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IDENTIFICATION OF INVESTMENT AREAS FOR INNOVATION ENTERPRISE ACTIVITIES AS REGIONAL DEVELOPMENT FACTOR

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Abstract

Innovation activities involve uncertainty and risks; therefore, a variety of investment sources, flexibility and adaptability of innovation processes are important principles of innovation financing. Financial support for an innovation project at all stages of its life cycle decreases market rejection risks and enhances its efficiency. An optimum combination of investment sources and forms has to be selected; their advantages and disadvantages have to be identified.

An innovation function of investment is its most important function. Investment helps upgrade fixed assets using research and development achievements for producing new or improved competitive products and developing new or modified efficient technology. Innovation activities are a basis for investment activities. Without innovation, capital investment is inefficient and products are noncompetitive.

Investment in regional innovation active enterprises requires identification of those ones which need for investment resources most of all. Priority areas of innovation active enterprises and features of regional development should be taken into account. In this respect, complex resource assessment for businesses engaging in innovation activities is required. To identify priority investment areas, a certain algorithm should be developed. Specific innovation areas should be determined based on a list of priority modernization and development areas of the country and its regions. A multiplier effect is taken into account as well. According to the effect, those objects should be financed whose development can create maximum demand for products of other industries.

Keywords: Enterprises, innovation activity, risks, regional development.

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1. Introduction

1.1. Financial support as a factor of innovation activities.

To be profitable, enterprises which compete in tough market conditions have to engage in innovation activities. Innovation activities are processes which result in creation of innovation products.

According to the world experience, implementation of innovation projects requires accumulation of investment resources and development of a flexible financing system (Matheis, 2016; Santa, 2014; Singh, 2017). Financing integrity and continuity for all stages of the innovation cycle, from fundamental researches to serial production, are crucial tasks which can be fulfilled by attracting investment resources from budgetary, non-budgetary, and corporate sources.

1.2. Need for continuous investment in the innovation cycle.

An existing financing mechanism for innovation activities is an obstacle for observing a financing continuity principle. As a rule, only separate stages of the innovation cycle are financed, and significant problems occur when passing from one stage to the following one.

Efficiency of the innovation process depends on involvement of all its stages in a uniform process and availability of investment resources. A variety of objectives pursued and alternative ways to achieve them, application of the same scientific and technical ideas in different industries with different results influence the search for potential investment sources and methods (Kodolova, 2015).

Availability of investment resources at all stages of the life cycle decreases market rejection risks and increases efficiency of innovation projects (Oulasvirta , 2017; Torugsa, 2017).

2. Problem Statement

2.1. Selection of investment priorities.

To enhance efficiency of investment resources, it is reasonable to assess their potential and identify priority investment areas. These activities can be performed by businesses themselves or federal, regional or local bodies developing and implementing innovation and investment programs (Lebedeva, 2015; Pedyash, 2015). To solve the task, the authors developed an algorithm which can be used to identify priority investment areas for innovation activities of businesses. The algorithm involves the four stages.

2.2. Enterprise potential assessment.

The algorithm can enhance efficiency of investment resources by assessing enterprise resources and selecting most significant innovation activity indices using correlation and regression and classification methods and identifying priority investment areas.

3. Research Questions

Having studied different viewpoints of Russian and foreign researchers, key characteristics of financing of Russian innovation enterprises were identified.

3.1. Continuity of innovation financing.

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First, a developed innovation support system should be integral so that its institutes ensure complex continuous financing of high-technology projects at all stages of their life cycles from development to serial production. Special attention should be paid to the projects at early, most risky stages when interests of private investors are minimum due to uncertainty of project perspectives.

In this context, the government could take an active role in financing of start-up companies contributing to initial researches and developments including development of working prototypes as a part of different industry and regional programs. At later stages of the project cycle involving commercialization of developments when investment attractiveness of projects is higher, the government contribution could be limited to credit warranty support activities and financing through private and public venture funds (Malkova, 2017).

