

D.A. Radoushinsky, S.V. Zdolnikova
COMMUNICATION CENTERS
AS AN ELEMENT OF THE INSTITUTIONAL ENVIRONMENT
OF INNOVATIVE ECONOMY

Д.А. Радущинский, С.В. Здольникова
КОММУНИКАЦИОННЫЕ ЦЕНТРЫ
КАК ЭЛЕМЕНТ ИНСТИТУЦИОНАЛЬНОЙ СРЕДЫ
ИННОВАЦИОННОЙ ЭКОНОМИКИ

The article discusses the relationship of information and communication factors and the level of innovation of a socio-economic system, the importance of informal communication and tacit knowledge within the modern concepts of knowledge economy and communicative economy. The aim of this work is to propose a concept of communication centers, show their place and role in the innovation infrastructure, to identify their basic characteristics and to develop an approach to understanding those of their functions for which the implementation infrastructure could be effectively created in addition to the existing elements of the national and regional innovation systems. The concept that we have adopted as a basis for the study is that the key function of a communication center in the socio-economic system with a given level of development is the organizing the interaction with representatives of socio-economic systems whose levels of development are the same or higher in order to obtain from them (through exchange, purchase, etc.) advanced technology, skills and other kinds of valuable information and knowledge. The main conclusions are as follows. The quality of knowledge at the micro-level, i. e. the long-term human capital of the region determines the actual availability and quality of the communication center in the existing innovation infrastructure of the region. The conducted review of the functions and features of the institutions of regional innovative infrastructure, including the technology platforms and the innovative regional clusters, as well as communications platforms in individual companies, and also the functions of the so-called innovative lift development institutes made it possible to establish that the communication center should have the following main characteristics: it should be intensely involved in the diffusion of innovations; it should integrate the directly interacting units that should be grouped geographically for informal transmission of tacit knowledge; it should have significant executive and administrative authority. A further substantiation of investments into creating the appropriate communication centers and an analysis of their effectiveness seems necessary.

INNOVATIVE INFRASTRUCTURE; REGIONAL INNOVATION SYSTEM; LEVEL OF INNOVATION; KNOWLEDGE ECONOMY; COMMUNICATIONS CENTER; HUMAN CAPITAL OF THE REGION.

Рассматривается связь информационно-коммуникационных факторов и уровня инновационности социально-экономической системы, значение неформальных коммуникаций и неявных знаний в рамках современных концепций «экономики знаний» и коммуникативной экономики. Цели исследования – предложить понятие «коммуникационные центры», показать место и роль коммуникационных центров в инновационной инфраструктуре, определить основные критериобразующие характеристики коммуникационных центров, разработать подход к пониманию тех функций коммуникационных центров, инфраструктуру реализации которых целесообразно создавать дополнительно к имеющимся в национальных и региональных инновационных системах элементам. За основу исследования принято положение, что ключевой функцией коммуникационного центра в социально-экономической системе с данным уровнем развития является организация взаимодействия с представителями социально-экономических систем с аналогичным или более высоким уровнем развития с целью получения от них (путем обмена, покупки и др.) передовых технологий, навыков работы и иных видов ценной информации и знаний. Качество знаний на микроуровне, или «человеческий капитал региона», в долгосрочном периоде определяет фактическое наличие и качество работы коммуникационного центра в существующей инновационной инфраструктуре региона. Рассмотрение функций и особенностей институтов инновационной инфраструктуры, включая технологические платформы и инновационные территориальные кластеры, площадок и сред коммуникаций в отдельных компаниях, а также функции «институтов раз-



вития инновационного лифта» позволяет установить, что коммуникационный центр интенсивно участвует в процессе «диффузии инноваций», объединяет непосредственно взаимодействующие подразделения, которые целесообразно группировать территориально для неформальной передачи «неявных знаний», обладает значительными организационными и управленческими полномочиями. В дальнейшем потребуется обоснование целесообразности вложений в создание соответствующих коммуникационных центров и анализ эффективности их деятельности

ИННОВАЦИОННАЯ ИНФРАСТРУКТУРА; РЕГИОНАЛЬНАЯ ИННОВАЦИОННАЯ СИСТЕМА; УРОВЕНЬ ИННОВАЦИОННОСТИ; ЭКОНОМИКА ЗНАНИЙ; КОММУНИКАЦИОННЫЙ ЦЕНТР; ЧЕЛОВЕЧЕСКИЙ КАПИТАЛ РЕГИОНА.

