

State and Bank Financing of Innovations: Federal and Regional Aspects

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Abstract—In the era of the knowledge-based economy, countries and regions that provide the fastest innovative development benefit from the global competition. Direct implementation of innovation policy is carried out by specific enterprises, in which innovative development plays the role of a key factor in the toughening competition. Thanks to state efforts, the basis of national innovation system has been formed. In particular, there are some federal and national research universities that provide research, innovation, and staffing for high-tech industries, and Russian venture funds, technology parks, industrial and agricultural and industrial parks, and business incubators. The Skolkovo Innovation Center has become widely known. Special attention is paid to region innovative development with innovative infrastructure. The effective use of resource potential of the region involves strengthening and expanding economic ties, increasing the intensity of investment processes at all levels of social and economic system, developing the infrastructure base and increasing the role of innovation in the system of economic interests of the region. The article discusses the key aspects of state and bank financing of innovation, not only at the federal level, but also at the regional level. The paper presents the complexity analysis of financing innovations associated with limited budgetary opportunities, insufficient participation of banks in the implementation of innovative investment projects. There are ways of problem solution to invest innovative activities of economic entities.

Keywords—*bank financing, innovation projects, investment, financial risks, regional development*

I. INTRODUCTION

The economic growth based on the export of raw materials cannot be stable for a long time, and in this regard, innovation financing at the federal and regional levels is of particular relevance.

Russia has some peculiarities that must be taken into account during the establishment of the national innovation system in general and innovation economy in particular.

Firstly, the industrialized economy makes it possible to combine the process of technical renewal of the industrial base (modernization) with conditions to improve the competitiveness of the domestic economy based on original technologies and products (innovation).

Secondly, despite the problem of “raw curse”, significant reserves of natural resources provide a sufficiently capacious

and solvent market for new technologies and products. In this situation, a significant proportion of Russian high-tech industrial enterprises should work to meet the needs of extracting natural raw materials, as this happens in individual countries.

Thirdly, the level of infrastructure development does not correspond to the scale of the state, which is an additional deterrent. At the same time, project implementation for transport communications can be for our country the most powerful engine of innovations. Separate projects are already being successfully implemented today, for example, the construction of the Crimean Bridge [4].

The need to change the existing model of economic development in our country, which is based on the export of raw materials to world markets, is a key priority for the Russian Federation. As an alternative, the majority of specialists propose a forced transfer of the domestic economy to an innovative footing, which involves significant financial investments from both the state and private business representatives.

At the same time, the large-scale transition to the innovative development of the national economy is hindered by institution weaknesses of finance, management and staff in the scientific and innovative complex of the country. The probabilistic nature of the effects of innovation and the high degree of riskiness of investments lead to the fact that the state remains the main investor. It is clear that only the principle of consolidation and plurality of innovative investors is a source of success in this direction of Russia's development.

The solution of problems related to financing of innovation activities of business entities at the federal and regional levels as well as the need to improve these processes is highly relevant.

II. FINANCE ANALYSIS OF INNOVATIVE ACTIVITIES AT FEDERAL AND REGIONAL LEVELS

Stimulation of innovation activities should be carried out through the obtaining of necessary financial resources to implement innovative ideas into final products and their implementation in the practical activities of economic entities.

First of all, let us analyze the dynamics of investments in fixed assets as a special form of financial investments to contribute to the expansion of fixed assets.

A. Analysis of Financial Aspects of Innovative Activities at the Federal Level

Structure analysis of investments in fixed assets is presented in Table 1.

TABLE I. INVESTMENT STRUCTURE IN FIXED ASSETS, %

Funds of financing	2015	2016	2017
Fixed assets	100	100	100
including sources of financing:			
own	50.2	51.0	51.3
attracted	49.8	49.0	48.7
including			
bank loans	8.1	10.4	11.2
borrowed funds of other organizations	6.7	6.0	5.4
foreign investment	1.1	0.8	0.8
budget funds	18.3	16.4	16.3
Others	15.6	15.4	15.0

^a Compiled by the authors on the basis of statistical data

The data in the table indicate that own funds of economic entities are still a significant source of funding. From the funds raised, there is a tendency to increase the share of credit funds of commercial banks. The volume of budget financing for the period under the review decreased by almost 2%. This indicates that market institutions assume this function.

B. Analysis of financial aspects of innovative activities at the regional level

We will analyze some parameters of innovation activity and sources of its financing on the example of one of the regions of the Russian Federation (Irkutsk Region).

