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Barriers to Innovation in the Implementation of the Investment Strategy: an Empirical Study

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Abstract

The problem of inward investment to the innovative economic sector is very acute today. The investment determines the economic development, but nowadays the low efficiency of investment activity in the sphere of innovations is obvious. This indicates the need for correction of the strategy taking into account social processes. The implications of innovative changes are not always predictable. The society takes innovations with a great caution. The innovation resistance can differ by the degree of its manifestation depending on the scale of innovative changes. Barriers encountered in the innovative changes hinder the innovative activity of financial companies, prevent the creation of new institutions and formation of innovative strategies, hamper the development of the actors implementing investment projects. This article studies the causes of innovative resistance and the parameters of existing barriers. The existence of innovation barriers and their detailed classification is described for the first time. The aim of this study is to create a model that allows to assess the barriers to the innovative development basing on their parameters. The study justifies the factors of the investment strategy adaptation in order to create the environment of successful activity for a company in the innovative region. The study determines the influence of these parameters on the state investment strategy. The suggested model is based on the statistical data from the State Statistics Committee of the Russian Federation. It can be implemented to analyze the innovative situation in a region in order to provide a necessary adaptation of the investment strategies.

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1. Introduction

Before the financial crisis in Russian economy there was an investment boom. It was characterized by concentration of investments in the sphere of activity of large (and especially, state-owned) companies. However, the Investment Development Strategy entirely depends on the ability to the rapid perception of innovations and determines the economic security of the state.

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This provision has an external and internal component. The first is about ensuring the scientific and technological security first of all. This requires strong scientific and technological capabilities, allowing to confront any dictates from the outside, which restricts our access to advanced technologies and breaks the existing production chains. The internal component of rapid perception is connected with the spread of innovations, allowing to prevent man-made and natural disasters, terrorism and illegal actions.

To ensure the innovative process it is not enough to increase the investment into the scientific research sphere. It is necessary to influence the factors of this process development, to create the technological, intellectual, structural, institutional and motivational prerequisites for an innovative type of economic growth.

The resistance to change and innovation has been deeply studied and described in works of the Social Systems School, where they assess the change of the new product perception, i.e., the innovative behavior of individual. A great contribution to the development of these issues has been done by D. J. Burns, S. Im, B. L. Bayus, C. H. Mason, G. Roehrich, R.F. Kleysen, Chr.T. Street, Thomas Zwick (Burns D. J., 1987; Im S., 2003; Roehrich G., 2004; Robert F. Kleysen, 2001; Franch, 2013; Knoke B., 2013; Zwick Th., 2002).

The other group of works is devoted to the assessment of obstacles to innovation and the production process chain in the form of knowledge perception and transfer: X. Franch, Pn. Soffer, Knoke, B., Wuest, T., Thoben, K. - D. P.Nijkamp, P. Rietveld, I. Salomon, B.F. Klimova, I. Semradova, C. Van Dijk, J. Van den Ende (Nijkamp P., 1990; Klimova B.F., 2012; Van Dijk C., 2002).

Separately, we can mention the papers of S. Ram, Robert F. Kleysen, Christopher T. Street, Susanne G. Scott, Reginald A. Bruce, David J. Burns (Klimova, B.F., 2012; Van Dijk C., 2002; Ram, S., 1987; Kleysen, R.F., 2001; Scott S.G., 1994; Burns D.J., 2007) – on modeling of innovation resistance and the way of innovation in the workplace. But these works are mostly of a micro-economic nature, they don't study the innovation policy implementation process in general from the perspective of a region or country. This article studies the process of overcoming the resistance to investment into innovations by means of creating a model which allows to diagnose the barriers to innovations when implementing the investment strategy. This research is very actual nowadays, as the innovative activities are a catalyst for public well-being. So the identification of barriers to innovations does not only expand the scope of knowledge on the problems of increasing well-being, but also helps to discover new ways, providing the prosperity of the region.

