

Research Article

Models for Elimination of Institutional Gaps within the Innovation Activity

**Farida F. Galimulina^{1*}, Aleksey I. Shinkevich², Vilora V. Avilova³,
Guzyal M. Kharisova⁴, Ekaterina L. Vodolazhskaya⁵, Irina V. Lushchik⁶
and Elena V. Novikova⁷**

¹Department of Logistics and Management, Kazan National Research Technological University,
Kazan, Russia. E-mail: dlogscm@kstu.ru

²Department of Logistics and Management, Kazan National Research Technological University,
Kazan, Russia. E-mail: ashinkevich@mail.ru

³Department of Economics, Kazan National Research Technological University,
Kazan, Russia. E-mail: avilovavv@mail.ru

⁴Department of Business Economics in Construction, Kazan State University of Architecture and Engineering,
Kazan, Russia. E-mail: rida@mail.ru

⁵Department of Economics, Kazan National Research Technological University,
Kazan, Russia. E-mail: alla-r81@bk.ru

⁶Department of Accounting, Taxation and Customs, Witte Moscow University, Moscow,
Russia. E-mail: luschikira@yandex.ru

⁷Department of Urban Economics and Housing Law, Moscow Metropolitan Governance University,
Moscow, Russia. E-mail: 0284@rambler.ru. *corresponding author email: dlogscm@kstu.ru

ABSTRACT

The paper is relevant due to the fact that the study of the problem of collaborative connections of research and production is urgent nowadays, for it is an actual issue in resisting the lag of domestic technological growth from the level of the developed states. It is aimed at adjusting the gap's preconditions of research and production segments of domestic economy and presenting economic models, the realization of which will reduce or eliminate the institutional gaps. The paper illustrates domestic practice of cooperation of research and production, identifies the national features of integration connections of research and production, based on the challenges revealed as the reducing of institutional gap suggests a "triple spiral" model and created on its basis the technological platform's model. Study conclusions are of practical value for public authorities in the formation and realization of federal and regional programs of innovation development, of regional infrastructural development, contributing to the innovative activity and application of instruments of technological platforms for it.

Keywords: consolidation, innovative formation, triple spiral, the institutional gap, mechanisms of innovation, institutional gap.

INTRODUCTION

The study relevance

A significant objective of the formation of the national innovative system is to reduce the institutional gaps between research and production. The institutional gap is understood the flow from the research sphere into the sphere but not all stages of movement are contributed by the Institute of Innovation. The study of interrelations of research and production is quite relevant nowadays due to the serious nature of the problem consisting in the fact that Russia has to overcome the lag in technological

development from the developed countries of the world. Countries which were not subjected a period of state monopoly, the prevailing part of the research is implemented by enterprises engaged in innovative products. The pre-crisis period of domestic research production accounts for only 5% of the personnel, participating in research production and about 6.5% of the total R & D implemented in the country (Sukhovey, 2009). This makes low transferring of new knowledge from the research sector into the production within the

national innovation system; it keeps low cost-efficiency of the realization of researches and needs more contribution to the innovative infrastructure. The institutional gap of research and production is one of the major explanations that today only 8-10% of domestic innovative projects are commercialized and demand for R & D results is satisfied mostly by importing. It is assumed that technological platforms are efficient mechanisms to avoid the current institutional gap in the value chain in the sector of innovation and institutional traps of double-stranded innovation interrelations in domestic environment of Russia.

METHODOLOGY

The study is based on fundamental and applied researches of foreign and Russian specialists who are engaged in the institutional models and the innovation processes. The subject of the study is institutional gaps emerging among the participants of innovative process. The study covers organizational and managerial interrelations emerging in integration process between research, production and state within the innovative formation. The study is aimed at defining mechanisms to reduce institutional gaps that appear at different phases of the innovative process in domestic conditions of Russia and determining of mechanisms for their avoiding. The study involves method of systematization of analytical data belonging to foreign and

domestic economy within the innovative activity, as well as the methods of formalization, analysis and synthesis. The complex methodological solution contributed to attain the objective outcomes of the study.

