

## Triple helix: from theory to realities

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**Abstract.** The article is devoted to the forms of interaction between business, scientific organizations and authorities on the development of partnership in the conditions of the regional economy. The role of intellectual property objects (IPO) in the innovative development of territories is analyzed. The practical experience of projects implementing, based on a preliminary study of the problems and potential of municipalities, as well as the transfer of IPO, is presented.

### 1. Introduction

For leading Russian and foreign scientists and economists, the task of finding tools for interaction between business, government, science and society is still relevant. The solution is aimed at ensuring the efficiency of the national economy. “The social triangle of actions” for big business is considered as a possible way to solve this problem. Public-private partnerships (PPP) deal with investment projects, the “triple innovation helix” deals with innovative projects and corporate social responsibility deals with social projects carried out simultaneously with core activities [1]. At the same time, the main thesis of the “triple helix” model implies that science can occupy a parity position with the government and business in the system of innovative development [2]. Henry Itskowitz, the author of the concept of the “triple helix”, believes that new types of scientific institutions should become the locomotives of modernization, developing the country with the direct assistance of business and authorities.

This thesis for the conditions of Russia is supported by the methodology for determining the innovative potential of socio-economic objects of different hierarchical levels, developed on the basis of descriptive examples of the empirical basis of the mechanisms for the emergence and development of innovations collected by H. Itskowitz, and approved at the macro level between 2010 and 2015. The methodology demonstrates that over the given period the knowledge-intensive factor made the greatest contribution to the innovation potential [8]. The methodology is based on the concept of space institutions, which allows considering it an important starting point for modeling. “However, to work ... with real objects, it is needed to move from the model plane to the level of institutional interaction with the identification of the institutional gaps, since when trying to shift the representation in concepts and models on real objects in domestic conditions it turns out that the gaps make it difficult to develop working mechanisms of organizational interaction” [9]. Thus, they should be classified for convenience of the subsequent analysis with recommendations for overcoming them.



## 2. Data and methods

It should be noted that there is an opinion that in Russia the resource dependence, the narrow cultural horizon of leaders, the absence of leaders, the passivity of the authorities and, often, of science itself, slow down the process of development of interaction between science, government and business. The examples of such gaps are identified by the classification as “gaps, the nature of which lies in the interaction of different hierarchical levels; gaps which occur at the entrepreneurship level at forming a relationship between the development of science and the introduction of developments in production; gaps which are caused by the contradictions and differences in the levels of complexity of the institution and the institutional environment”, etc. [10]. It is assumed that the main task of the government is to improve the legislative base of innovation activity and create conditions for public-private partnership, that is, to attract business to cooperation with universities in the field of creating and introducing new domestic developments and technologies, when the government is ready to share risks and R & D and technology introduction costs with business [3]. Here there are “the gaps caused by the absence and / or halfness of the normative and methodological base” [10], as well as in the institute of Intellectual Property.

Intellectual property as a potential point of growth and the basis for interaction in a certain territory, practically in all countries (including Russia) is generated by the three clusters: state research centers, laboratories, public academies (in Russia it is the Academy of Sciences with its fundamental orientation and research planning horizon for decades); corporation research centers (in Russia they present branch applied sciences tightly connected with production); universities [4].

The results of intellectual activity in the form of intellectual property objects have both scientific and technical novelty and market potential, ensuring the production of a knowledge-intensive product in demand on the market. Patent protection ensures product competitiveness for a certain time, but the processes of IPO commercialization depend on the stage of knowledge readiness for use by the consumer, not only in the sphere of material production, but also in making managerial decisions in the areas of finance, marketing, human resources management, etc., as well as on the production potential, the complexity of patent protection (the presence of an umbrella patent and the so-called “cluster of inventions”) and other factors.

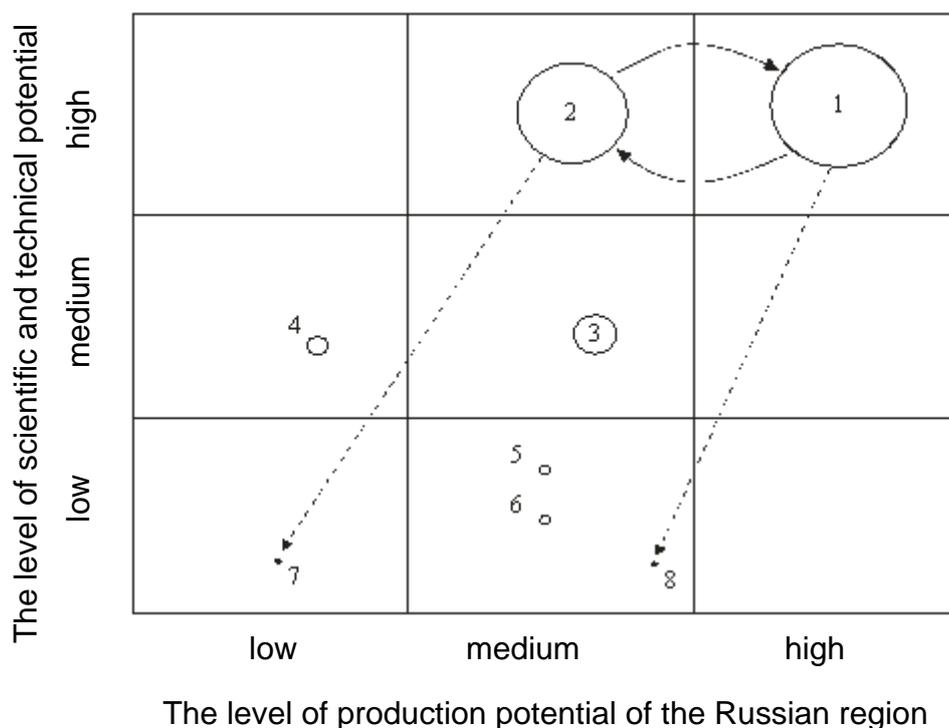
In Russia, the mechanisms for securing rights to intellectual property created when performing work under a state or municipal contract are regulated by the Civil Code of the Russian Federation (Article 1373). The right to obtain a patent and the exclusive right to an invention, a utility model or an industrial design created in the performance of works for municipal needs belong to the organization that performs the municipal contract (the executor) if the municipal contract does not provide that this right belongs to the municipality or both to the executor and the municipal formation.

Thus, the Russian legislation allows the subjects of the federation (SF) and municipal formations (MF) to form a portfolio of intellectual property (patent portfolio), while using different options for ownership, which should be defined in each individual contract, based on the conditions of expediency.

In accordance with the current Russian legislation, SF and MF may assign rights to:

- results of intellectual activity related to the interests of the regional (municipal) economy;
- intellectual property objects, concerning which SF and MF have the intention to independently develop a prototype into the industrial application and the finished products sale;
- intellectual property objects, which SF and MF can profitably sell or license.

The assessment of the innovation potential of SF (MF) can be made on the basis of two factors: the level of production potential (availability of basic and circulating funds, labor and natural resources, scientific and technical information, etc.) and the level of their scientific and technical potential (patent activity, volume of the available scientific and technical reserve, the structure and level of staff qualifications, the number of scientific schools and the corresponding system of knowledge transfer). Schematically the results of the evaluation are shown in figure 1.



**Figure 1.** The chart of intellectual activity of the region.

During the formation of projects based on IPO, the following factors were taken into account: availability of necessary natural resources, compliance (excess) of new technologies to the world level, economic, social, environmental efficiency of projects, potential synergies through complementarity of projects, which is especially important for depressed areas.

Harmonization of IPO portfolio management processes provides for the transfer of knowledge from publicly-legal entities with high scientific potential to depressed areas with a certain kind of natural resources. Diffusion of the IPO promotes the leveling of the socio-economic development levels of individual MF in a region and the transfer of their economy to an innovative path.

Realization of rights to IPO can be carried out by the SF (MF) by adding to the authorized capital the value of rights to patented technologies, which can serve as the beginning of the formation of new high-tech companies. Without monetary payment, it is possible for the founder to contribute the market value of the IPO right as a contribution to the authorized capital and acquire blocks of shares (controlling or simple ones). This approach allows to IPO commercializing, for example, through the formation of joint ventures: strategic alliances, enterprises based on franchising (a complex of exclusive rights is transferred to objects of different nature), etc. Expansion of intangible assets and the use of IP rights as collateral is not the only list of issues that require their consistent implementation.

The main tasks of the government (municipal) policy to involve IPO, created at the expense of state (municipal) funds, in the economic turnover, are the orientation of scientific developments, R & D work and industry on the creation of high-tech, competitive products commercially profitable for the economy and life activity of SFs (MFs) and the spread of market relations in the sphere of the intellectual property use.