2. The innovation resistance

An innovation is an idea, product or technology used in the production which is perceived by the consumer as new or having unique qualities (Wong, S.K.S., 2013; Maranville S., 1992; Frankelius P., 2009). However, when introducing something new, we encounter such a problem as the resistance to innovation. This phenomena is caused mostly by people's conservatism and inertia which significantly complicate the perception of innovation (Kleijnen M., 2009).

The changes encouraging the economic development through the investment in knowledge and technology cause such changes in relative prices and allow economic actors to create such organizations which provide them with the benefits of access to limited resources. The asynchrony between the introduction of technologies and the accompanying institutional arrangements in the modern world leads to an innovational stagnation.

In modern conditions the basic and most important part of regulations is reflected in the set of laws, judicial and administrative acts. The political institutions are primary in relation to the economic ones, so the State determines the norms and rules of the economic actors behavior. Thus the state can influence the processes occurring inside it, such as barriers to entering and exiting the market the interest to invest into these projects. It can set the conditions for the functioning, benefits and so on. So, the institutional barriers depend on the state.

A direct influence of the state on the investment process is expressed in the following forms. The state as an investor performs the functions of financing the branches of industry whose production has nationwide nature and can be manufactured only at the state enterprises or at the enterprises which will not become private in the nearest future in accordance with the current legislation.

Central banks can indirectly affect the investment activities through regulation of the required minimum reserves. This method consists in the fact that the central bank sets the reserve requirements to the commercial banks as a percentage of the amount of their deposits which are stored in its accounts. An increase in the reserve requirements reduces the size of credit resources, and vice versa, when decreasing the requirements the commercial banks get the possibility to expand credit operations and to increase the proportion of long-term loans, thereby encouraging the investment process.

The innovation resistance (obstacles to investment into innovations) is manifested in a series of barriers which can be divided into 5 groups:

- 1) Infrastructural:
 - lack of a developed infrastructure able to provide the creation of national informational resources required to maintain the scientific and technological progress and innovation development which is constantly speeding up;
 - imbalanced innovative environment, including enterprises, research, technological and educational spheres;
 - obstacles to the efficient commercialization of innovations (as regulation in the field of trade).
- 2) Connected with the form of innovation activity support:
 - lack of local centers supporting the innovation activities;
 - sputtering of investments to various sectors;
 - low investment activity in the municipalities;
 - long-term passage of documents necessary for construction (reconstruction);
 - slow transformation of social structures and resistance of consciousness;
 - lack of innovation of a functional purpose;
 - lack of significant sources of venture capital;
 - low liquidity of risky investments;
 - low prestige of entrepreneurship in small science intensive business;
 - underdevelopment of cooperation links;
 - relatively low quality of the actors' investment portfolios;
 - strategy of the industrial sector under conditions of uncertain economic situation in the country is not focused on the innovative development and use of the results of domestic research and development;
 - lack of bringing scientific ideas to the stage of commercial use;
 - lack of collaboration between marketing agencies and scientists;
 - overestimation of the innovative capacity;
 - low rate of introduction of innovative products to the market.
- 3) In the sphere of education and management:
 - insignificant level of interaction between higher education and business;
 - lack of flexible system for advanced training and retraining of professionals in the field of innovations;
 - focus of the scientists on the research, but not on the final result (an innovational product);
 - lack of sufficient quantity of professional managers of venture capital funds and low level of entrepreneurs' investment culture.
- 4) Determined by actions of the state:
 - prevalence of political objectives over the economic ones;
 - legal and organizational problems;
 - non-efficient current system of copyright protection;
 - lack of certainty in setting goals for the program in the state itself;

- disunity among the various ministries (first of all, the Economic Development and Trade, the Ministry of Education and the Ministry of Communications, and also several others: Ministry of Industry and Energy, Ministry of Atomic Energy and the Ministry of Finance);
 - lack of projects which can be implemented with the use of public-private partnership.
- 5) Informational:
- poor informational support of venture business;
 - limited awareness of the customers about financial products;
 - lack of statistical data for accurate calculation of tariffs and reserves.

3. Model indicating the barriers to innovations

We have the task to improve the behavior of the system of investments in innovations. In connection with this it is not important if we study the micro-economic level (an enterprise providing goods or services) or the macroeconomic one (regional or national economy). The progressive development of the system comprises an increase of the quantity of similar elements, selection of elements, differentiation and integration of structures. This improves the reproduction reliability in order to intensify the functions and to expand the ties with the environment.

The problem of necessary calculations under conditions of fuzzy parameters or inaccurate technological information in the equations can be solved by constructing a system of fuzzy sets and by the regression analysis (Baoding L., 2002). Our model is based on the assumption about the existence of a group of parameters illustrating the features of the investment strategy in the field of innovation. On the results of the statistical database study after a preliminary regression analysis 3 groups of parameters have been formed and a series of their features characterizing the barriers in each group have been indicated:

- 1) the group determined by the state actions and infrastructure;
- 2) the group depending on the form of activity support;
- 3) the group connected with education and management.

Tables 1 - 3 present the source data for these three groups respectively.

Table 1. The source data for the group determined by the state actions and infrastructure (State Statistics Committee of the Russian Federation, 2014)

Year	Investments in non-financial assets at actual prices, (bln. rubles)	Proportion of enterprises and organizations performing research and development in the total number of enterprises and organizations by economic activities	Proportion of technologies having a purity of patent in the total number of advanced production technologies	Expenditure on technological innovation in various economic spheres (bln. rubles)
	Y	X1	X2	X3
2002	1787.42	0.030452761	0.320495186	92443.9
2003	2210.72	0.028266422	0.438489647	120227.4
2004	2891.02	0.016322927	0.467455621	142345.8
2005	3677.29	0.015438508	0.464678179	143222.6
2006	4640.83	0.011560822	0.552380952	207384.6
2007	6797.77	0.010545680	0.514102564	232624.7
2008	8897.26	0.009493074	0.608640407	300410.3

2009	8072.87	0.008686999	0.557667934	391652.0
2010	9272.64	0.008815189	0.608796296	388447.3
2011	11215.14	0.009045514	0.588752197	733815.9
2012	12786.16	0.009045514	0.594104308	666891.2

Table 2. The source data for the group depending on the form of activity support

Year	Investments in non-financial assets (at actual prices), (bln. rubles)	Proportion of employees occupying administrative positions (employed in document preparation) in total employment in the economy	Expenses of organizations on the information and communication technologies (bln. rubles)	Amount of innovative works and services (bln. rubles)
	Y	X1	X2	X3
2002	1787.42	0.130775964	160212.8	210575.1
2003	2210.72	0.143465571	164572.3	332824.3
2004	2891.02	0.14895582	168373.3	461023.5
2005	3677.29	0.147090241	215301.6	589005.3
2006	4640.83	0.146135946	252029.7	773110.9
2007	6797.77	0.155334181	299389.4	955201.2
2008	8897.26	0.155415968	372733.4	1095799.0
2009	8072.87	0.162354128	421377.8	924539.5
2010	9272.64	0.163082335	515648.2	1228384.0
2011	11215.14	0.16584106	603006.8	1921808.2
2012	12786.16	0.164679572	842673.9	2565696.6

Table 3. The source data for the group connected with education and management

Year	Investments in non-financial assets (at actual prices), (bln. rubles)	Proportion of highly qualified specialists in the total employment in the economy	Proportion of people with higher education in the total number of Russian citizens working abroad (by level of education)	Issue of doctoral studies in the scientific research institutes (number of persons)
	Y	X1	X2	X3
2002	1787.423935	16.24395584	39.97970161	151
2003	2210.717897	16.16939365	35.31708546	138
2004	2891.019173	17.54997468	26.64771718	140

2005	3677.291242	17.35929916	34.27108295	154
2006	4640.8308	17.43774299	31.79004365	155
2007	6797.773279	19.13208027	35.90015172	148
2008	8897.264438	19.15357704	33.64829755	139
2009	8072.874494	19.05077708	47.54771064	116
2010	9272.644377	18.79432116	39.36300473	123
2011	11215.14228	18.82740485	43.76378629	107
2012	12786.1648	19.36962751	41.34534721	95

The regression analysis allowed to reveal the influence of the features on the investment strategy, to trace the relationship between the features within each group and to digitize the quantity of investments in non-financial assets (bln. rubles, at actual prices) in 2002–2012.