It should be noted that governments invest in starting and later stages of high-technology projects in many leading countries (Valdez-Juárez, 2016). For example, in the USA, the Small Business Administration covers most research and development costs as a part of the Small Business Innovation Research Program – SBIR. After researches are completed, private investors invest in innovation activities but the government continues to support the projects through the federal system of venture institutes with private and public capital assets (Salamonsen, 2015; Su, 2017).

3.2. New investment methods for innovation activities.

Second, a range of financing mechanism for innovation businesses should be diversified using credit protection of venture companies so that they can get access to bank finances, subsidies to research and development activities, government procurement of high-technology domestic products (energy saving or medical equipment), high technology products export stimulation through the use of public export credits, guarantees and insurances. All these tools are not used in Russia which restricts government resources to stimulate innovation activities.

Public assistance to domestic businesses in purchasing foreign advanced technology for creating internal technology chains and high technology enterprises whose manufacturing, research and technology resources can be used for upgrading similar Russian enterprises. It would be reasonable to grant loans to Russian purchasers through federally-chartered organizations, carry out joint investment activities or invest in capital assets of foreign corporations (Lorincová, 2016).

3.3. Public financial support for innovation activities.

Third, programs of public financial support for innovation companies need to be modified. At present, they have no serious effects on the dynamics of innovation processes in Russia. For example, the budget of the Small Business Development Fund is 1,5 % of all the federal budgetary expenditures on researches (3,4 billion rubles in 2009), the budget of the Russian Technology Development Fund is 1,5–4 % of the federal budgetary expenditures on researches. In Finland, for example, in 2008, the National Innovation Agency TEKES granted 516 million Euros (more than 20 billion rubles) to Finnish companies. It is evident that domestic companies are on unequal terms with foreign ones due to restricted public financial support. It results in decrease in their international competitiveness.

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One more significant area of public support is efficiency enhancement for development institutes focused on innovation financing. To this end, the following measures should be taken:

– to establish investment priorities, including project selection principles and criteria integrated in public innovation policies;
– to create efficient innovation lift mechanisms;
– to organize technology platforms – permanent grounds with the participation of development institutes, business officials and researchers for discussing innovation projects in priority areas of technology development of Russia.

Thus, the current stage of economic development of Russia requires significant investment in traditional sectors and innovation projects. Meanwhile, Russia lacks an efficient mechanism which would encourage their diversification. Significant investment in innovation projects is able to turn Russian into a highly developed innovative country (Nechaev, 2015, 2016).

Currently, one of the key innovation financing sources is own resources of enterprises. However, implementation of innovation projects requires more significant financial resources. Therefore, new methods for attracting additional resources should be developed. The lack of such methods restricts innovation activities of businesses.

Thus, elimination of innovation financing restrictions and identification of optimum investment areas for innovation active enterprises are crucial research issues. The analysis showed that areas of innovation financing mechanism improvement are underexplored in existing research works (Nechaev, 2017).

4. Purpose of the Study

The study aims to develop approaches and guidelines for improving investment methods for innovation activities of enterprises.

5. Research Methods

To identify key innovation investment stages and analyze their efficiency, an algorithm based on correlation and regression and classification methods was developed.

5.1. The first stage of innovation financing algorithm.

The first stage involves creation of a set of innovation active enterprises whose economic indices are going to be analyzed.

5.2. The second stage of innovation financing algorithm.

The second stage involves selection of innovation activity indices and their classification by types of resources. To select indices having most significant effects, a correlation and regression method and a multiple linear regression equation were applied:

$$p_i = b_0 + \sum_{j=1}^{n} b_j k_j + b_j m_j \quad , \qquad (1)$$

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where p_i – values of innovation activity results determined by inserting corresponding values of factorial characteristics in the regression equation;

b_0 – free coefficient;

b_j – model parameters (regression coefficients);

k_j – factorial quantity innovation activity indices;

m_j – factorial quality innovation activity indices;

$j = \overline{1,n}$ – number of factors.

The formula is used to study relations between innovation activity indices and determine those ones which have most significant effects on final results. Both quantity and quality indices can be used.

5.3. The third stage of innovation financing algorithm.

The third stage involves classification of enterprises by innovation activity indices using a correlation and regression method. Mean values of selected indices are calculated by formula:

$$\overline{L_i} = \frac{\sum_{i=1}^{n} L_i}{n}, \quad (2)$$

where L_i – innovation activity indices in corresponding measurement units;

$\overline{L_i}$ – mean values of innovation activity indices in corresponding measurement units;

n – number of enterprises under study;

i – number of innovation activity indices, $i = \overline{1,n}$.

The formula is used to calculate mean values of innovation activity indices applied for classifying enterprises by innovation activity results. The classification of enterprises is based on the parameters presented in Table 1.

Table 01. Parameters of enterprise classification by innovation activity indices

Values of innovation activity indices	Classification criteria for enterprises
I. Low innovation activity index values	Enterprises with below middle innovation activity index values
II. Middle innovation activity index values	Enterprises with middle innovation activity index values
III. High innovation activity index values	Enterprises with above middle innovation activity index values

Thus, comparison of innovation activity indices can be used to classify enterprises into the three groups regardless of their characteristics.

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5.4. The fourth stage of innovation financing algorithm.

The fourth stage involves identification of priority innovation activity financing areas. To this end, according to Table 2, innovation activities are identified for each group of enterprises:

Table 02. Identification of innovation areas (IA) for an enterprise

Enterprise classification parameters by IA values	**Directions activities**	**Values of used notation**
I. Enterprises with low innovation performance	$O_i = L_{i\min}$ (3)	O_i – directions of activity for enterprises with low IA values; $L_{i\min}$ – the minimum value of the innovation activity indicator from a group of enterprises with acceptable characteristics.
II. Enterprises with average indicators of innovation activity	$O_i = \overline{L_i}$ (4)	O_i – directions of activity for enterprises with average indicators of IA; $\overline{L_i}$ – average values of innovation performance indicators from a group of enterprises with acceptable characteristics.
III. Enterprises with high innovation performance	$O_i = L_{i\max}$ (5)	O_i – directions of activity for enterprises with high indicators of IA; $L_{i\max}$ – maximum values of indicators of IA from a group of enterprises with acceptable characteristics.

Minimum index values for enterprises with acceptable characteristics can be targets for enterprises with low innovation activity index values. Middle index values can be targets for the second group of enterprises. Maximum index values for enterprises with acceptable characteristics can be targets for enterprises with high innovation activity index values.

To identify investment areas, deviations of innovation activity index values from target values are calculated by formula:

$$N_i = \frac{L_i}{O_i} * 100\% \text{ ,} \qquad (6)$$

where N_i – deviation of the innovation activity index value from the target value;

L_i – innovation activity indices;

O_i – innovation activities of enterprises.

The formula calculates the deviations of innovation activity index values by each enterprise from target values to identify priority investment areas.

6. Findings

Thus, the algorithm helps select most significant indices of innovation activities of businesses, classify innovation active enterprises by values of these indices, determine innovation directions and

identify priority investment areas. Identification of priority investment areas enhances efficiency of investment resources due to complex assessment of business resources.

7. Conclusion

7.1. Resource mobilization possibilities.

Financial support for innovation activities in Russia is not sufficient. However, the national economy has enough resources to increase the volumes of investment in innovation activities (resources of pension funds, insurance companies, credit organizations, the Reserve Fund, etc.). It is important to involve most of these institutes into financing of innovation activities.

7.2. Clear priorities as an investment factor.

The lack of clear investment priorities which affects investment efficiency is an important feature of investment in innovation activities of enterprises. To solve this task, the authors developed an algorithm which allows selection of optimum innovation activity indices by their values, identification of targets and investment priorities. Identification of investment priorities can enhance efficiency of financial resources by assessing enterprise resources which will have positive effects on regional and national development rates.

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