The study includes: 1) Identification of the problem of interrelation between the entities of the innovative process, realized in Russia; 2) the demonstration of evolution of the system of participants' interrelation; 3) justification of technological platforms as mechanisms to reduce the institutional gaps within the innovative process.

The study outcomes

The challenges in the course of interrelations between the entities of innovative process are clarified

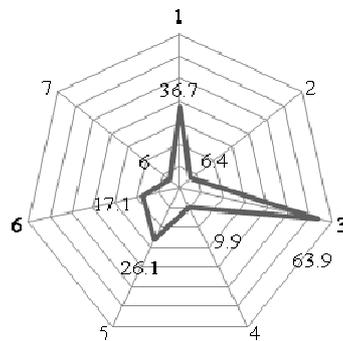
It is important to investigate the structure of finance sources of technological innovations. Production which is connected with huge business is less interested in this type of innovation; while for enterprises with small business the innovation is the way out to rapid growth. There is a variety of business contributing programs in the sphere of high-tech production but the main source of financing for R & D is the enterprises' own funds: the accumulated and retained profit, deterioration, share capital, the proceeds from the sale of shares, the proceeds from the issue of securities (Figure 1) (Kudryavtseva, 2016).



Figure 1. Sources of financing of technological innovations in domestic high-tech field, 2014, % (RY HSE, 2016)

A significant issue of Russian research is the low level of requirements of the public economy on research and development. The International Economic Forum annually estimates the extent of consolidation of research and production in the sphere of research and development. In accordance with the estimation, in 2014 Russia was on the 45th place among the 140 countries with an index of a

weighted average of 3.6 out of possible 7 (2011 -on the 85th place among the 144 countries with an index of a weighted average of 3.4 out of possible 7). As for the United States within this rating it is on the 3rd place with the closeness of consolidation of educational institutions and industrial enterprises - 5,8 (World Economic Forum, 2015). In spite of the competitiveness of research in Russia, precedence is given to the acquiring of existing technologies in other countries and it is explained by the relatively low degree of riskiness and lower cost (Figure 2).



1 - research and development, 2 - acquiring of patents and licenses 3 - buying of equipment 4 - acquiring of new technologies 5 - acquiring of software, 6 - training of personnel 7 - Market study

Figure 2. The share of the production enterprises which are engaged in particular kinds of innovative activities in the total number of companies realizing technological innovations by the end of 2014 (RU HSE, 2016)

For the production segment of domestic economy in the R & D preference belongs to the acquiring of equipment (63.9%) and research and development on their own (36.7%) (RU HSE, 2016). But in accordance with the outcomes of 2014 the largest share of newly presented innovative products in the total amount of shipped goods, activities and services is new just for the enterprise - 4,9% (in high-tech spheres of the economy). Innovative to the international market in 2014 were only 0.01% of all goods, activities and services provided, while in 2013 the rate was 0.04%, in 2011 - 0.9% (RU HSE, 2015).

There are a number of causes for the non active organization of business in R & D. According to the outcomes of an interview organized by the Union of Russian Industrialists and Entrepreneurs, the main barrier in the innovative activities of enterprises is the lack of their own capital (see Figure 3).