The following scheme of our model graphically shows the existence of innovation barriers when implementing the investment strategy. The value of features allows to diagnose the presence of a barrier. To simplify the model perception three characters are introduced:

- «+» shows the presence and efficient activity of a feature, which indicates the absence of a barrier;
- «-» shows the absence of necessary factors, which indicates a significant barrier in the implementation of the investment strategy in the field of innovation;
- «/» reflects the presence of necessary factors but their use is not efficient, which also indicates a barrier.

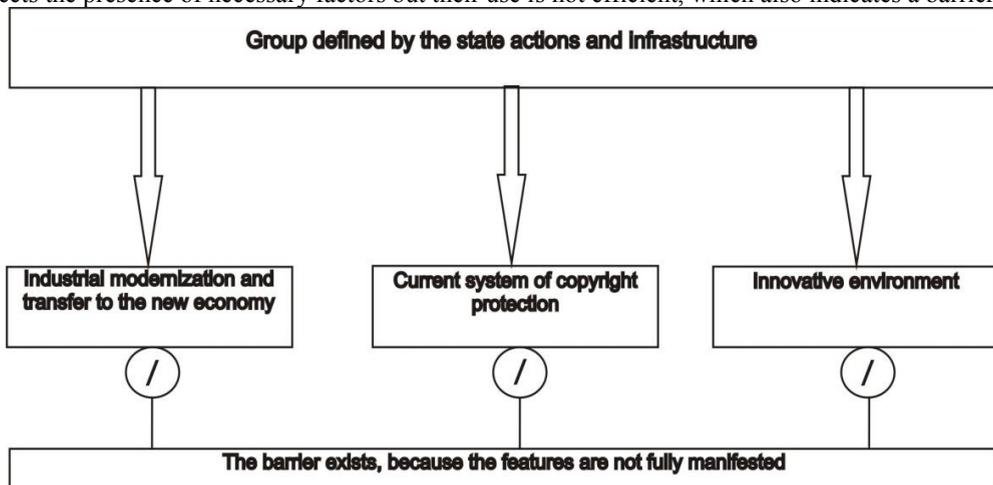


Fig 1. Model of the barrier determination for the group, determined by the state actions and infrastructure (author data)

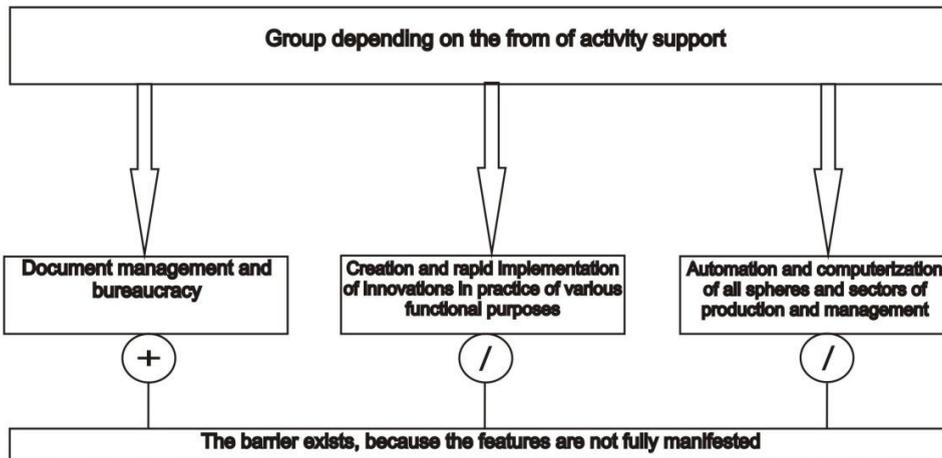


Fig 2. Model of the barrier determination for the group depending on the form of activity support (author data)

