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**OBJECTIVES AND MANAGING MODEL OF DEVELOPMENT OF
RESEARCH AND EDUCATION NETWORKS**

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Abstract

The paper presents some aspects of organizational and substantive foundations for the development of network cooperation in education as a set of interrelated substantive, technological and managerial ideas, principles and conditions designed to:

- increase communication of educational institutions with the external environment (society, industry, academic organizations, the education system in general);
- streamline management of network cooperation in the organizational plan;
- create conditions for the effective implementation of management activities, scientific validity and optimal ratio of network cooperation of tradition and innovation in the content, forms and methods, taking into account the individual needs and requests of the participants of the cooperation.

The leading theoretical research method is structural-functional approach which allows considering the content of the main components of a developing scientific-educational network and the dependencies between them.

Main factors and organizational-substantive conditions for the formation of an effective infrastructure for scientific and educational network are described. It is established that the creation and development of research and education networks in the education system largely contributes to the desire of educational institutions to self-development and self-organization

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1. Introduction

The new Millennium begins with the fourth global scientific revolution, which is born of postnonclassical science, the study of complex self-developing system, including a human. This stage of the development of scientific research is characterized by the intensive application of scientific knowledge in all spheres of social life. Interdisciplinary and problem-oriented forms of research activity are put on the foreground alongside with the subjects of disciplinary research. Moreover, in interdisciplinary studies science usually faces with a complex system objects, which in some disciplines are often studied only fragmentarily. The object of the modern interdisciplinary research is increasingly becoming a unique system characterized by openness and self-development. Such types of objects gradually begin to determine the nature of the subject areas of basic sciences, determining the image of a modern postnonclassical science. Such changes in modern society lead to changes of level characteristics of system development open up new opportunities and new situations to implement a system of self-organization and solution of problems of self-government. Therefore, the study of the problems of network cooperation in a rapidly changing socio-economic conditions in general and actively modernized systems of education in particular is important for the development of theoretical foundations for the development of education in general. In this connection the problem of development of network cooperation of organizations of the education system and business structures which are discussed in this study are especially urgent in modern conditions and can be characterized as an important socio-pedagogical and socio-economic problem (Burt, 1980, Jackson, Wolinsky, 1996; Podolny, 1998)

2. Problem Statement

The regulations of the Government of the Russian Federation as the main strategic task of changing socio-economic system of the country marked The transition to innovative development marked in the regulations of the Government of the Russian Federation is the main strategic task of changing socio-economic system of the country. The effectiveness of these changes depends directly on modernization of the education sphere, creating a main resource for the development of the country – human potential.

To achieve this goal, systemic changes are necessary associated with the formation in the educational systems of different levels of readiness for innovative activity which is impossible without changing the fundamentals of the management of the development of the education system.

This conclusion is confirmed by the results of the analysis of experience of innovative activity in the educational systems of different levels, fixing numerous breaks and errors in its organization. But at the same time the following main reasons hindering the development of innovative activities in education are revealed:

- Lack of theoretical and methodological preparedness of the education system to fulfill the tasks of strategic development of the country as a whole;
- Undeveloped technological bases of realization of strategy of innovative development of the education system at its various levels and technology transfer of innovative practices;
- Inadequate integration of educational, research and production (technical innovation) activities.

It should be noted that full-scale innovative activities, capable to provide the evolutionary transition of educational organizations to the updated effective practices in recent years have increasingly been associated with a networking approach as a new tool for enhancing the competitiveness of territories and sectors, developing their innovative potential are considered flexible network structure innovation clusters and innovation networks created on the basis of multilateral agreements and uniting innovative firms, scientific and educational organizations. These structures are designed to provide favorable conditions for the concentration of intellectual, technological and educational capacity of organizations interacting in order to improve the quality of services of commercialization of research results and ensuring the quality of education. Network cooperation is becoming an effective mechanism of integration of subjects of national innovation systems that allow them to develop dynamically, ensuring compliance with processes of formation of competences of the human resources requirements of the knowledge economy, helping to increase innovation activity, competitiveness of participants in the interaction. So Grant & Baden-Fuller pointed out that the ability to find knowledge and then apply them in practice can be implemented in various forms of collaboration; the variety of forms of cooperation that are not under one “roof” of ownership, is constantly growing, thus providing a more effective environment for discovery of new knowledge (Grant & Baden-Fuller, 2004). Duncan, W. and Swan emphasized in their works that the cooperation, for example, between major universities, in many cases based on the principles of partnership, collaboration and formation of strategic alliances aimed at improving the quality of education and research activities (Duncan, 2003, Swan, 2004). In the Russian Federation in recent years there has been an active development of innovative-educational clusters, technological platforms, scientific and innovation networks, which would bring together industrial, educational and research organizations with the goal of innovative economic development (Matveyev, etc., 2016; Dmitriev, 2015; Davydova & Dorozhkin, 2016).

3. Research Questions

In modern society global transformations are occurring and as a result we can see the change of the level characteristics of its system development, new opportunities and new situations to implement a system of self-organization and solution of problems of self-government. Thus, there is a need of the organization and the multiplicity of cooperations in the new environment. The phenomenon of cooperation in all its complexity, includes actors, resources, interaction space, its form, structure, time factors, suggests performance criteria, establishment of the actual situation, to achieve the required performance.

The special importance of network cooperation today is determined by the following considerations:

- Currently, the direct linear cause-and-effect relationships cannot explain the processes and phenomena occurring in complex systems. It is important to be able to see, understand and use the possibility of cooperation of many factors, to consider the impact of numerous feedbacks, complicating the relationship of cause and effect;

- There is a growing attention to the phenomenon of the ambiguity of the discussed positions that are complementary to the understanding of complexed systems. The ability to recognize the diversity of

perception of reality in practice means cooperation and interaction through discussion, acceptance or reasoned denial of other points of view;

- Perceived internal alternatives of decisions. An important component of the development and implementation of new solutions becomes a record of all virtues and risks that accompany this decision;
- Growing awareness of the necessity of taking into account not only immediate, but also long-term effects of decisions, particularly of a global nature.

The main directions of management support of self-organizing activities of scientific, educational institutions and industrial enterprises in the conditions of network cooperation are associated with the redistribution of tasks, delegation of authority, development of horizontal ties and the formation of a single “cultural field” of network cooperation of organizations, the development of the subjective capacity. According to Gadde & Araujo the problem lies in the discovery and implementation of self-organizing and leadership capacity of the participants in the network (Gadde & Araujo, 2006). In this study we are talking about the new direction of development of network cooperation in the form of research and education networks. The concept of “scientific and educational network” in this case has a special meaning. On the one hand, the network acts as a set of prevailing interest of creative teams representing various educational organizations engaged in the development of new scientific knowledge, which is the scientific component of network cooperation. At the same time, striving for the development of new knowledge about processes and phenomena explains the presence in the scientific-educational network the educational component aimed at increasing the level of methodological culture of the participants of network cooperation. The necessity of formation of methodological culture of working in a network cooperation of the teaching staff is defined by contemporary socio-cultural situation, when the fast and rapidly changing modern information society

4. Purpose of the Study

Based on the works of I. Prigogine and his colleagues on the theory of self-organization (Prigogine, Stengers, 1984), we can highlight fundamental ideas that need to be taken into account when considering questions of management of innovative development of scientifically-educational network:

- Complex systems (which include research and education network) cannot be imposed on the path of development, which are not determined by their internal needs;
- The possibility of effective development can be determined by coincidence (the case does not reject the requirement of regularity), and therefore success, success in development depends largely on the ability of heads of subjects of network cooperation to see and not to miss a propitious occasion and unique situation;
- For the successful development of scientific-educational network it is necessary to harmonize the pace of development of all its parts, all entities of management of the development and actions of those entities;
- Efficient development of scientific-educational network can be implemented as a result not only of a strong and comprehensive management actions, but also as a result of the so-called weak local impacts, if they are accurately designed and give a powerful resonance effect in all parts, links, at all levels.

Thus, the main purpose of scientific-educational network is a complex creation of conditions and mechanisms of self-organization and self-development of stakeholders. In fact, this is a new approach to managing the development of the educational, scientific organizations and enterprises to develop and promote concrete joint innovations. We believe that research and education network is a kind of joint capital for educational organizations and industrial enterprises, which allows developing their own intellectual capital of participants of network cooperation. During the formation of such joint capital, individual knowledge is transferred to the enterprise database for use by all participants of the scientific-educational network. A characteristic feature of this corporate knowledge is the possibility of its development in an “open” mode, i.e. network members can take the knowledge from the network, improve them and return back to the grid, therefore, knowledge is not simply stored in the network, but is develop in a way that leads to new opportunities for the expansion of network cooperation of the participants (Davydova, Dorozhkin & Fedorov, 2016). The fundamental difference between scientific and educational networks from other types of educational networks is that such networks are arranged “bottom-up” to the needs of the participants before the formation of the development goals of scientific-educational network. It allows solving problems of development of organizations - participants of the cooperation of organizations and enterprises and provides the basis for the successful development of the network

5. Research Methods

The study was based on the main aspects of the multilevel methodology which takes into account philosophical, general scientific, specific scientific and disciplinary research methods. Theoretical methods - analysis, synthesis, generalization, analogy, modeling; experiential – learning practices of educational institutions, regulatory and educational documentation, pedagogical observation, experimental summative, formative, control study were widely used during the study. Methods of the evaluation of changes in the stability of network cooperation took into account the definition of the index of intensity of cooperation in scientific-educational network, which has been calculated as the ratio of the number of successful cooperation in the network to the number of possible links in the network identified at different stages of the project. In addition, we studied the correlation relations between participants of the cooperation, to identify common projects and intellectual products, depending on the total number of ties in the scientific and educational network.

The experimental base of study is Russian State Vocational Pedagogical University (Yekaterinburg, Russia). In total more than 90 educational and research institutions and industrial enterprises, more than 1600 teachers of educational institutions participating in the cooperation in the different periods of development of scientific-educational network took part in the research

6. Findings

The study has found that the creation and development of research and education networks in the education system largely contributes to the desire of educational institutions to self-development and self-

organization. Ensure that the system is self-organizing and, therefore, had the opportunity to progressively develop; it must satisfy at least the following requirements:

- To be open;
- The processes occurring in the system needs to be corporate, i.e. its components must be consistent with each other;
- The system must be dynamic, i.e. to be away from the equilibrium state.

Thus, it is the need to develop corporate processes that stimulates the transition to enhanced cooperation open educational systems in terms of network cooperation (Silkina, Vaganova, 2015). The basis for the development of the subjects of network cooperation within the scientific and educational network founded the movement to the knowledge in the established field of knowledge based on modeling and experimentation. It should be noted that the network and non-network management paradigm is essentially incompatible paradigms. Brick and mortar paradigm of management focused on clear goal setting and knowledge in advance of what should and could be the cooperation between the educational organizations. Therefore, in the framework of non-networked governance a clear plan of the results of cooperation is a key priority. Uncertainty, openness of the results of cooperation should be kept to a minimum. The result of the cooperation must be calculated with the greatest possible certainty. Thus, the non-network model of management is focused on linearity and certainty. The network model is paradigmaly different model, since it is the fundamental uncertainty of the results of the cooperation as an essential value and management in the conditions of creative uncertainty. The development of innovative educational organizations poses tasks to the teachers that do not have ready-made standard solutions, thus the uncertainty of its activities is created.

The result of network cooperation is born “here and now” in the process of contacting the various subject data, and because it is fundamentally impossible to schedule. Thus, network cooperation of organizations – it is a cooperation in which the dialogue of the uniqueness of these organizations and identifying the uniqueness of each participant of cooperation is taking place. If the organization becomes the subject of network cooperation, this means that it occupies such a position in which it is fundamentally impossible to replace.

Thus, the main conditions of formation and development of effective network cooperation include:

1. Awareness of the uniqueness of each organization.
2. It has a pronounced pedagogical subjectivity.
3. The willingness of this organization to describe and present their subject content.
4. The willingness of organizations to perform the work on presenting their own subjectivity.
5. The adequacy of the network of self-presentation of each organization and the ability to express your uniqueness.
6. The availability of technical connectivity, the availability of the navigation system.
7. Dialogic design and construction of joint activities.

The main principles of forming the network infrastructure consist of the following four principles:

1. The continuity of support for the participants of network cooperation;
2. Expanding the space of self-organization and productivity of educational institutions of the network;

3. Expansion of professional roles and team learning;
4. Mobility of the network.

Among the main factors influencing the formation of the network infrastructure, there are:

- Extensive use of humanitarian technologies as a management tool and methodological support of innovative activity of subjects of cooperation of scientific and educational networks;
- A systematic creative development of professional groups – members of network cooperation.

Important organizational and substantive conditions for the formation of an effective infrastructure for scientific and educational network are:

- Creating an environment of proactive collaboration among members of scientific-educational network, providing the expansion of space of self-development of specific organizations;
- Formation of an open information infrastructure for innovative activities to provide the communications (transfer, storage and processing of information) and communication (intellectual communication, exchange of meanings, emotions and values) support for collective co-creation of constituent entities of the network and their cooperation with the external environment;
- Training of professional teams to a productive and innovative activity through systematic training sessions, which provides a sequence of professional development in the network cooperation: teacher – researcher – innovator.

7. Conclusion

Basing on the foregoing research, the education network can be regarded as a specially created extension form an innovative cultural and educational space of the participants of network cooperation, which is testing new types of activities and forms of relationships, the exchange of educational resources to ensure the integrity, openness and ability of self-development of participants of network cooperation and to create new intellectual products. The main functional purpose of the scientific-educational network is to create a set of conditions and mechanisms to enable self-organization and self-development of subjects of innovation activities

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