Introduction. Is it appropriate to complement the existing institutions of the Russian innovation economy with new elements aimed at maintaining and strengthening the communication function? What is the interrelation of innovation, communications, and their effect on the development of major socio-economic systems in modern conditions? The answers to these questions are highly relevant as it is currently a priority to preserve the market and democratic development institutions under significant external pressure on the socio-economic system of the Russian Federation.

The role of communication in a socio-economic system is discussed today mainly in the works of sociologists like Daniel Bell, T. Van Dyck, Manuel Castells, N. Luhmann, M. McLuhan, T. Parsons, J.P. Habermas, D.P. Havra, D.V. Panarin, V.I. Inozemtsev, F.I. Sharkov, and others.

The factor of communication has arisen as a major innovation-related economic category in the post-war period (i. e. the second half of the 20th century) and has kept its importance until today. Innovation research includes studies by such world-renowned scientists as P. Drucker, P. Kotler, Michael Porter, F. Hayek, I. Shumpetter, as well as works of Russian researchers, such as O.G. Golichenko, L.M. Hochberg, S.V. Kuznetsov, G.B. Kleiner, V.V. Okrepilov, and others.

The scientific literature on the subject analyzes the mechanisms of interaction between the subjects of the Russian national innovation system, as well as the mechanisms of innovative systems formation based on knowledge economy, some aspects of the effectiveness of an innovation infrastructure in a region, the nature and approach to economic analysis of complex innovation activities, and reviews the components of the regional innovation potential. A number of studies also examined the connection of integration of innovative processes at enterprise level and their relationship with macro-regulation at national level [1–4], and the concept of territories of priority development [5].

The role of information and communication in the innovation process is quite widely studied in literature. In particular, the works of V.A. Plotnikov and S.P. Koida [6] study the economic mechanisms of the information society and the role of the information infrastructure in providing innovative development. The article by I.G. Ershova and Y.V. Vertakova [7] focuses on analyzing the indicators for describing the development of knowledge economy in the region. The dependence of communications and the level of development of innovative economy is also considered by the author in the article 'Determining the level of development of the innovation environment in the communications economy' [8].

We should also note that there is a significant amount of useful information related to the development of the innovation potential of the regions of the Russian Federation on the official website of the National Center for Monitoring the Innovation Infrastructure of Scientific and Technical Activity of Regional Innovation Systems [9], and in the materials of a number of conferences [e. g., 10].

These works, as well as some others, study the effect of information and communication technologies (ICT) on modern business practices, the promotion innovative changes, and the impact of several aspects of information and communication factors on the innovation level of a social and economic system. The scientific literature also examines the role of technology transfer centers as an integral part of regional innovation systems, and the processes of transfer of knowledge and technologies in integration-type businesses.

Formulation of the problem. The object of study in this paper is the institutional environment of innovative economy associated with the concept of innovation systems at national and regional levels. The aim of this work is to develop an understanding of the specific elements of the innovation infrastructure which can be defined as a communication center, and to study the possible functions and features of communication

centers in national and regional innovation systems (NIS, RIS), i. e. to describe their key characteristics and to show the place and role of communication centers in the innovation infrastructure. A task connected to the purpose of the study is to identify the currently existing elements of innovation infrastructure at the level of national and regional innovation systems, which can be attributed to communications centers; we are also going to develop an approach to understanding the functions of communication centers for which it would make sense to create the implementation infrastructure in addition to the existing elements.