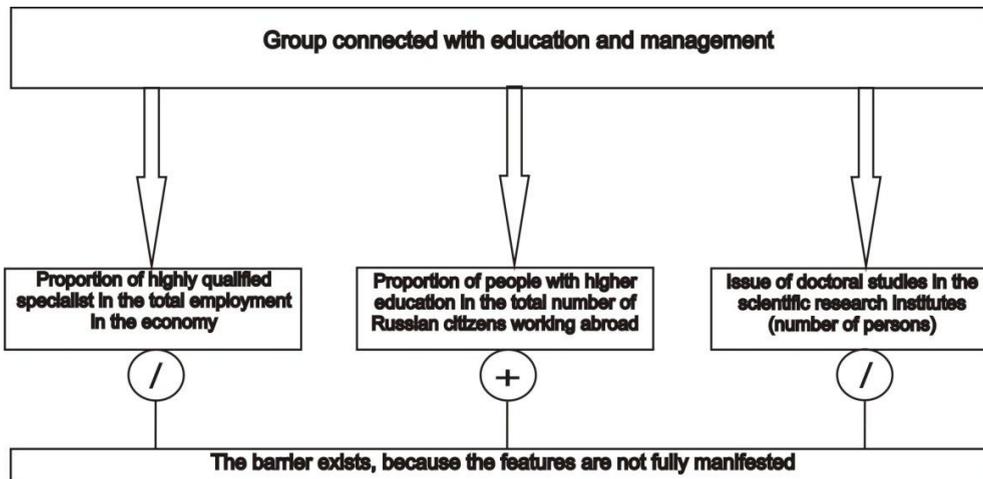


Fig 3. Model of the barrier determination for the group connected with education and management (author data)

As it is seen from Figures 1, 2 and 3, all the barriers (hindering the investment in innovation) exist. The features which determine these barriers are: the political objectives prevail over the economic ones; the current system of copyright protection is non-efficient; the basic elements of the innovational sphere (scientific and technical sphere, educational sector and enterprises) are imbalanced and exist in isolation from each other; the document management and bureaucracy are still an obstacle to an efficient innovational and investment activity; the automation and computerization of all spheres and sectors of production and management is not going rapidly enough; the creation and practical implementation of various functional innovations is not rapid enough, there are significant time gaps between the development, commercialization and application of inventions. "Brain drain" is also an important obstacle.

Let us analyze in more detail how each of the features affect the investment strategy of the state.

The proportion of enterprises and organizations performing research and development in the total number of enterprises and organizations (by economic activities) during 11 years decreased by 30%. The proportion of technologies having a purity of patent in the total number of advanced production technologies increased from 2002 to 2012. The expenditure on technological innovation in various economic spheres (calculated in millions of rubles) in the period from 2002 to 2012 increased by 7 times. In 2011 there was a sharp jump in the direction of increasing the both indicators, but in 2012 the latest indicator slightly decreased. The proportion of employees occupying administrative positions (employed in document preparation) in total employment in the economy increased, which shows the necessity to continue the struggle with bureaucracy. The expenses of organizations on the information and communication technologies (mln. rub.) increased by 5 times. The amount of innovative works and services (mln. rub.) increased by 12 times, which shows a positive result of the innovational activity, and the increase was uneven due to the crisis of 2008–2009, but later, in 2011–2012, there began an active growth of these works.

The proportion of highly qualified specialists in the total employment in the economy is increasing, but for a better development it should grow at a higher rate. The proportion of people with higher education in the total number of Russian citizens who went to work abroad is also increasing, which indicates an outflow not only of labor force, but also of better human capital. The issue of doctoral studies in the scientific research institutes decreased almost by 1,6 times, which shows reduction of relevance of this development trend.

4. Conclusion

Our model shows that in all the three groups there are no signs of reducing the barriers to the efficient investment activity of the state. All the groups are characterized by the presence of parameters of an attribute appearance, but their change is not enough for a successful investment activity, and it indicates the presence of barriers. Besides, in the groups «form of activity support» and «education and management» there is a stable feature which increases the barrier of a successful investment activity. It shows the necessity of improvement and adaptation of the state strategy.

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