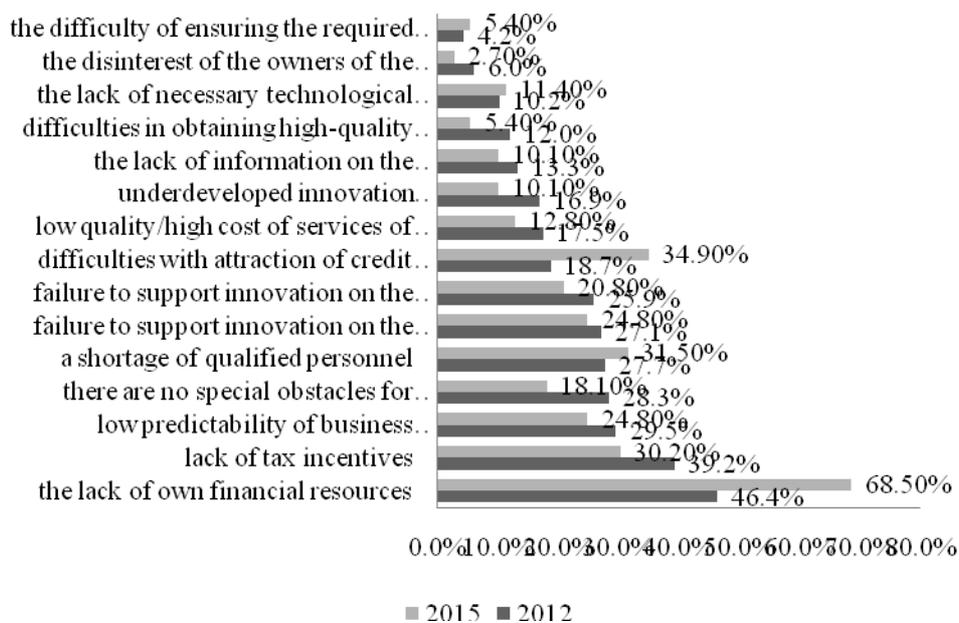


Figure 3. Factors that hinder the development of demand from the production on R & D in Russia (% of interviewed) (RSPP, 2015)

It is significant to take into account such factors as lack of competent staff. Despite the growth in the quantity of researchers with advanced degrees (2008 - 101 thousand people, in 2014 - 109 thousand

people), the total amount of staff engaged in research and development, is gradually reducing (Figure 4).

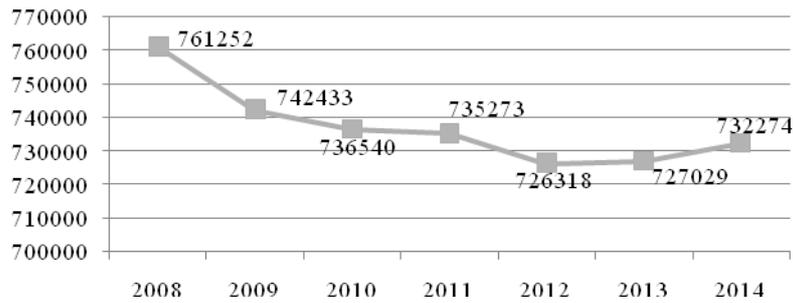


Figure 4. Dynamics of the amount of staff engaged in research and development (pers.) (Rosstat, 2016)

Thus, in 2013, 63.5% of young employees resigned from the research institutions of their own accord due to socio-economic problems (RU HSE, 2015). Consequently, the proportion of old groups of researchers is growing: employees aged over 60 make up 26%. Besides, the share of entrepreneurs who do not notice any barriers for innovations is growing: there is a positive tendency in the range of 7% (RSPP, 2015)

M. Weber considers that entrepreneurship primarily is based on research and technological innovations. So, entrepreneurs are commonly driven by research inventions, making demand for innovations. The existing obstacles' overcoming in the interrelation between research and production belongs to state, as it serves as a consolidator of joint efforts.

Formation of partner interrelations

Traditionally partnership involves 3 phases in its formation. In the command economy system the interrelations of the state, production and research used the static model which was characterized by a lack of interrelation. There was a predominant government control of economy, production and research. Absence of competition resulted to low interest on the side of production to the research. Monopolies were kept by ministries and took a fixed status in the public economy (Figure 5)