The government (municipal) policy on the involvement of IPO in the economic circulation is designed to strengthen and expand commercial, industrial and scientific-technical cooperation between scientists and entrepreneurs, scientific and industrial organizations, regardless of the form of their ownership, and protect both their interests and the interests of the territories. This policy is aimed at developing the principles of public-private partnership based on scientific knowledge.

The existing foreign and Russian experience confirms that the private sector is more sensitive to the needs of the market. At the same time, “a private entrepreneur” realizes that the commercialization of scientific developments is a long-term process, requiring considerable effort and cost to obtain possible profits. Therefore, at the initial stages of this process, it is very important to involve support structures funded or co-financed by the public sector. It is also important to ensure the reciprocal movement of requests for innovation from the territories and enterprises seeking to solve the problems and tasks of their development, and innovations from innovative and active research institutes and design bureaus, universities and small innovative enterprises focused on obtaining commercial results from their activities.

Practically in all Russian regions some natural minerals are mined, and in all municipalities there is a question of interaction with extractive companies on the principles of PPP and on the basis of a project approach. Municipalities are already actively looking for structures that would help them develop and support territories development programs on the principles of public-private partnership, based on the project approach and integrated natural resource development. They are prompted to this by the Federal Law of June 28, 2014 No. 172-FZ “On Strategic Planning in the Russian Federation”.

The authors have some practical experience in the formation and implementation of projects in municipalities, based on a preliminary study of the problems and potential of municipalities [5, 6, 7]. The key direction, in this case, is the introduction of effective technologies and modern approaches at the municipal level in the following areas:

- resource and energy saving (including the reduction of energy consumption at the municipal level);
- use of secondary energy resources, including forest and mining waste;
- optimization of housing and communal services infrastructure;
- sustainable and environmentally oriented agriculture;
- development of small business;
- development of social potential and capital of the local community.

The following main principles of the project approach are used:

1. A set of projects (a group of interrelated projects that are carried out within one or several compactly located municipal entities) is formed from a group of applicant organizations that should include the municipal entity or city administration representatives and representatives of various sectors: business, non-governmental and non-profit organizations (NPOs), as well as representatives of the social sphere, namely education and health.

2. A set of projects unites from two to five different projects. Projects alone cannot be financed.

3. Projects should be implemented at the municipal level, facilitate the involvement of citizens in local government and be carried out with the participation of different sectors of society (NPOs and administrations of municipal organizations).

4. Each project should include practical measures aimed at sustainable development of the territory.

5. The set of projects should be aimed at concrete results that contribute to the sustainable development of the territory, i.e. they would significantly improve the natural and energy resources management and reduce the threat to human health from environmental pollution; the results of the projects should be presented in specific measurable indicators.

6. The work on projects should be conducted publicly and openly; the results of a project set should be made available to the general public.

7. Project sets should facilitate the involvement of the public, especially young people, in specific activities.

8. Project sets mean reinvestment to the future; all communities should demonstrate their readiness and ability to effectively reinvest their savings, resulting from the implementation of energy-saving (or other) projects, in the development of their communities.

This approach is aimed at developing different models of mutually beneficial cooperation of all sectors of the local community in the interests of its sustainable development, creating favorable conditions for the participation of small and medium-sized businesses in programs for sustainable social and economic development of the territories.

At the same time, both innovative and already tested models of the municipalities' development are getting expanded on the territory of the Russian Federation.

For example, according to the available experience, the use of energy and resource-saving technologies to create officially recognized mechanisms for investing savings into other priority projects of the community with active public participation is an effective way of creating new tools and mechanisms for the development of municipalities.

As practice has shown, it is important to maintain the following priorities in the development of territories development programs based on the project approach:

1. Development of municipalities; municipalities should propose Municipal Project Sets aimed at improving the quality of life of community members and the local economic situation in general, and promoting transparency and sustainability of positive structural changes taking place in the community. Consortia should offer projects based on an assessment of the needs of their community. It is encouraged to attract other resources of the administration, local businesses, NPOs and citizens to facilitate the more successful implementation of the proposed initiatives.

2. Implementation of practical measures and achievement of concrete results for increasing the sustainability of the process of local and regional development.

3. Strengthening of partner alliances and cooperation of various stakeholders; that means the involvement of local municipal authorities and representatives of two other sectors, NPOs and business, as well as representatives of organizations providing services to the community, such as educational and medical institutions, in the process of community development; involvement of the population in the implementation of the projects through social partnership is a strategic direction.

4. The implementation of projects sets in the same territory contributes to the effectiveness of project implementation and the achievement of synergies from activities in the fields of resource management, increasing community activity and building partnerships.

5. Participation of citizens in the community life; that implies involving community members in the decision-making process, protecting their own interests and public examination of new legislative initiatives to increase activity and transparency of community processes, and motivating young people to participate in community life.

6. Interaction between the public and local government bodies; that includes the creation of new and the promotion of proven sustainable mechanisms for financing socially significant projects by reinvesting the savings (obtained from the introduction of energy and resource-saving technologies at municipal facilities) on the basis of local and regional legislative mechanisms.

7. Use of community resources; that implies the work with communities that have expressed a desire to introduce new experience using their own resources.

The main tasks to be solved by the project approach are:

1. Implementing practical projects aimed at improving the quality of life of the population in local communities according to formulated priority topics based on the involvement of local residents in the process of solving community problems (introducing effective technologies for the development of municipal energy, housing, agriculture and small business);

2. Launching mechanisms for collegial decision-making by all stakeholders on balanced development of the local community, including the use of savings for sustainable development;

3. Approbating management mechanisms for funds saved and attracted during the projects implementation;

4. Encouraging further dissemination of project experience in the region.

### 3. Results and discussion

The analysis of the companies' selected patents showed that the main direction of their research and technological activity is the development of technologies and equipment related to the enrichment of coal.

At the same time, these patents were registered over the past three years, and the lifetime of the technology is 8 years, therefore, the companies are constantly improving their own developments. Moreover, the patents are valid, i.e. justified in force, which proves that they are used in coal production.

At the third stage of our study, the existing patents were evaluated in terms of their "breakthrough character". The studied patents cannot be attributed to "transforming innovations". According to experts, the patents refer to the obsolete technology, and match the level of the 1970s – so, they cannot be attributed to "transforming innovations" nor can they shape the value chain.

To create and implement "transforming innovations" in the coal industry, firstly, it is necessary to cooperate with coal companies from related industries, which will increase the added value of the final product. The closest to the coal industry in Kemerovo Region are the enterprises of mechanical engineering, small chemical production, energy industry, and developers of automated control algorithms. Secondly, new forms of cooperation are needed, for example, innovative enterprises in related industries to form value chains with the region's largest coal companies which will develop new technologies taking into account the identified strategies for conducting research activities. Thirdly, measures are needed to encourage companies to form and use "transforming innovations".

### 4. Conclusion

As a conclusion, the following results, obtained during the project sets implementation, could be listed:

- local administrations, NPOs, business structures and the public are developing and approving mechanisms for long-term joint public and private financing of their communities development on the principles of funds consolidation and transparency in making decisions about investing resources;
- there is an active public involvement, especially of young people, in the decision-making process related to the planning of their communities development and the resources allocation, which contributes to the institutionalization of civic initiatives;
- the stability of communities in the long-term perspective is improving, the problems of energy and resource saving, environmental management, public health, environmental education, responsible approach to business development, creation of jobs, etc. are being addressed.

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### References

- [1] Shestak V P 2016 *Finance: Theory and Practice* **20(4)** 6–16 DOI:10.26794/2587-5671-2016-20-4-6-16
- [2] Dezhina I "Triple helix" in the Innovation System of Russia <http://institutiones.com/innovations/265-q-q-.html>
- [3] <http://pppcenter.ru/29/novosti/events/rossiya-buksuet-po-spirali-rbk-daily.html>
- [4] Itskowitz H 2010 *Triple helix. Universities – Enterprises – the State. Innovation in Action* (Tomsk: Tomsk State University of Management Systems and Radio Electronics) p 238
- [5] Nikitenko S M 2008 *Fundamental Research* vol 12 33–36
- [6] Nikitenko S M et al 2009 *Formation of Effective Mechanisms of Innovative Development of the*

*Region's Economy. Series Innovation. Entrepreneurship. Investments (Kemerovo)*

- [7] Nikitenko S M et al 2009 *Regional Economy: Theory and Practice* **24** 17–26
- [8] Istomina S V et al 2018 *National Interests: Priorities and Security* vol 14 1(358) 97–120
- [9] Istomina S V et al 2018 *Problems of the Configuration of the Global Economy of the 21st Century: The Idea of Socio-economic Progress and Possible Interpretations. Collection of Scientific Articles* vol 1 (Krasnodar) pp 102–109
- [10] Pakhomova E A et al 2017 *Philosophy of Economy. Almanac of Center for Social Sciences and Economics Faculty of Lomonosov Moscow State University. Special issue* December 2017 pp 357–368