The methodology of the study. The premise of the study is that it is possible to isolate a number of functions of the national and regional innovation systems and to form on the basis of that a concept of a new element of an institutional environment of innovative economy, which is the communications center. Since the national-level stability is currently achieved largely through the inclusion of the economic system of the country in the international division of labor, it will be important to underline an international focus of the element in question.

The research methods of this article are based on the system analysis of the existing elements of the innovation infrastructure. We offer a unique viewpoint on the composition of the core and additional advanced functions of communication centers, and on the key characteristics and the set of components included in the concept.

Communication in the innovation economy. A communication (or communicative) economy may be defined as a type of modern social and economic system in which the knowledge required for implementing the innovation process is created, disseminated and used through information communications. The main function of the communications center in the socio-economic system with a given level of development is organizing the interaction of representatives of socio-economic systems with the same or higher level of development in order to obtain from them (through exchange, purchase, etc.) advanced technology, skills and other kinds of valuable information and knowledge.

A system of knowledge transmission and dissemination for further use that is mentioned

in virtually all definitions of knowledge economy or communicative economy [11, 12, 13, 14, 15] is a key feature and a central element of a modern innovation system. The dissemination of knowledge implies the pre-existing intensive communications which allow the conversion (or 'materialization') of knowledge into innovation and indicate a high level of innovation of a given socio-economic system, and create a platform for the acceleration of economic growth.

The currently developing system of knowledge dissemination (the innovative environment) becomes an information and communication factor of economic growth. Knowledge as the intangible capital is disseminated through formal and informal networks. The divisions of large organizations in various countries and regions between which there is a movement of employees are an example of formal networks. (E.g. the units of national (in large countries) or transnational companies, the network of diplomatic missions of a state, federations, associations and the events they hold, such as competitions, conferences, forums, etc.)¹.

Informal knowledge networks are formed through informal communication in the local community, and through these communities that may consist of socially active population groups with varying skill sets and lifestyles adopting professional slang and 'habits', as well as implicit and explicit life values, including the ratio of individual and group interests, concepts of prestigious quality products and places of residence and work, and other values.

The mobile part of the top qualified professionals move into different industries and different countries and regions, where additional incentives have been created or the innovation environment (according to M. Castells) has spontaneously evolved, and thus form a *mobility reserve* in the knowledge economy and promote informal knowledge transfer, using as a vehicle

¹ It may be assumed that a number of measures of the federal target program «Scientific and scientific-pedagogical personnel of innovative Russia» for 2009–2013 and for 2014–2020, approved by the Decree of the Government of the Russian Federation of 28 July 2008, № 568 and Decree of the Government of the Russian Federation of May 21, 2013 № 424, respectively, are aimed at establishing formal knowledge networks in Russia in the field of research and innovation.



the formal knowledge networks. This circulation and communication of highly skilled workers among the various branches and regions can be linked to the information and communication factor of economic growth.

We should note that implicit knowledge disseminated through informal networks includes the culture of thinking, the decision-making algorithms, the personal acquaintances, the value priorities, the intuitive assessment of situations and other elements that are difficult to formalize. This knowledge is acquired by a person through an extended stay in specific innovation environments such education in certain universities, training programs, or certain work environments. B. Lundvall highlighted four ways of learning tacit knowledge «in the process of work, in the process of use, in the process of searching, and in the process of learning by interaction» [16].

It is obvious that values, beliefs, and personal acquaintances distributed through formal and informal networks in the knowledge economy have a significant impact on the decisions made by an individual or a group. In the knowledge economy, trust between partners takes the form of economic interest and is expressed in the high evaluation of the assets and the innovative capacity of the economic actors that appear to be the most promising for cooperation and capital investment (for example, a sharp rise of Apple capital value in 2014).

Reduced confidence in partners, understood as a factor of knowledge distributed through informal networks, may lead to a decrease in the worth of the international liquid assets and the re-assessment of the innovative capacity of a company. An example of this is a sharp decrease in the capitalization of the Russian stock market that has happened in 2008 and in 2014. While the effectiveness, and, consequently, the fair market value of the largest Russian companies in the RTS and the MICEX indices could not have changed so drastically due to political reasons, the information from the informal knowledge networks has had a significant impact on investors from countries that have not officially recognized the independence of South Ossetia and the new status of Crimea.

Thus, assessments made in the informal environment of the global innovation economy can significantly influence decisions about investing into various economic assets.

Communication centers in the innovation environment. The scientific literature has developed an understanding that the innovation environment is represented by a set of institutions that reflect the stages and phases of the innovation process which is defined as the innovation infrastructure, the institutional environment of innovative economy and the national innovation system (NIS) [17]. The NIS encompasses a complex of institutions that provide innovative processes and possess certain production traditions and political and cultural peculiarities. It is a system of interconnected institutions of various specialties working in the country and employed in innovation activity and the implementation of innovations (large, medium and small innovative companies, government agencies, universities, technology parks and incubators, etc.) that combine various types of resources including physical, financial, intellectual, scientific, technical and other necessary for innovative activity [18].

The basic parts of the innovation infrastructure are the following: technological (industrial and technical) infrastructure, the financial infrastructure, the training infrastructure, marketing, the information and consulting infrastructures.

The government program of the Russian Federation 'Economic development and innovative economy' (2013) states that the effective functioning of the 'innovation lift', i. e. a network of state-created development institutions that support innovative projects at all stages of development (sub-program 5 'Promoting Innovation', the main event 5.6 'Creation and development of institutions and infrastructures, providing launch and operation of an innovation lift') [19] is a tool ensuring the coordination of economic entities with the goal of supporting innovation. A mechanism for sharing information about promising innovation projects should be created as part of the innovative lift, and a transfer of such projects from one development institution to another should be established. The functions of information exchange and transmission imply that it is the development of the institutions mentioned in the government program that are most closely associated with the theoretical principles of the communication centers of innovation infrastructure that are discussed in this paper.

At the moment, however, the mentioned institutions are not a fully developed element of the mechanism of innovation management in the

Russian Federation, and their status is not entirely certain. In view of this, it is our belief that developing the concept of communication centers of innovation infrastructure would allow to enrich the concept of the 'institutions of the innovation lift development».

While discussing the concept of the institutes of development, the Head of the International Laboratory for Economics of Innovation of HSE (Higher School of Economics in Moscow) L.M. Hochberg emphasizes that a function of the institutions of the innovation environment and research funds to support innovative projects and initiatives communication platform is to serve as communication platforms [20].

The vertical classification of innovation infrastructure institutions designed by L.M. Hochberg highlights the important role of the development institutions with the function of communication platforms which is thus one of the central organizational functions necessary to determine the tasks to be solved within the framework of the research and production levels of the innovation infrastructure institutions, including the technology platforms and innovative territorial clusters.

It is known, in particular, that the creation of technological platforms in Russia in 2010 repeated the European experience [21]. At a time when the behavior of venture capital and small business in Europe was not similar to the venture boom in the US, there was an effort to involve industrial companies into research-based synergies with research and government agencies at the pre-commercial stages of innovation projects. Communication Centers within technology platforms can be an important tool connecting the requests of industrial companies with the relatively independent research carried out under the programs of state support of science (Russian business structures are coordinating only two out of 34 platforms; these are a Laser Association nonprofit organization and SUEK, LLC).

Innovative regional clusters are widely studied and discussed in scientific literature. If we assume that cities evolved as craft and trade clusters, the city of Заталһуык, which was founded in the 8th millennium BC and specialized in ceramics, non-ferrous metallurgy and production of hand tools, can be considered the first example of such cluster. A cluster of textile

industry formed in Manchester in the 18th and the 19th centuries, while a cluster of steel and chemical industries formed in the Ruhr Basin; the 1960s saw the emergence of Silicon Valley. Until recently, the clusters have formed spontaneously, and their targeted development started in the second half of the 20th century. One of the examples is the Research Triangle Park, a technology center in North Carolina which had previously been considered, being a tobacco state, so to speak, one of the poorest regions in the United States. A biotechnology cluster Medicion Valley has formed on the border of Denmark and Sweden. Numerous other examples could be cited.

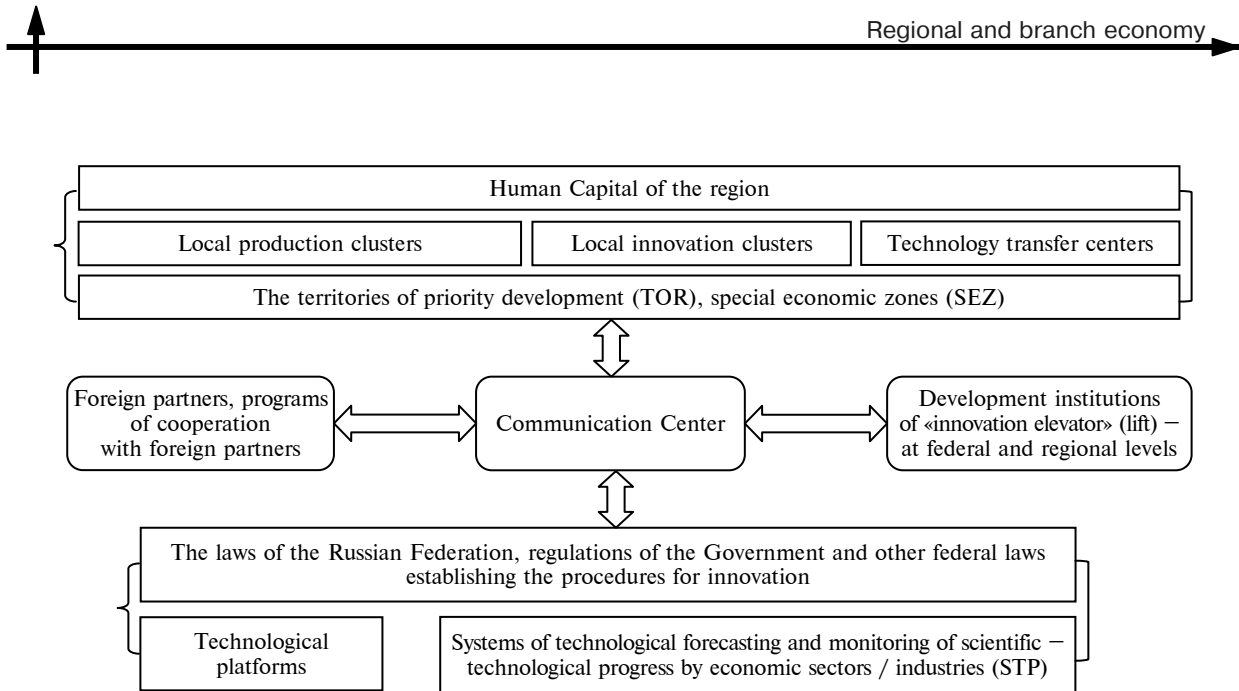
In contrast to the cluster system, the territorial industrial complexes built in the USSR were, essentially, state-planned production chains that did not allow for domestic competition, and were thus less flexible and adaptable despite better outputs due to their scale.

Modern communication centers operating on the level of innovative regional clusters are meant to be a field of interaction of equal players, i. e. the ordering industrial and commercial companies, research companies and centers, government agencies designed to allocate funding and monitor the results of development of innovation infrastructure in the regions.

The role of communication centers in the institutional environment of innovative economy can be presented as follows (see. Figure).