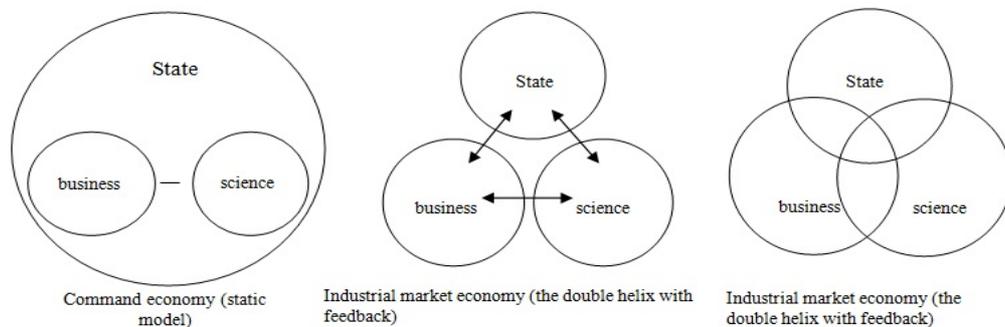


Figure 5. Development of the system of partner interrelations (Katukov, Malygin & Smorodinskaya, 2012)

The production market economy resulted to the occurring of double interrelations of these entities. A competitive environment gives rise to the effects of economic agglomeration. The example of interrelation of state and production are financial-production groups. Research is involved into production, contributing to well-known inventions implemented for industrial aims. Post-industrial economy is characterized by the innovative environment which leads to the interactive consolidation. The success of innovation

depends on the diversity of synergetic interrelations of three segments. The idea is here - the development of the cluster alliance, the interrelationship system which can be illustrated by the model of the "triple spiral" (Katukov, Malygin & Smorodinskaya, 2012).

Every of three entities of the "triple spiral" (educational institutions, production and state) implements its feature: production carries out industrial-production feature; government – fulfills control of contractual interrelations of the parties, guarantying the stability of the

interrelation and exchange of information; educational institutions serve as the source of new knowledge and technology.

The core part in the "triple spiral" model belongs to the educational institutions. It is conditioned by the phenomenon that knowledge is becoming the main force in the competitiveness of the country. In contrary with the public-private partnership, in which the prevailing role belongs to government, "triple spiral" gives the first place to research. The process of consolidation network of three entities takes place: their competencies are exchanged and acquire the complementary nature. Educational institutions interrelate at every phase of the innovative process. At the initial phase of knowledge generation there is an interrelation of government and research, then in the process of technology transferring the educational institutions interact with production, and the outcomes are introduced to the market by joint efforts of the government and the private segment. The efficiency of interrelations depends on the fact with which the entities of the model are cooperating. Significant is the complementary nature of the entities: research contributes to the enterprises, business centers to the educational institutions, government to the representatives of venture capital funding. Nowadays the model of the "triple spiral" is accepted as a classic model of consolidation which is necessary for innovation and is used in the economy of the developed and of the developing states and states with economies in transitional period (MacGregor & Carleton, 2012). Russia is a country in which the model does not operate completely. The economy of Russia possesses the peculiarities of semi-market system, with prevailing of the paired interrelationship with the dominance of the government and the absence of feedback (Katukov, Malygin & Smorodinskaya, 2012). The outcome of incomplete cross-sector interrelation is the occurrence of institutional "gaps" - situations which are inefficient within the stability of innovative formation of the institutional direction, only optimal for two entities - a local optimum ("anti-institute of innovation"), where entities' purpose is to provide for that new technologies do not occur,

gaps are kept (Shinkevich, 2011). There is a direct interaction between the extent of differentiation of the constituent parts in the "spiral", connected with the innovation and the market, and the probability of "gaps". This regularity at a particular place makes it possible to attain sustainable growth, as these parts can interrelate together in different kinds of economical activities. In cooperation "research-production" technology gaps take place as an outcome of a closed process chain. Gaps in a spiral "government-research" are expressed as "inability" of government support for innovations (Shinkevich, 2011). Cross-segment interaction with government participation cannot be overcome because of the wish of the government to keep to the vertical interaction with other entities of the "spiral", which contradicts the contemporary innovative demands. That is why, the government cannot avoid such traps. As a primary source of financing, government support draws material production. As an outcome there is a stable local optimum between production and state. M.V. Shinkevich (2011) explains the existence of institutional gaps with a negative transactional effect of innovation formation in the production segment.