TABLE II. INNOVATION INDICATORS AT REGIONAL LEVEL

Indicator	2015	2016	2017
Number of enterprises that perform innovation activities, units	51	49	54
Volume of innovative products shipped to total volume, %	2.9	1.3	0.8
Sources of financing innovation activities - total, %	100.0	100.0	100.0
including			
own funds of enterprises, %	95.6	97.8	98.8
Federal budget, %	1.1	1.2	0.9
others, %	3.3	1.0	0.3

^b Compiled by the authors on the basis of statistical data

The number of enterprises that perform innovation activities on the example of the analyzed region in the total volume is insignificant. The volume of innovative products to the total volume does not exceed 3%. At the same time, during the period under review, its volume began to decline. The main source of innovation financing is own funds of enterprises. Their share is more than 95%. At the federal level the share of own funds is a little over 50%. The data indicate a highly heterogeneous level of innovative development of regions of the Russian Federation. The gaps between the leaders, which

traditionally are the regions of the Central Federal Circle and other subjects of the Russian Federation, are very significant. But at the same time indicators of financial support for innovative development of the country are at an acceptable level.

III. PECULIARITIES OF INNOVATION FINANCING IN MODERN ECONOMIC CONDITIONS

A. Innovation Financing by Banking Sector

Today some economic entities that have a serious resource potential and may take a more active part in financing the innovation sphere in the country show a weak interest in this area. It is about commercial banks; own funds (capital) increased from 4.7 trillion rubles up to 9.4 trillion rubles from 2010 to 2017. A modest role of credit institutions as a whole in the investment process is reflected in their share in the structure of investments in fixed assets, which averaged 9% in the period under the review.

Financial and credit activities of Russian commercial banks are still poorly connected with the real needs of innovative economy. Due to inadequate lending procedures and credit risk assessment, banks often cannot provide national companies of various scales with necessary financing. At the expense of commercial bank loans, no more than 3-4% of innovative projects are financed, and the share of long-term loans does not exceed 5% of the total amount of credit investments in the economy. Indicators of developed countries are much higher. The share of bank loans as a source of financing for innovation active enterprises in individual countries is 20-40%.

B. State Funds of Financing Innovation

State financing of innovation activities at the expense of budget funds is carried out in accordance with the goals and priorities of the state innovation policy. It is necessary to solve national scientific and technical problems and promote the development of innovative entrepreneurship in the country.

Budget financing of innovation, along with own funds of enterprises, occupies a significant place in the innovation process. At the same time, financing of priority directions of the country development is carried out through the implementation of innovation-oriented federal target programs, such as "Federal Space Program", "Maintenance, development and use of GLONASS system for 2012-2020", etc.

At the same time, financing of innovation activities from budgetary sources may have negative consequences due to the crowding out of private investors by the state. As a rule, state-owned sources of financing are more profitable for innovative enterprises, since they are cheaper or free of charge altogether.

In addition, the state does not exert significant pressure on the innovator, demanding to provide an innovative product being commercialized as output (it is necessary to satisfy formal requirements to implement innovative projects).

It should be noted that indirect incentive methods (first of all, tax breaks and benefits for contributions to extra-budgetary funds) do not contribute to a significant increase in research and development costs in large companies because of the

unfavorable innovation environment in most regions of the country. In addition, companies, which fear additional tax audits, do not enjoy benefits and do not classify their expenses as innovative. And in the case of tax benefits, the quality of spending on innovation is reduced, as companies receive a guaranteed tax benefit from the money spent before using the allocated funds, which reduces the motivation for the return on costs as such [3].

In addition, in the current economic conditions, which are characterized by a chronic shortage of budgetary funds, the state is forced to deal with “pressing problems”, while the innovation theme fades into the background. The state policy of investment support of innovations is a decisive factor in the development of the country, but the domestic practice of its implementation has certain specific peculiarities. For example, for many years the criteria for providing financial resources to scientific organizations did not reflect the need to create incentives for them to search for forms of innovative partnership with private business.

Undoubtedly, the state plays an enormous role in the development of innovation processes, since mastering and applying innovations in production and management is a complex and costly and very risky process. Therefore, it requires government support or tutelage. Active introduction of innovations to the state is beneficial because it gives the society a significant economic effect. Moreover, innovation activity has lately been a defining element of international competitiveness.