The upper part of the figure represents the key elements of the regional innovation system, while the lower part represents the national innovation system.

The level of development of the institutions of the innovation infrastructure in the regions (regional innovation systems) shows significant variations [22–24]. The regions typically have the largest share in the structure of national innovation systems, since the regional innovative environment is focused on market diversification and replicating the innovations developed and tested in the leading regions (donor structure), or in the regions which possess versatile innovation environments. These innovative recipient regions shall enter the innovation process at the stage when the pre-prepared innovation projects are continued or completed, carrying on the process of commercialization of innovations [25].



The role of communication centers in the institutional environment of innovative economy in Russia

The defining characteristic of knowledge in terms of competitiveness is its quality. The quality of knowledge at the micro-level is a set of professional skills of employees. The differentiation of innovative potential of countries and regions is affected by the level of professional competence, education and qualifications of their working population, which is to say the human capital and the service capital [26]. The human capital of the region determines both its level of development as an innovation environment and that of the institutions of knowledge economy in a given country or region.

The process of innovation diffusion diffusion is traditionally portrayed as a step-by-step penetration of innovations from the donor regions into the recipient regions. The territory of the regions serving as innovation donors contains, as a rule, a developed innovation infrastructure (like the largest innovation centers such as Silicon Valley in the United States or the Maastricht Triangle in Europe that have served as a basis for the Skolkovo and Tomsk innovation zones), as well as branches of large foreign companies, which helps to create innovations or borrow them from other countries.

In the face of pressure from the outside and geopolitical competition during the Soviet era, Russia had its own experience of creating scientific and innovative centers such as Dubna or Troitsk near Moscow, and other closed cities. However, the military technologies that were the product of the donor regions in the Soviet

period, while advanced for their time, had no commercial prospects for the consumer market.

Innovative communication centers today must indeed support the marketing function of the commercialization of innovations in the consumer market or B2B market. At the moment, there is yet no concept of communication centers of the innovation infrastructure in scientific literature. However, the innovation infrastructure institutions responsible for the distribution and the penetration of innovations (the so-called diffusion of innovations) may be used as communication centers. For the purposes of this discussion, communication centers can be divided into three markets: the defense customers market (characterized by high secrecy), the industrial market with large customers, and the consumer market.

Since part of the innovation institutes are directly or indirectly responsible for the communication functions, the first step in determining the effectiveness of introducing the additional elements related to the diffusion of innovation to the innovation infrastructure in the region is to locate the organizations whose activities can be attributed to the communications center, and their markets. In order to classify parts of the existing institutions of the NIS and RIS infrastructure as communication centers, it makes sense to consider their characteristics, and functions which would be responsible for the processes of sharing and dissemination of knowledge.

We should note that there are special areas and environments which are designed to increase

the interaction and communication intensity to achieve the best results, and, ultimately, allow individual companies to implement their innovative potential within the framework of strategic development programs [27]. Given the important role of geographical proximity for organizing informal communication and transfer of tacit knowledge in the process of dissemination of innovations, such sites can be functionally defined as communication centers at the level of individual companies.

Based on the company size, we may assume that communication centers should be developed:

A) At company level. Among contemporary examples of creating a platform for the communication center of the largest company is The project of association of research assets of state corporation «Uralvagonzavod» in a new dedicated building in St. Petersburg [28].

B) At the level of associations of commercial and non-profit organizations at the regional level. It is our opinion that university scientific and innovation centers present a good format for communication centers of this scale (for example, the Peter the Great St. Petersburg Polytechnic University Technopark, the ITMO University Innovation Park, or the Center for Collective Use of Equipment of the National Mineral Resources University in St. Petersburg, Russia, as well as institutions associated with further development of the concept of innovative regional clusters).

C) At the level of associations of commercial and non-profit organizations at the federal or inter-regional level with the inclusion of public-private partnership elements. Examples of this include Skolkovo in Moscow, the innovation zones in Tomsk, Innopolis in a suburb of Kazan, the Arctic cluster project in the Northwestern region with the center in St. Petersburg [29], as well as institutions associated with further development of the concept of innovative technology platforms.

In all these cases, an important feature of the communication center is the close proximity of the units gathered together, which is an important condition for the direct interaction of staff and for informal networks to function on this basis, contributing to the transfer of tacit knowledge the importance of which has been mentioned above.

If we follow this approach, it would be justified to conclude that the communications center cannot

be a division simply providing information (i. e. is similar to a data or an expert consulting center); the center must have a certain set of management powers allowing to assign tasks to other production units.

Thus, the innovation infrastructure communication center should have at least the following set of characteristics: it should be heavily involved in the process of innovation diffusion; it should integrate the directly interacting units that should be grouped geographically for the informal transfer of tacit knowledge; it should possess organizational and managerial authority.

Moreover, the following additional characteristics of a communication center may be mentioned:

- its international nature due to orientation towards collaboration with foreign partners;
- its focus on the current mechanisms and legal forms of the public-private partnership (PPP), which meets the requirements of efficient business in modern conditions;
- a substantial PR-component able to engage the so-called creative class of the country and domestic and foreign business partners in the work of the communications center;
- providing humanitarian and business cooperation with the Russian state and military structures, including the structures of the Rear of the Armed Forces of the Russian Federation.

The last characteristic is of fundamental importance as it expresses a new approach to the cooperation of military and civil structures in Russia and the information openness of the state.

These promising characteristics of communication centers are a subject for further analysis and research.

In this study, the following main results have been achieved:

1. Communication centers were tentatively defined as institutions of the innovation infrastructure responsible for the distribution and the penetration of innovations (innovation diffusion), the effectiveness of which is determined in the long-term period by the human capital of the region. This definition specifies the basic direction of future research, including the principle of evaluating the effectiveness of the communication center.

2. To find the characteristics that are recommended for establishing a regional innovation infrastructure communication center we have suggested an approach connected with monitoring the existing institutions of the innovation infrastructure, platforms and media communications



in individual companies, as well as the functions and features of development institutions of the innovation lift in the region. Such an approach allows to fully use the opportunities and improves the targeting of additional functions of the communication center in case it is established.

3. The basic key characteristics of a communication center are found; these are the intensive participation in the process of innovation diffusion; the geographical closeness of an association of directly interacting units in order to transmit informal tacit knowledge; the significant organizational and managerial powers.

The author sees the following direction for further research: the description of those functions and features that the communication centers as a specific element of the innovation infrastructure can contribute to national and regional innovation systems (NIS, RIS), technology platforms and regional innovation clusters including technology transfer centers and other existing elements of innovation infrastructure and integration forms of business. In the future we also need to study the advisability of investing into establishing the appropriate communication centers and to analyze their effectiveness.

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RADOUSHINSKY Dmitrii A. – St. Petersburg State University of Film and Television. 191119, Pravdy str. 13, St. Petersburg, Russia. E-mail: d.radoushinsky@gmail.com

РАДУШИНСКИЙ Дмитрий Александрович – доцент кафедры Санкт-Петербургского государственного университета кино и телевидения, кандидат экономических наук. 191119, ул. Правды, д. 13. Санкт-Петербург, Россия. E-mail: d.radoushinsky@gmail.com

ZDOLNIKOVA Svetlana V. – the engineer of scientific laboratory of the scientific and educational center «Innovations and Industrial Economy» St. Petersburg polytechnical university of Peter the Great, graduate student. 195251, Politechnicheskaya str. 29, St. Petersburg, Russia.

ЗДОЛЬНИКОВА Светлана Вячеславовна – инженер научной лаборатории научно-образовательного центра «Инновации и экономика промышленности» Санкт-Петербургского политехнического университета Петра Великого, аспирант. 195251, ул. Политехническая, д. 29, Санкт-Петербург, Россия.