Industrial production involves chemical technologies which are connected with the high-level medium technology segment. The government is interested in contributing to not all types of industrial production, so the exit is a technology platform that unites high-tech sub-segments (sphere of new materials, deeper processing of hydrocarbon raw materials, energy effectiveness, energy saving, nuclear energy and so on.) and low-tech traditional and commodity production (mining, metal processing, fertilizers, petroleum production, etc.).

Technology platforms - a mechanism to reduce the institutional gaps within the innovations

If to compare the level of innovation in fields such as mining, manufacturing, and marketing research, engineering availability of raw materials is watched for raw kinds of economical activity, as foreign enterprises are interested just in the feed stream, independent

processing of raw materials and production of new products (Figure 6).

R & D in the production segment of the economy is low, reduced in the result of pressure of innovations' developers, sales of obsolete technology and imports of high-tech products. This fact disturbs the growth of domestic position on the international arena (Galimulina et al., 2016). It is assumed to reduce depression from imports of high technology products and to improve the level of development and, then, exports of R & D in the

production segment of the economy via technological platform as a mechanism for balancing the level of innovation in these kinds of economical activities. Macro-technologies as the key of technology platforms will integrate the processes of production, processing and marketing of high-tech products in a unite chain, which will strengthen the level of competitiveness, the amount of domestic exports and overcome the suppression of the domestic research from the imports.

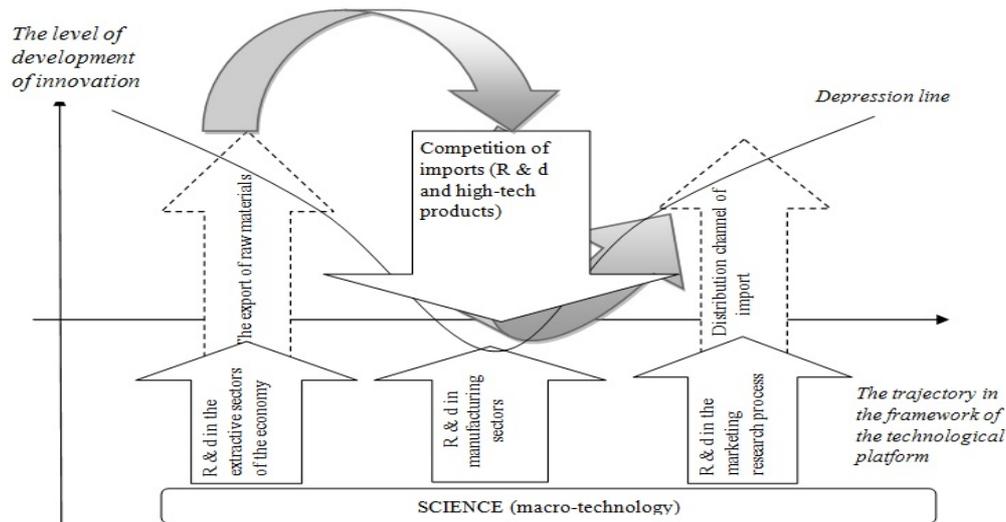


Figure 6. Depression of high-tech segments of the domestic engineering model (Galimulina, 2015)

Avoiding of institutional gaps is possible with third-participant's innovative involvement within the double spiral. Model of "triple spiral" constructs the base of the principles for the development of technological platforms. The technological platform is explained as connectional mechanism directed on stepping up efforts to form advanced commercial technologies, new products and services, to attract additional sources to research and development based on the involvement of all entities (production, research, government, public), to strengthen the legal framework in the sphere of research and technology, innovative growth. Technology platforms, along with other mechanisms, are constructed to strengthen the cooperation of various entities of the innovative system. The core stakeholders are not only researchers and R & D practitioners but also managers, production associations, government authorities, businesses, consumers, etc.

DISCUSSIONS

Bridging the gap between the production and research segments is the most significant objective of development in Russia for a fertile atmosphere for innovations. In economic literature, this concept is illustrated by the categories "abyss", "failure", "valley of death" by a number of scientists like (Freudenthal & McLaughlin, 2009, Saritas, 2013, Shinkevich, 2011).