C. Innovation Financing at Regional Level

The effectiveness of funding at the regional level largely depends on the effective construction and operation of a regional innovation system. As a rule, regional support for financing innovation is implemented in several directions.

First of all, this is budget financing of a part of expenditures, which is valid only for state organizations. The next area concerns the provision of subsidies for tax breaks. An equally important area is the payment of part of the costs of physical infrastructure.

In our opinion, special attention should be paid to the legal framework to implement innovation and its financing at the regional level.

It should be noted that the above areas of regional investment policy are crucial factors for the development of small business in Russia. However, it should be noted that the principles of policy are not sufficiently formulated, there are no clear actions regarding the development of innovations, respectively, the investment and innovation sphere of the region is developing, but weakly. Special attention should be paid to the financing of innovative activities in the regions by the banking structures.

IV. TRENDS OF FINANCING IN MODERN ECONOMIC CONDITIONS

Despite a significant resource base, cases of participation of banking institutions in the lending of high-tech projects are rare and mainly concern the production of traditional equipment, for example, airplanes, medical equipment. The development of fundamentally new types of products and promising

technologies, coupled with high risk, is of weak interest for banks.

An important peculiarity of banking is a shorter investment horizon than that of pension funds and insurance companies, which directly affects the nature of investments. Unfortunately, the main form of interaction between banks and high-tech enterprises is still cash management services [9].

A. The Reasons of Low Level for Innovation Financing by Banking Sector

There are several good reasons why innovations are not attractive for banks.

- One of the reasons to hinder the development of lending to innovation, is a high risk of non-repayment of borrowed funds. This is because of implementation peculiarities of the most innovative activities. The bank is very interested in positive credit history of the borrower.
- Another serious problem is that innovative organizations, which are predominantly small businesses, are often unable to provide adequate collateral for loans issued. In the case of issuing unsecured financing, the amount of funds received is significantly reduced.
- Every bank loan must be repaid within a certain period. This is not always acceptable for lending to the innovation activities of enterprises, since the time of goods release, technologies, services to the market as well as their commercial success, is extremely difficult to predict. At the same time, creditor banks are conservative in the selection of potential borrowers and subject them to comprehensive checks, which leads to the increase in the time of decision-making on a loan.
- A serious problem is the interest rates for loan use.

Such strict requirements for enterprises claiming to receive funds from a bank (including innovation-active ones) result in borrowers using credit resources in a very limited amount and only for projects with high commercial viability, or for specific orders for issuing developed products.

B. Ways to Activate Banks in Innovation Process

As possible measures to enhance the participation of banks in the innovation process is the expansion of state guarantees for investments in venture projects that allow banks attribute the costs of these projects to the first risk group. Another measure is the partial or full guarantee of unsecured loans.

The use of guarantees of compensation of a part of losses from participation in a venture fund to a bank investor is also relevant. In addition, the state can more actively use the tool of preferential taxation of credit institutions that provide funding for research and development, work on the creation of new technology.

The world experience shows that the more developed the national economy, including in terms of innovation, the higher

the level of capitalization of the banking system. The share of bank capital in GDP can be calculated by the formula:

$$K = KNB / T \quad (1)$$

where K – share of bank capital in GDP; KNB – capital of national banks; T – GDP.

In developed economies, this figure ranges from 12 to 16%. In the Russian Federation, this figure is just over 6% percent. In addition, in Russia, the ratio of banking system assets to GDP in recent years does not exceed 40%, whereas in most of the leading countries of the world, a similar ratio is in the range from 200% to 300%.

C. Effectiveness Determination of Innovation Financing

For a comprehensive assessment of innovation financing, it is necessary to evaluate its effectiveness. As a rule, in the economic literature there are three groups of key indicators for assessing the effectiveness of financing innovative activities (Fig. 1.).

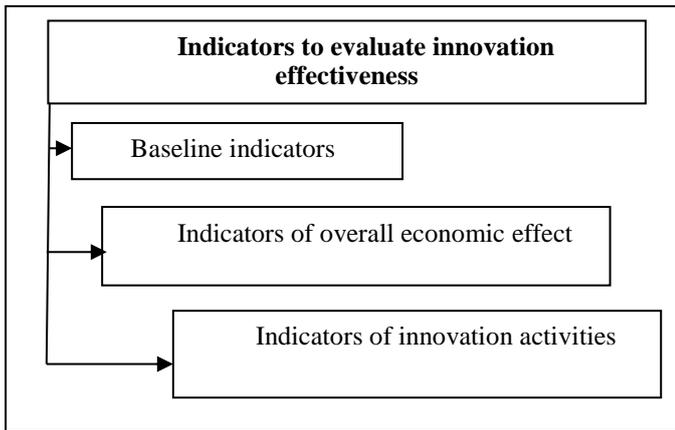


Fig. 1. Key indicators to evaluate innovation effectiveness.

Baseline indicators help to track the amount of costs of an economic entity to conduct research and development work. This group of indicators is indicators of orderliness and sufficiency of funding for further innovative development, including through accelerated development and development of fundamentally new innovations.

Indicators of overall economic effect help in quantitative terms to reflect the most important parameters to evaluate the activities of an economic entity. Such parameters include cost, labor productivity, and product quality. By improving these indicators, the organization gains comparative advantages and ensures current competitiveness in the domestic and international markets.

Effectiveness indicators of innovation activities reflect the performance of research and development activities, the impact on technological and product innovations, and the increment in the results of intellectual activity.

The indicators of all three groups make it possible to quantify and qualitatively characterize the expected results of financing the organization’s innovation activities, and, in

aggregate, are sufficient for a comprehensive assessment of the effectiveness of innovation activities.

V. DISCUSSION

The urgent task is the search for new mechanisms that contribute to the consolidation of participants in the innovation process, attraction additional resources to the innovation sphere, change in quality characteristics, and problem solution of transforming savings into investments.

At the same time, the issues of investment policy implementation today receive serious attention from the scientific community [3, 7, 14, 17]. The works by B. Stosic, M. Mihic, R. Milutinovic, S. [11], M. Weimer, L. Marin, [16], I. Yeremenko, E. Rudskaya [18] and other researchers are devoted to innovative investment approaches.

The analysis of scientific works in the field of financial support of innovation showed that a lot of attention is paid to the problems of this sphere.

In our study we analyzed some aspects of innovation implementation and its financing both at the federal, Thai and regional levels. They substantiated the necessity to activate the banking community in financing innovations [7, 13, 16].

At the same time, the issues related to the development of mechanisms that affect overcoming the disunity of the participants in the innovation process, attracting additional resources to the innovation sphere, including from the banking sector, have not yet sufficiently developed.

The country's transition to innovative development remains a key priority for the Russian Federation. The crisis phenomena observed in the domestic economy today are a direct consequence of the non-optimal structure of the domestic economy. About half of all revenues of the Russian budget come from the sale of raw materials on foreign markets. Such a dependence on the world conjuncture once again actualizes the need for forced transformations to increase the volume of innovative products produced, work performed, services rendered. It is necessary due to the introduction of sanctions against our country. Their action is directed against mining companies and financial sector. Western states are aware of the severity of the consequences of these actions for the Russian economy, and do not plan their early cancellation. In this regard, the policy of the country's leadership on the development of its own production and import substitution can only be welcomed.

VI. CONCLUSION

Thus, innovation implementation is associated with a high level of risk, and implies that its financing should be based on the multiplicity of sources involved. It determines the search for their optimal combination, identifying the advantages and disadvantages of the application.

The development of new mechanisms that will contribute to the consolidation of participants in the innovation process, attraction of additional resources to the innovation sphere, change in their quality characteristics as well as problem

solution of transforming savings into investments, is an urgent task at present.

The analysis showed that the current situation in the field of innovation is far from meeting the country's challenges in modernizing production and expanding the output of modern high-tech products. Long-term underfunding of the innovation sphere at the federal and regional levels will have serious consequences for the country as a whole, helping to preserve the raw structure of the national economy, enhance technological degradation, and reduce the international competitiveness of domestic non-commodity products.

All the risks associated with the preservation of the export-raw material model of the economic growth are clearly demonstrated by the current economic situation in the country. Serious reforms initiated by the authorities are an attempt to overcome existing financial constraints. All this indicates that the innovation scenario of the development of the Russian economy is the only possible one. It is important to note that the transition to an innovative development path should not be accompanied by a one-time abandonment of raw materials sources of growth.

Unfortunately, the main source of innovation financing is still own funds of enterprises, which are not always sufficient. The implementation of innovative projects, on the contrary, requires the involvement of significant amounts of financial resources. In such conditions it is necessary to form new approaches to solve the problem of consolidating the resource potential of various economic entities with their subsequent direction in the innovation sphere. One of the priorities is to improve the existing and develop new opportunities for bank financing of innovation processes in the regions and the country as a whole.

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References

[1] S. Albrecht, E. Bollhöfer, P. Brandstetter, F. Trippe and J. Woidasky, "Resource efficiency potentials of innovations in resource-intensive production processes", *Chemie-Ingenieur-Technik*, vol. 84(10), pp. 1651-1665, 2012.

[2] S. Anokhin, J. Wincent, V. Parida, N. Chistyakova and P. Oghazi, "Industrial clusters, flagship enterprises and regional innovation", *Entrepreneurship and Regional Development*, vol. 31(1-2), pp.104-118, 2019.

[3] D. A. Antipin , M. L. Bagaynikov, "Identification Of Investment Areas For Innovation Enterprise Activities As Regional Development Factor", *The European Proceedings of Social & Behavioural Sciences EpSBS*, vol. 4, pp. 25-32, 2018.

[4] D.A. Antipin, V.M.Pakholchenko and O.V. Tauryanskaya, "Banking supervision: current trends and prospects", *Proceedings of the International Conference on Trends of Technologies and Innovations in Economic and Social Studies*, vol. 1, 2017.

[5] T.Boshkov, "Creating successful management through risk exposure detection and access to finance of the company", *Quality - Access to Success*, vol. 18, Issue 156, pp. 116-118, 2017.

[6] T. Hu, _ C. Xie, "Competition, Innovation, Risk-Taking, and Profitability in the Chinese Banking Sector: An Empirical Analysis Based on Structural Equation Modeling", *Discrete Dynamics in Nature and Society*, vol. 1, 2016.

[7] J.T. Jalles, "A new theory of innovation and growth: the role of banking intermediation and corruption", *Studies in Economics and Finance*, Vol. 33(4), pp. 488-500, 2016.

[8] T. Koc, E. Bozdog, "Measuring the degree of novelty of innovation based on Porter's value chain approach", *European Journal of Operational Research*, vol. 257, Issue 2, pp. 559-567, 2017.

[9] A.S. Nechaev, D.V. Ognev and O.V. Antipina, "Analysis of Risk Management in Innovation Activity Process", *International Conference on Quality Management, Transport and Information Security, Information Technologies*, pp. 548-551, 2017.

[10] D. Pickernell, P. Jones. M. Beynon, "Innovation performance and the role of clustering at the local enterprise level: a fuzzy-set qualitative comparative analysis approach", *Entrepreneurship and Regional Development*, vol. 31(1-2), pp. 82-103, 2019.

[11] B. Stosic, M. Mihic, R. Milutinovic, S. Islamovic, "Risk identification in product innovation projects: new perspectives and lessons learned", *Technology Analysis and Strategic Management*, vol. 29, Issue 2, pp. 133-148, 2017.

[12] G.A. Tabacco, "Does competition spur innovation? Evidence from labor productivity data for the banking industry", *Economics Letters*, vol. 132, pp. 45-47, 2015.

[13] N.Taherparvar, R. Esmailpour, M. Dostar, "Customer knowledge management, innovation capability and business performance: A case study of the banking industry", *Journal of Knowledge Management*, vol. 18(3), pp. 591-610, 2014.

[14] D. Teece, M. Peteraf, S. Leih, "Dynamic capabilities and organizational agility: risk, uncertainty, and strategy in the innovation economy", *California Management Review*, vol. 58, Issue 4, pp. 13-35, 2016.

[15] N.A. Torugsa, A. Arundel, "Rethinking the effect of risk aversion on the benefits of service innovations in public administration agencies", *Research Policy*, vol. 46, Issue 5, 2017, pp. 900-910.

[16] M. Weimer, L. Marin, "The role of law in managing the tension between risk and innovation: introduction to the special issue on regulating new and emerging technologies", *European Journal of Risk Regulation*, vol. 7, Issue 3, pp. 469-474, 2016.

[17] B. Xu, Y. Xia and M.U. Rahman, "Enterprise level cluster innovation with policy design", *Entrepreneurship and Regional Development*, 31(1-2), pp. 46-61, 2019.

[18] I. Yeremenko, E. Rudskaya, "Banking business innovations: Conceptual foundations of modern economy development", *International Journal of Economics and Financial Issues*, vol. 6 (8 Special Issue), pp. 361-369, 2016.