to improve decision making process for government-backed venture projects. In Russia, assessment of efficiency of interaction between state-owned financial institutions and venture investors is still evolving. The situation drives to improve mechanisms and tools of government financial monitoring and control via building of the KPI system taking into account the possible implementation. Hence, the research results enable to improve efficiency management decisions in terms of funding of innovative government-backed venture projects.**

Keywords—innovations; national innovation system; digital economy; territorial differentiation; venture investments

I. INTRODUCTION

These days, we see the 'smart' economy is emerging, and the transition to the 'smart' economy implies more efficient use of various kinds of resources to increase living standards. The future of the world and Russian economies depends on how fast new technologies are developed and spread, new industries are created, traditional sectors are integrated into new economy [1].

Innovative modernization of an (national) economy as a strategic direction of government policy is a necessary condition for a qualitative breakthrough in ensuring sustainable economic growth. One of the signs of development of an efficient economy is "mobilization of new sources of growth and use of opportunities revealed by global innovations, which become a priority for all the parties concerned" [2]. Given this, countries focused on an innovation-based model of economic growth get an additional incentive to increase the efficiency of reproduction process of public goods at the stages of formation, exchange, distribution and use. So, studying issues of efficient use of financial resources as a factor influencing reproduction of economic potential (in terms of quality and rate) can be viewed as a hot research topic in Russia and other countries as well.

The paper analyzes and systematizes experience of foreign countries in terms of organizing venture funding of state-backed projects. It also describes the models of venture investments as a factor of economic growth and outlines the ways to improve funding mechanisms of venture projects within government stimulus and innovations development policy.

The research results form an information analysis base for efficient management decisions of government bodies regarding venture project management.

II. METHOD. THEORETICAL AND METHODOLOGICAL BASIS OF THE PAPER

The world community has accumulated considerable experience in comparative analysis of countries in terms of economic growth. For a qualitative assessment of competitiveness of national economies, a wide range of approaches is employed to build a system of integrated development indicators of national innovations. Regular country surveys and various rating based on their basis enable comparison in terms of innovations development. The most well-known national innovations ratings include The European Innovation Scoreboard (EIS), as well as The International Innovation Index (III), The Global Competitiveness Index (GCI), The Knowledge Economy Index (KEI), The Global Innovation Index (GII) etc.

For territorial-administrative units (NUTS) of the EU and OECD countries, the Regional Innovation Scoreboard (RIS) provides a comparative assessment of innovation systems performance. In the US, the Portfolio innovation index (PII) is used. The structure of the regional indices RIS [3] and PII [4] reflects the inputs and outputs of innovations.

In PII, a generalized score of innovations development based on a survey of more than 3,000 US territorial units is calculated as the result of a convolution of four sub-indices formed from 5–7 indicators. A certain weight is assigned to each of the aggregated indicators: equal units in terms of contribution, among which are human capital, economic dynamics; productivity and employment, have, in aggregate, 90% of the integral indicator. The remaining 10% falls on the unit of economic well-being. A comparative analysis of the PII index values results in conclusion about the levels of innovations development of the US regions.

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Comparative analysis of the EU and the OECD countries to assess efficiency of innovation activity (ESI, RSI indices) is based on Data Envelopment Analysis (DEA) nonparametric method. DEA models are used to assess the quality of functioning of complex socio-economic systems. They represent performance indicators as a ratio between achieved results (output parameters) and resources spent (input parameters) [5–7].

According to the general methodology for innovation development monitoring in the EU and OECD countries, statistical indicators describe factors that influence:

- innovation enablers, including human resources (the ratio of people aged 25–64 with higher education in the total population of the corresponding age group etc.), financial resources (research and development (R&D) spending of government budget; the share of venture capital in GDP etc.);
- firms activities – investment spending (R&D spending of businesses etc.), structure of entrepreneurship (the share of innovative small and medium enterprises (SMEs); demographics of SMEs, etc.), performance indicators (number of registered patents, etc.);
- innovation output, based on the number of innovators (the share of SMEs introducing product or process innovations in the total number of SMEs; the share of innovative firms, where innovations significantly reduced material and energy consumption; the share of innovative firms, where innovations ensured large reduction in labor costs, etc.) and indicators of efficiency of use of innovations (employment in knowledge-intensive and high-tech industries, share of new products sales in total sales, etc.).

On the basis of quantitative indicators, assessment features of the innovation development of territorial observation units are formed with the following main types of innovation territories: Innovation Leaders; Innovation Strong; Innovation Moderate; Innovation Modest. In each of the categories, emphasis is placed on more successful innovators (Innovation Leader +, Innovation Strong +, Innovation Modest +) and less successful innovators (Innovation Leader–, Innovation Strong–, Innovation Modest–) [3].

In Russia, the Federal State Statistics Service of the Russian Federation (Rosstat) and the Institute for Statistical Studies and Economics of Knowledge (ISSEK) of the National Research University Higher School of Economics (HSE) are responsible for conducting statistical observations of various types of innovations, the development and use of common language to ensure the interconnection and continuity of indicators of innovation activity, as well as to ensure comparability of domestic practices and international standards.

Despite the unified methodology for calculation of statistical indicators for innovations, a comparative analysis between countries in terms of efficiency of innovations is complicated by the following reasons. In statistical sources, data on a number of indicators are presented either for individual countries ("Gross enrolment rate in higher education", "Share of expenses for technological innovations in the total volume of goods shipped, work performed, services", etc.), or for relatively short time periods ("Research and development (R&D) expenditures as a percentage of gross domestic product (GDP)", "Percentage of the population possessing information and communication technologies skills", etc.).

It should be noted that in the context of an emerging innovative global economic system, the reason of some statistical discrepancies within a comparative analysis between countries is the fact that in countries with developing economies the interpretation of the concepts of production of innovative goods and the provision of innovative services may not correspond to the international standards adopted in developed countries. Thus, there are discrepancies in the interpretation of the concept of "innovation" by international and Russian statistical institutes.

In the guidelines published by Eurostat and OECD on the organization of statistical observations of innovation, innovation is defined as "the introduction of a new or significantly improved product (item of goods or service) or process, a new marketing method or a new organizational method in business practice, the organization of working areas or external relations" [8]. In Russia, according to the Federal Law No. 127-FZ "On Science and State Science and Technology Policy" dated 23.08.1996, innovations are defined as "a new or significantly improved product (item of goods, service) or process, a new sales method, or a new organizational approach a method in business practice, organization of workplaces or in external relations."

III. RESULTS

Classification and clustering of European territories by types of innovation development enables to assess the national economies' innovative modernization rate. According to the published report Regional Innovation Scoreboard–2019 [9], the distribution of 238 territorial units of the member countries of the European Union, Norway, Serbia and Switzerland by types of innovative territories is the following (Fig. 1): innovation leaders (38 regions), strong innovators (73 regions), moderate innovators (97 regions) and novice innovators (30 regions).

As can be seen from Fig. 1, according to the RIS index, there is an uneven distribution of regions. More than half (53.0%) of the surveyed territories has a weak level of innovation activity, which is not exceeding the median value of innovation development (RIS = 90.5). A weak level of innovation activity is a feature of almost all eastern regions of the European Union, including Bulgaria, Romania and others. 31.0% of the surveyed territories are strong innovators, and 16.0% are innovation leaders. Countries such as Switzerland, Germany, Denmark, Finland, Sweden, the Netherlands and others are the leaders in terms of number of innovation territorial units, which have friendly environment for innovation development platforms, knowledge-intensive startups, and provide interaction between government financial institutions and venture investors in high-tech sectors.

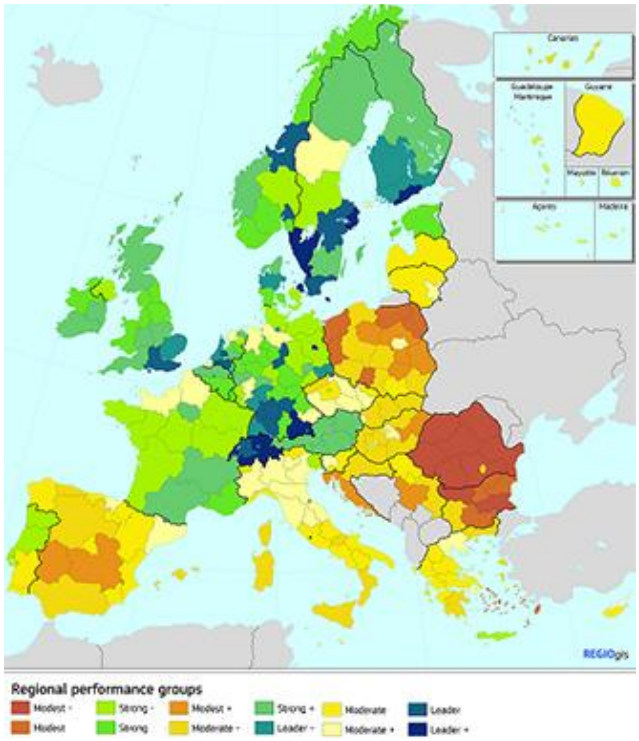

Fig. 1. Classification of innovative territories (according to RIS estimates in 2019) [9]

In Russia, various quantitative indicators are used to characterize the innovation modernization of the economy. The most common is the Russian Regional Innovation Index (RRII), which has been compiled by ISSEK since 2012. The methodology is close to the Eurostat methodology, but includes a number of features that take into account the impact of macroeconomic factors and differences in regional government. The multi-level hierarchical structure of the RRII index is based on a system of 37 statistical indicators grouped in four areas of innovations in terms of socio-economic conditions, scientific and technical potential, parameters of innovations and the quality of innovation policy [10].

The RRII index feature is that "Budget costs for science and innovations" subunit includes indicators that reflect government participation in funding of innovation activities: the share of budget expenditures on science in total budget expenditures; the share of budget funds in total cost of introducing technological innovations (for industrial enterprises); the share of budget funds in total government spending on the development of innovation infrastructure to support SMEs [10].

According to Rating of innovative development of the constituent entities of the Russian Federation report [10], there is a distortion in modernization of the Russian economy due to the varying degree of impact of economic, geographical and demographic factors on the implementation of innovation projects in the Russian regions (Fig. 2).

Consistent leading position of three regions (the Republic of Tatarstan, Moscow and St. Petersburg) is largely due to the role of federal executive bodies in the formation and development of innovative infrastructure of the regional socio-economic system (engagement in the implementation of government and federal target programs, government property management, and funding of educational and scientific organizations, the development of venture entrepreneurship, etc.).

An analysis of the results of fundamental and applied research, made by foreign and Russian experts, allows to conclude that successful functioning of financial institutions and venture investment tools depends on government incentive measures for development and support of innovations. Reduction of the support for development of innovative infrastructure can lead to increased differentiation of territories in terms of innovations development. Efficiency of innovations is largely driven by the development level of the infrastructure component of venture investments (investment climate, preferential taxation, training etc.) [11–13].

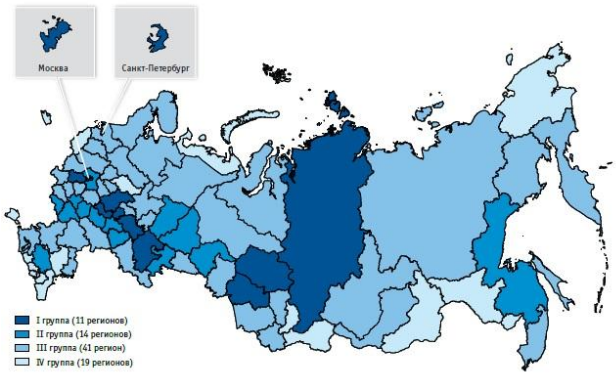

Fig. 2. Classification of constituent entities of the Russian Federation according to RII estimates (in terms of innovations) [10]

A cross-country analysis of innovations (Fig. 3) allows to conclude that regardless of the development level of national economies for 2014–2016 there has been a declining trend for the share of entities that received budget funding, in the total number of entities that carried out technological innovations.

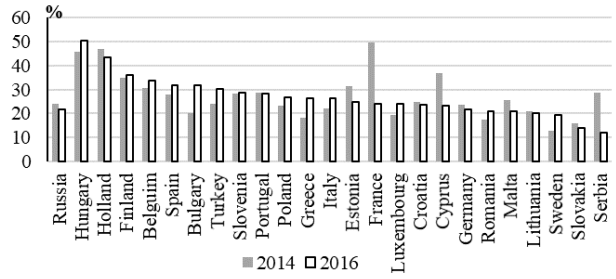

Fig. 3. Allocation of budget funds to entities for the implementation of technological innovations, break-up by countries [10]

According to experts of the World Economic Forum (WEF), the reduction in budget funding of innovation projects in countries such as France, the Netherlands, and others, is

largely due to improved interaction mechanisms between government financial institutions and venture investors.

The decrease in the level of Russian budget expenditures for innovation activities funding can be explained by the sanctions imposed by the Western countries [14–16].

IV. CONCLUSION

Venture investments as a driver of economic growth create conditions for the development of national innovation systems.

International experience and Russian practice show that the system of government financial regulation of venture investments is one of the factors in accelerating the innovative modernization of national economies. An analysis of the best practices of foreign countries in venture funding made it possible to identify the main models of government-backed venture project funding. The development of mechanisms and tools for venture projects funding given government backing for development of innovations is a prerequisite for sustainable economic growth. Effectiveness and efficiency are the criteria to assess quality of government regulation of venture investments.

REFERENCES

[1] A. Dynkin, Ed., Strategic global forecast 2030. Moscow, 2011.

[2] The World Intellectual Property Organization. Retrieved from: http://www.wipo.int/about-wipo/ru/dgo

[3] Regional Innovation Scoreboard 2019, Methodology Report. Retrieved from: https://ec.europa.eu/docsroom/documents/35946/attachments/1/translations/en/renditions/native

[4] Crossing the next regional frontier: Information and Analytics Linking Regional Competitiveness to Investment in a Knowledge-Based Economy. Retrieved from: http://www.statsamerica.org/innovation/report_next_regional_frontier_2009.html

[5] T. Arshinova, "Construction of Equity Portfolio on the Basis of Data Envelopment Analysis Approach," Scientific Journal of Riga Technical University, Vol. 49, 3, 2011.

[6] W. Cooper, L. Seiford, and K. Tone, Data Envelopment Analysis. A Comprehensive Text with Models, Applications, References and DEA-Solver Software, 2nd Edition. Springer, 2007.

[7] M. Karimzadeh, "Efficiency Analysis by Using Data Envelop Analysis Model: Evidence from Indian Banks," Int. J Latest Trends Fin. Econ., Vol. 2, No 3, pp. 228–237, 2012.

[8] OECD, Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition, The Measurement of Scientific and Technological Activities. OECD Publishing, Paris, 2010.

[9] Regional Innovation Scoreboard 2019. Retrieved from: https://ec.europa.eu/growth/industry/innovation/facts-figures/regional_en

[10] G. Abdrakhmanova, P. Bakhtin, L. Gokhberg et al.; L. Gokhberg (ed.), Russian Regional Innovation Scoreboard. Issue 5. Moscow: HSE, 2017.

[11] F. Sekmen, and M. Toptas, "Education, technical progress, and economic growth in the information age: the case of Turkey," Int. J. Soc. Ecol. Sustain. Dev., 6 (1), pp. 73–84, 2015.

[12] S. Lachenmaier, and H. Rottmann, "Effects of innovation on employment: a dynamic panel analysis," Int. J. Ind. Organ, 29 (2), pp. 210–220, 2011.

[13] R.B. Bouncken, T. Clauß, and V. Fredrich, "Product innovation through coopetition in alliances: Singular or plural governance?" Industrial Marketing Management, 53, pp. 77–90, 2016.

[14] V.V. Grebenik, Ed., The problems of economic security of Russia in the context of the geopolitical crisis and the sanction pressure of Western countries. Moscow: Izdatelstvo «Nauchnyy konsultant», 2017. (In Russ.)

[15] O.A. Borisova, Ed., Sustainable socio-economic development of regions on the basis of competitiveness: industrial aspect. Moscow: Izdatelstvo «Nauchnyy konsultant», 2016. (In Russ.)

[16] E.N. Rudakova, Ed., Formation of The Financial Management System: Theory, Experience, Problems, Prospects. Moscow: Izdatelstvo «Nauchnyy konsultant», 2018. (In Russ.)