M.V. Shinkevich (2011) in his studies considers forecasters of institutional gaps, based on the presence of a negative transactional impact of innovative growth in the production segment. But, it is not specified within what interrelations these gaps occur (research-production, research-state or production-government) and the integrative interaction of these institutions are taken into account within the framework of the "triple spiral" model and

problems' solutions on the determined institutional gaps' reducing.

CONCLUSION

So, the model of the "triple spiral" and based on it the mechanism of technology platforms is presented to avoid the institutional gap between research and production. Besides, the domestic public innovative system should try to destroy the blurring contours of the system, its absence of backward linkages and consolidation of actions and to determine the entity clearly who is responsible for the optimal solutions and their realization. The analysis of the pairwise interrelation of institutions-research-production, research-state, and production-government allowed revealing the challenges inherent in the domestic innovative system and to formulate a complex of tools to optimize these interrelations that will contribute to a more full application of the innovative capacity of Russia.

REFERENCES

1. Freudenthal, G. & McLaughlin, P. (2009). Classical Marxist Historiography of Science: the Hessen-Grossmann-Thesis. The Social and Economic Roots of the Scientific Revolution: Texts by Boris Hessen and Henryk Grossmann. *Boston Studies in the Philosophy of Science*, 278, 1-40.
2. Galimulina, F.F. (2015). Managing the development of technology platforms in innovative sectors of the Russian economy: PhD Thesis, Kazan.
3. Galimulina, F.F., Shinkevich, A.I., Komissarova, I.P., Mayorova, A.N., Astafyeva, I.A., Klimova, N.V., Nabiullina, K.R. & Zhukovskaya, I.V. (2016). Technology Platforms as an Efficient Tool to Modernize Russia's Economy. *International Journal of Economics and Financial Issues*, 6(1), 163-168.
4. Indicators of innovation. (2016). Statistical publication. Moscow: Moscow National Research University "Higher School of Economics".
5. Katukov, D.D., Malygin, V.E., & Smorodinskaya, N.V. (2012). The institutional environment of the globalized economy: the development of network

- communications. Moscow: Institute of Economics, Russian Academy of Sciences.
6. Kudryavtseva, S.S. (2016). Modelling of innovative development in the theory of open innovation. *Economic Bulletin of the Republic of Tatarstan*, 1, 49-54.
7. Lubnina, A.A. (2015). Improving the management of innovative development of the petrochemical complex of the Republic of Tatarstan. *Economic Bulletin of the Republic of Tatarstan*, 4, 40-44.
8. MacGregor, S.P. & Carleton, T. (2012). Sustaining Innovation. Collaboration Models for a Complex World. New York: Springer.
9. On measures of state support of development of cooperation of Russian higher education institutions and organizations implementing integrated projects for high-tech production. (2010). *The site of the Russian newspaper*. Direct access: <http://www.rg.ru/2010/04/16/pravila-dok.html>.
10. On the state of the business climate in Russia in 2015. (2015). Direct access: <http://media.rspp.ru/document/1/4/9/49a7e7582a6770fb770f8ea535b63a6c.pdf>.
11. Russia by the Numbers. (2016). *Krat.stat.sb*. Moscow: Rosstat.
12. Saritas, O. (2013). Systemic Foresight Methodology, in: Science, Technology and Innovation Policy for the Future. Heidelberg: Springer.
13. Science. Innovation. Information Society. (2015). Science. Innovation. Information Society. Moscow: National Research University "Higher School of Economics".
14. Shinkevich, M.V. (2011). The institutionalization of sustainable innovation development of mezzo-systems: models and management technologies. Kazan: Kazan. nat. resear. tehnol. University.
15. Sukhovey, A. (2009). Formation and actualization of the prerequisites of innovation development of the region. Direct access: <http://rusk.ru/st.php?idar=114529>, free.
16. The Global Competitiveness Report 2015–2016. Direct access: http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf.