

# Interaction of Participants in the Innovation Process in the Region in the Context of Sustainable Development

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**Keywords:** Sustainable Development of the Region, Innovative Development, Interaction of Stakeholders of the Innovation Process, Quadruple Innovation Helix, Open Innovation.

**Abstract:** Studies of the processes of sustainable development of regions are associated with the solution of a number of scientific problems that describe economic parameters. This takes into account the increasingly complex context and new requirements for the relevance of models for the development of multi-level management systems. The variety of elements possessed by modern dynamic socio-economic systems at all levels should contribute to the formation of their flexibility, adaptability, stability, and multivariate development. A new approach to the study of the problems of sustainable innovative development of the region can be offered by the theory of systems with emphasis on a new understanding of complex self-organizing structures and the laws of their evolution, as well as the concept of open innovation, which allows participants in the innovation process to establish partnerships based on the exchange of knowledge. Therefore, the purpose of the study is to provide a theoretical justification and develop a model solution for the formation of interaction between participants in the innovation process in the region in the context of its sustainable development. The proposed approach allows us to reveal the problem of involving the civil community as stakeholders of the innovation process in the region in the process of choosing priorities for its development. Since the socio-cultural characteristics of the region's population can both limit and stimulate innovation processes, it is important to take them into account when implementing innovation policies in the context of sustainable development of the region. The research materials can be used to substantiate the directions of sustainable development of the regions, taking into account the socio-cultural factors that determine the behavioral model of the civil community in the innovation sphere.

## 1 INTRODUCTION

The current strategy of innovative development is important for a preventive response to the changes that are taking place, when resources are limited, and the situation requires the formation of a new «image of the future» of the region and its understanding by all participants in the innovation process. According to the «quadruple innovation helix», the participants in the innovation process in the region are four groups of stakeholders: state authorities, business community, civil society, science and education. The model serves as a tool for visualizing collective interaction and knowledge exchange within the following subsystems of the regional innovation

system: political, economic, civil, scientific and educational. At the same time, each subsystem has its own potential, creates its own type of capital and participates in the formation of a regional strategy in the context of sustainable development of the region through the principles of cooperation and partnership in the innovation sphere. It is about building partnerships for the joint development of innovations based on special tools that stimulate the exchange of information and knowledge. The competitiveness of the region as a territory of innovative development depends on this. Partnerships and interactions are of fundamental importance for the development of best practices and the introduction of new business models in the format of innovative activities in the region and

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the expansion of opportunities to overcome global challenges in achieving the sustainable development goals.

In the modern scientific literature there is a sufficient number of interesting works in the terminology «innovative territory», «innovative nation», «smart region», «smart strategy», «smart development», «sustainable development». The interrelation of these concepts is manifested in the construction of a general picture of the harmonization of national and local efforts to achieve positive dynamics of socio-economic development of the territory, as well as in the understanding of the current processes of activation of innovation activities and the formation of an innovation strategy. Moreover, it is important to note the special role in the development of the territory of its unique features and industry specialization, which is a source of formation of innovative and strategic potential. Taking into account the spread of the term «territory» in the scientific literature and its contradictory content meanings, in the framework of this study, we will consider the regional level and the region as a socio-economic system as a territory. Therefore, in the issue of territorial competitiveness, we will study the problems of harmonizing the skills and developing the potential of stakeholders as participants in the innovation process due to the synergy achieved at the regional level.

## 2 RESEARCH METHODOLOGY

In the course of the research, we used modern tools applicable in the management of innovative development of regions in the context of sustainable development, scientific works of foreign and domestic scientists on the problem under study. The methodological basis of the research was made up of general scientific methods of cognition, statistical methods of research, as well as the principles and methods of the systematic approach. The information component of the study includes data from Russian state statistics, reference data from domestic and scientific literature, materials of scientific and practical conferences, as well as information from scientific journals and the Internet environment.

The formation of the scientific position of the authors was influenced by the work Carayannis E., Dezhina I., Grigoroudis E., Glaziev S., Haken G., Kuznetsov B., Porter M., Prigozhin I., Schumpeter I., Zubarevich N., whose ideas are the basis of theory and practice on the problem under study.

Despite the existing scientific background on the problem of sustainable development of the regions,

would like to note the lack of elaboration of the issues of choosing priorities for regional development with the involvement of groups of participants in the innovation process, according to the quadruple innovation helix. There is no comprehensive approach to studying and organizing the interaction of participants in the innovation process in the region based on the principles of open knowledge circulation as the basis of innovation activity.

## 3 RESULTS

The problem of sustainable development of the region is relevant for all subjects of the Russian Federation, which is especially evident in the conditions of nonlinear dynamics. In the first place, the issues of translating a new technological paradigm, which involves the transition from the knowledge economy to the economy of action through the identification and use of global trends and achievements in the development of a particular country, region, industry, organization, come to the fore. The understanding that the effectiveness of the country's innovation system is determined by the quality and level of innovative development of the regions is overlooked.

Given the differentiation of Russian regions in the field of innovation, we can say that there are no effective mechanisms to support companies with the potential to develop world-class innovations, as well as weak incentives for innovative activity of Russian enterprises (Gorodnikova et al., 2018). The study showed the presence of systemic problems of a regional and sectoral nature:

- low level of commercialization of developments that use the capabilities of modern «end-to-end» digital technologies;
- insufficient balance of innovation infrastructure as an important tool for supporting innovation activities of regional or industry entities;
- limited financial resources as a barrier to the development of innovations in any field of activity;
- weak effectiveness of the mechanism for coordinating and stimulating project activities in the field of innovation development and implementation;
- low activity of industrial enterprises in the development and implementation of innovative technologies in their activities;
- insufficient elaboration of the mechanism for including aspects of the innovation process in

the elements of the value chain in theoretical and applied terms;

- low activity of research centers in the creation and promotion of innovative projects;
- low level of innovation culture that promotes effective and open interaction of participants in the innovation process;
- insufficient attention to the problem of the formation and development of the innovation environment as an important condition for the innovative development of the territory.

Innovation activity in the regions of the Russian Federation can be characterized as focused on imitation, and not on the creation of breakthrough innovations (Gokhberg and Kuznetsova, 2010). A critical analysis of the scientific works of domestic and foreign scientists on the problem of innovative development of territories allows us to conclude that there is a serious problem of balancing innovative development, the essential model of which is presented in Figure 1.

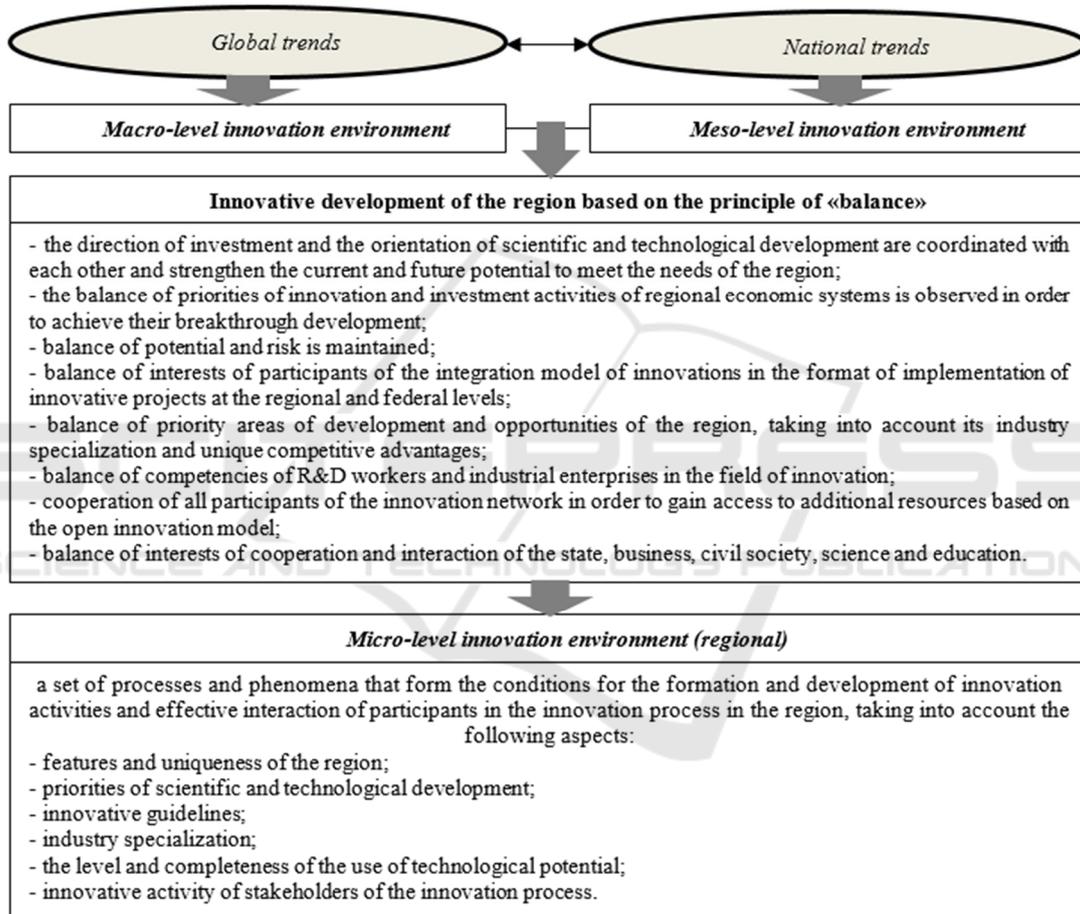


Figure 1: The model of innovative development of the region in the context of the formation of its innovative environment.

Modern systems theory allows us to conduct an up-to-date study of the problem of innovative development of the region from the point of view of its dynamic complexity (Knyazeva, 2020). The basic postulates provide an understanding of the system elements and characteristics of the region.

Considering the region as a complex dynamic system, which assumes a change in time and the possibility of switching different modes of operation, it is necessary to note such an important system property as holism (Figure 2).

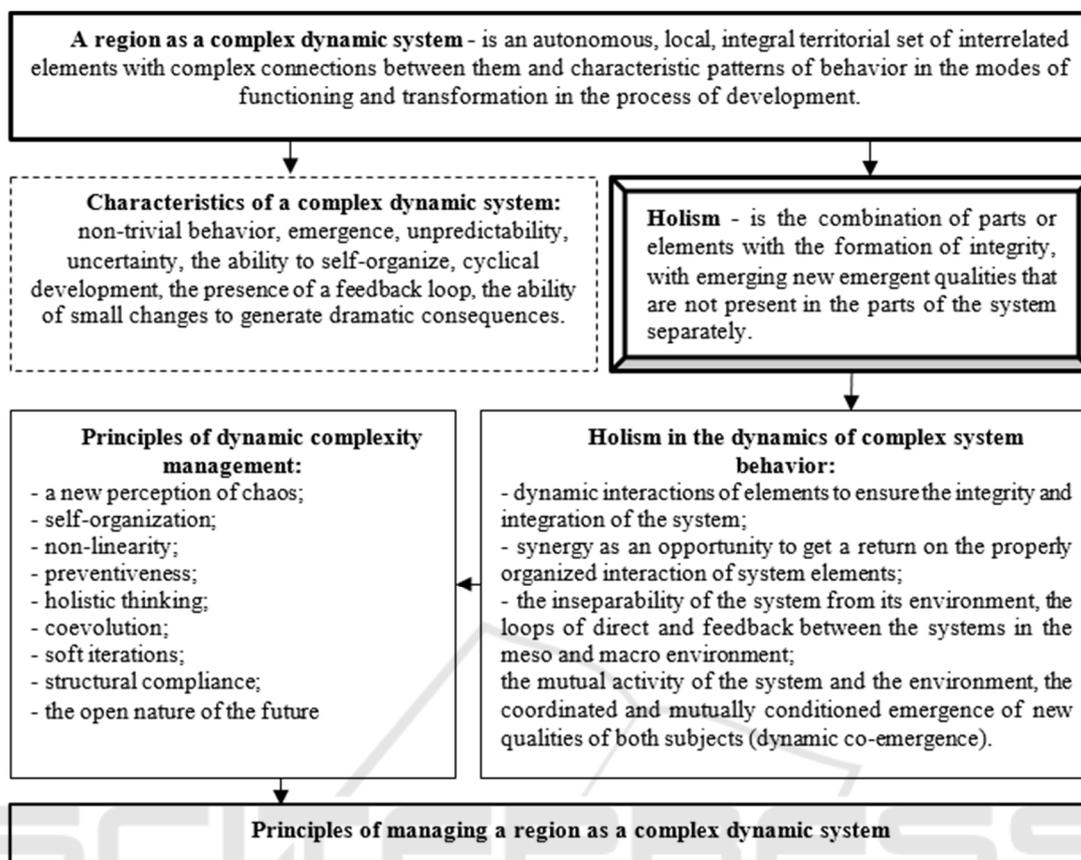


Figure 2: Holism as a basic property of a dynamical system.

According to the research, scientific knowledge about the systems allows us to expand the approaches to the formation of the innovation process and the development strategy of the region. We are talking about the use of the principles of dynamic complexity management as guidelines for the organization of management activities in the socio-economic systems of the regional level:

- a new perception of chaos (randomness, variability and variability are properties of evolutionary processes that form diversity as a combination of elements with unique characteristics; for the balanced development of the system, diversity is extremely necessary, especially in the innovation sphere of the region);
- self-organization (builds internal structures of the system based on external requirements through self-adjustment and self-regulation mechanisms; as a result, new values can be formed, shared by all subsystems of the region; the pace of development of elements within the complex structure of the regional system can be synchronized);

- non-linearity (complex systems have many paths of evolution that correspond to their internal nature and the cyclical nature of the ongoing processes, which confirms the need for the use of scenario planning methods for the region);
- preventiveness (in the process of systems functioning, points of singularity inevitably arise, accompanied by increased turbulence, chaos, and irrationality in behavior; this fact must be taken into account when forming a regional development strategy and react proactively to upcoming changes in the format of determining new forms of interaction between participants in the innovation process in the region to create and implement innovations);
- holistic thinking (the ability to see «the forest behind the trees» - the whole behind its parts, to act at the local level on the basis of a strategic vision; to form a strategy for innovative development of the region based on its unique characteristics, based on the trends of the global technological paradigm);

- coevolution (understanding the ways to build dynamically stable integral structures leads to mutual coordination and harmonious development of the system elements – their coevolution, which allows to accelerate the progress of the formed integral structures and develops synergy in the system);
- soft iterations (for high efficiency, small in size and insignificant in effort, but properly organized actions (iterations) are necessary; correct and soft impact, applied at the right point and at the right time, can «awaken» the system; correct management in the region can reveal and develop its innovative potential);
- structural correspondence (topological optimal combination and connection of the system elements into an increasingly stable whole with the formation of a single structure that ensures future development; for the region, we are talking about an optimal and relevant management structure that corresponds to the chosen strategy of innovative development);
- the open nature of the future (passing through the phases of instability and bifurcation, the system inevitably finds itself in a situation of choosing the future path of development from possible alternatives; regional systems are able to form their resilience, extracting new opportunities, increasing readiness for the

development of innovative potential, determining the strategy of innovative development through the formation of the «image» of the future).

Thus, the use of the principles of the concept of holism in solving the problem of innovative development of the region as a complex dynamic system allows us to distinguish the following settings: the «image» of the future for the region can and should be formed; the scenario of the future development of the region depends on the correct choice of priorities for innovative development; current actions are important for the implementation of the «image» of the future. This fact justifiably proves the need for effective management of regional development to use the methods of scenario planning and foresight research.

Continuing to study the problems of innovative development of the regions, we come to the conclusion that it is necessary to review the approaches to the activation of innovative activity of the participants. Innovation in a regional context requires all participants to work together, despite differences in goals and interests. To study the problem in the framework of the study, the model of the «quadruple innovation helix» was taken as the basis for the formation of the innovation architecture in the region (figure 3).

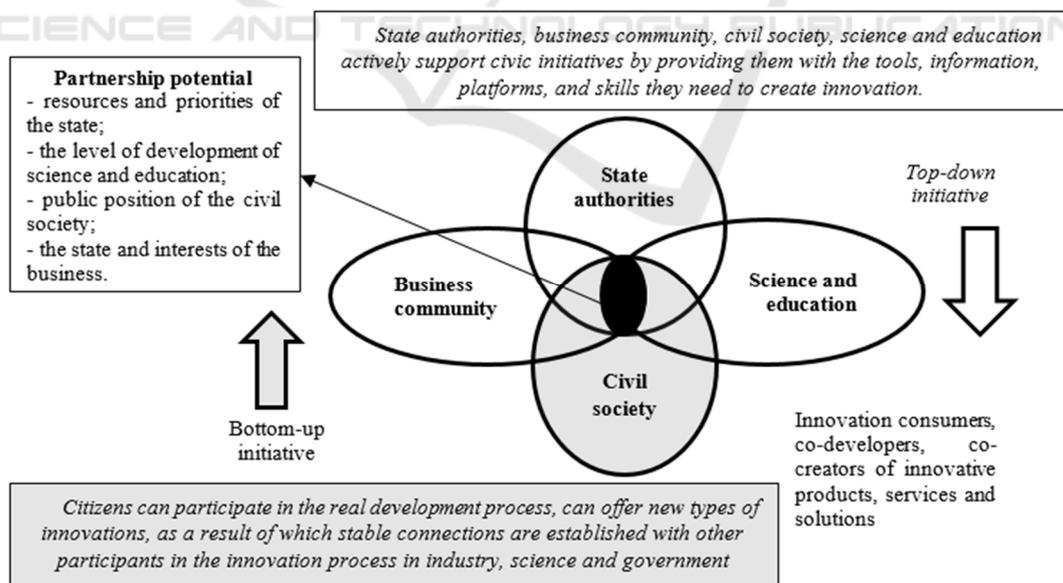


Figure 3: The «quadruple innovation helix» model as a basis for the formation of the innovative architecture of the region.

The model assumes the formation of an effective innovation space in the region based on the interaction of four sub-spaces formed by groups of participants

(state authorities, business community, civil society, science and education). The core of the model is the civil society as the real «users» of innovations

(Carayannis and Grigoroudis, 2016). This is due to the fact that the very idea of creating a quadruple innovation helix is aimed at boosting innovation and creating innovations that are important for users. It is the users who determine the essential content of the innovation process and are its driving force.

A feature of the innovation process in the region can be considered the possibility of using dynamically balanced approaches «from the top down» - an initiative in the direction of interaction between government agencies, the business community, science and education; «from the bottom up» - the actions and opinions of the civil community. When using the model, there is a need to involve all groups of participants in the innovation process in the discussion of the strategy of innovative development of the region, which means the formation of new forms of cooperation and partnership (Kutsenko, 2015). The study of the theory and practice of using the model allowed us to identify the problem of involving a group of civil society in the innovation process of the region. In Russian practice, there are no examples of active participation of citizens in the reasoned discussion of initiatives and the creation of innovations. In European practice, the following forms of interaction with the participation of the civil community can be distinguished:

- territorial poles of economic development (a set of initiatives of companies, social and solidarity economy networks united by a common territory, in which managers of social small and medium-sized enterprises, local authorities, research centers and educational organizations participate, implementing a common strategy of cooperation and mutual assistance to support local innovative projects of sustainable development);
- territorial development projects (public-private partnership format involving the innovative potential of the civil community on a competitive basis for the implementation of three types of projects: local initiatives; structural projects implemented jointly with neighboring territories; flagship projects to strengthen the reputation, improve the image and increase the attractiveness of the territory);
- houses of territorial development (territorial observatories for evaluating incoming initiatives, attracting representatives of the civil community to participate in projects, filling them with humanitarian content).

Such forms of interaction occur against the general background of the independent development of civil society through the activation of their

innovative activity. The involvement of the population is stimulated through various services, and the local economy is fueled by more intensive contacts and communications. In the European concept of «smart specialization», this process is called «entrepreneurial search» - a technology for organizing a constructive dialogue between stakeholders to develop a strategy for innovative development of the territory. It is interesting that the parties to the agreement become effective participants in the innovation process in the region and agents of the regional innovation culture (Tronina et al., 2019).

An important challenge is to achieve synergy between the participants in the innovation process to ensure «complementarity» of skills and build consensus. At present, the scientific literature has accumulated a good reserve of theoretical knowledge and methodological developments on the issues of synergy. In social terms, synergy manifests itself in the formation of integrity and cooperation, as well as in holistic individualization. At the same time, the whole does not suppress the individual, but develops it. Therefore, in well-formed social structures with high synergy, the level of aggression is reduced to a minimum, and the intensity of cooperation reaches a maximum (Loginova, 2015).

To form synergy as a measure of the effectiveness of interaction of stakeholders of the innovation process in the region as a system, the following conditions must be met:

- consistency in time and space of the conditions for interaction of participants as subsystems of the regional innovation system;
- the presence of «disturbed» states of subsystems that contribute to the development of the system through qualitative changes;
- external control actions on the system in the form of state regulation should be compatible and comparable in direction and momentum;
- identification of the leading link in the innovative development of the system and ensuring its self-development.

Leading theorists and practitioners of regional development point out the importance of forming common ideas that correspond to the local culture, are widely shared by local communities, and therefore provide motivation for joint actions. This requires the creation of certain conditions and mechanisms of cooperation, allowing to break the existing mental stereotypes of the impossibility of open interaction. One of the modern approaches to solving the problem of interaction of participants in the innovation process in the region is the open innovation model as a driver of innovative development (figure 4).

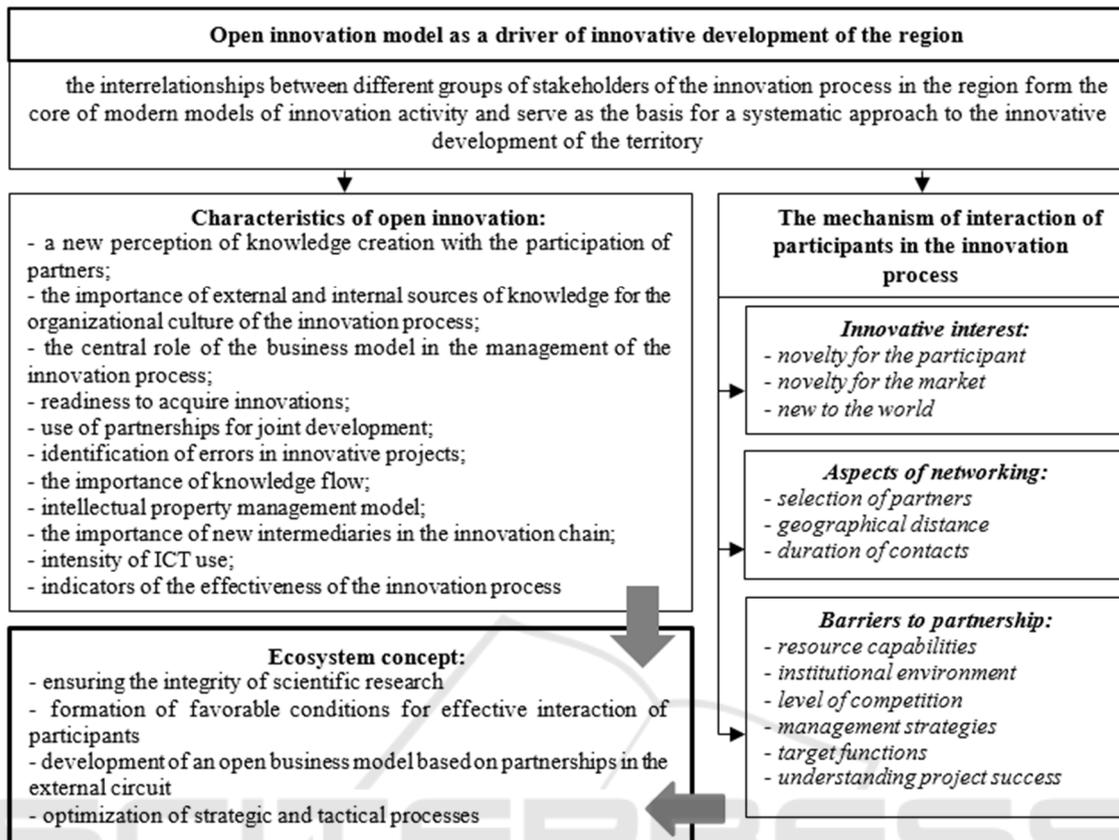


Figure 4: The essence of the Open Innovation model.

The model is based on the principle of free dissemination of knowledge and results obtained at different stages of research (Ottonicar et al., 2020). We are talking about overcoming the boundaries in attracting external specialists to the internal innovation activities of the subject within the framework of projects and on the basis of strategic partnership. As a result of open innovation, scientific knowledge is combined with practical skills, and the following advantages are developed:

- formation of entrepreneurial and critical thinking;
- adaptation and improvement of the education model at the regional level;
- integration of entrepreneurial, scientific and educational activities into the system of continuous learning;
- the emergence of new structures to encourage innovation;
- formation of a new innovative culture in the region.

In the scientific research of many authors, the undeveloped practice of interaction between the participants of the innovation system is noted,

however, the principles of openness should be integrated into the innovation activities of the region in the context of its sustainable development.

#### 4 THE DISCUSSION OF THE RESULTS

The effectiveness of innovation policy at the regional level can be explained by the difference in the socio-cultural characteristics of the Russian regions and the values characteristic of their population. From the point of view of innovative development, the region forms its own ratio of the demand for innovations (conditions for the introduction of innovations in the region) and the supply of innovations (conditions for the generation of innovations). The sociocultural gap (values and behavioral attitudes) is determined by studying the following characteristics: the sociocultural profile; the specifics of generalized and institutional trust; behavioral attitudes related to various aspects of innovation activity.

In conditions of significant cultural diversity and taking into account the extent of the territory of Russia, the socio-cultural characteristics of individual regions can serve as drivers and, conversely, become barriers to the introduction of new technologies and the formation of new technological markets. This should be taken into account when developing and using tools to stimulate innovative growth.

Thus, the model solution to the problem of interaction of participants in the innovation process in the region allows us to take into account the theoretical constructions of the theories studied in the course of the study and present them in the format of principles (balance, holism, synergy, openness), supplemented by the peculiarities of the influence of socio-cultural factors (Figure 5).

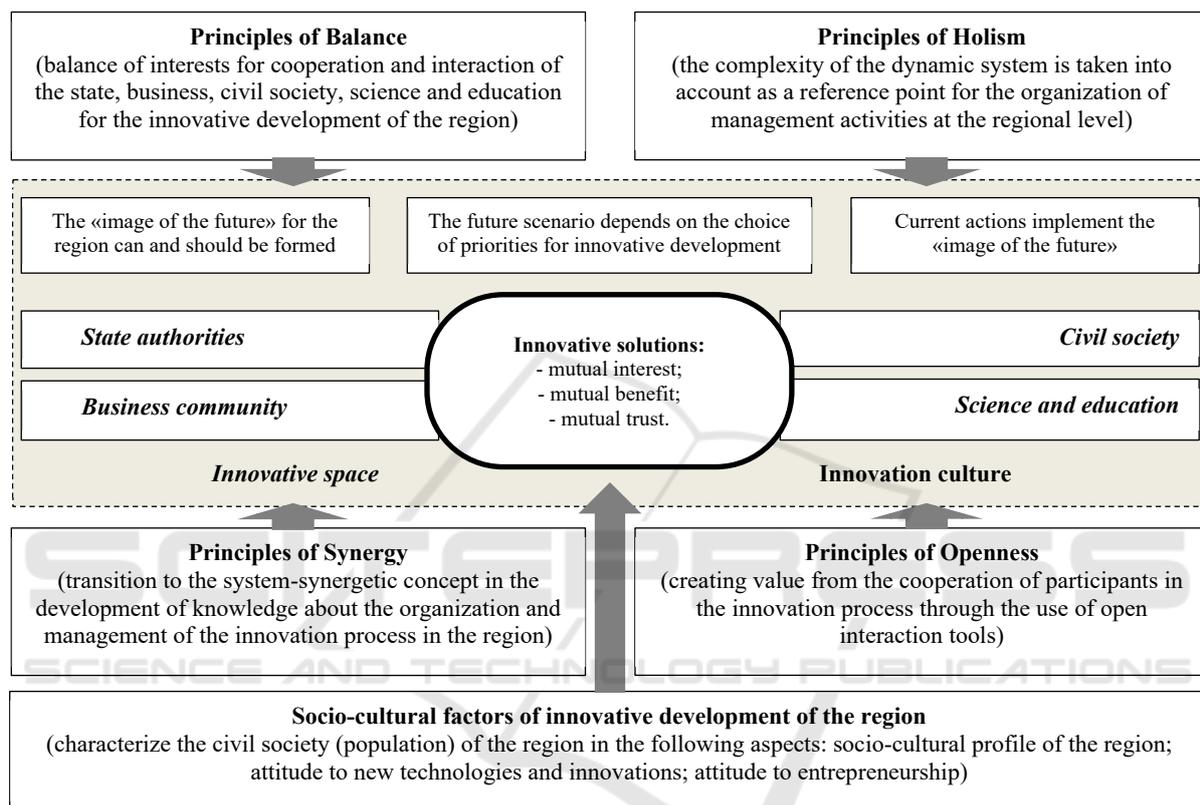


Figure 5: A model solution for the formation of interaction between participants in the innovation process in the region.

As innovation activity at the regional level becomes more flexible, it means that new users should be involved in it, using new integration tools. The model solution proposed by the authors for the formation of interaction between the participants of the innovation process in the region can be supplemented by the open innovation platform model as a key coordination mechanism. This will provide a qualitatively new space for interaction, and the platform participants will have the opportunity to share knowledge and use the urban environment as a «living laboratory» (Raunio, Nord, Kautonen and Rasanen, 2018).

## 5 CONCLUSIONS

The study highlights systemic problems of a regional and sectoral nature, reflecting the relevance of issues of stimulating innovation activity in the context of sustainable development of the socio-economic system. In the continuation of this, the essential model of the innovative development of the region in the aspects of the formation of its innovative environment is presented. Studying the features of innovative development from the point of view of system complexity, the authors consider the concept of holism, which allowed us to form the principles of managing the region as a complex dynamic system. The necessity of involving groups of participants in

the innovation process in the discussion of the strategy of innovative development of the region and the special role of the civil community in this issue is justified. The model of open innovation as a driver of innovative development of the region is considered, which allows to study the relationship between groups of stakeholders based on the free exchange of knowledge, intellectual property and new ideas. The joint solution of the problems of sustainable development creates a synergistic effect and allows a large number of ideas to be in demand as part of the selection of priorities for improving the competitiveness of the territory. Important in this process is the influence of socio-cultural factors that reflect the characteristics and attitude of the population to the issues of sustainable development of the region through innovation.

This article are exploratory in nature and contain a conceptual approach to the study of the features of interaction between participants in the innovation process in the region, which is of scientific interest. The practical significance of the study is connected with the possibility of using the model solution proposed by the authors in the methodology of forming a strategy for innovative development of the region with the involvement of regional stakeholders in this process. The directions of further research of the authors will be related to the study of the development of the necessary competencies of stakeholders for the use of the principles identified in this work for the formation of interaction of participants in the innovation process in the region in the context sustainable development.

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