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«SMART» ECOSYSTEMS IN THE INNOVATIVE DEVELOPMENT OF THE TERRITORY

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Abstract

Modern conditions of innovative development of territories are determined by the processes of digitalization of almost all spheres of activity. The issues of adaptation of participants in the innovation process through integration mechanisms that form new models of cooperation and partnership in the format of economic systems (ecosystems) come to the fore. Studying the issues of ecosystem development reflected in scientific works, the conclusion is made about the role of the ecosystem as a sustainable coordination mechanism, where competition and cooperation cease to be mutually exclusive categories. For each participant, the ecosystem, on the one hand, is a key factor in determining the strategy and forming a competitive advantage, and on the other hand, it reveals the concept of a strategic niche for each participant as a set of resources and competencies that ensure value creation. At the same time, the predominance of cooperative relations that allow creating the network and synergistic effects does not exclude competition for resources and consumers at all. The article attempts to form and describe the starting points for the implementation of the ideas of innovative development of territories based on the formation of a new model of the innovation ecosystem based on the principles of cooperation and partnership. For this, in our opinion, it is appropriate to use the concept of «smart specialization» and the «quadruple innovation helix» model.

Keywords: Cooperation model, ecosystem, innovative development of the territory, region

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1. Introduction

Economic systems (ecosystems) are currently emerging in almost all spheres of activity of economic entities, regardless of industry specifics and regional binding. At the same time, new methods and mechanisms are used for their creation, functioning, and development. In our opinion, it is appropriate to apply a «smart» approach to modern ecosystems. Just as the objects around us and the technologies we use become smart, both individual organizations and entire ecosystems should become smart. In our opinion, the main attention in the «smart» approach for ecosystems should be paid to the formation of partnerships between participants, taking into account the rapidly changing environmental conditions. This is a new reality in which changes are inevitable both in technological and managerial terms. It is necessary to establish partnerships between ecosystem participants through the formation of a new landscape based on the design of new models of cooperation (Babikova & Fedosova, 2021). Why it is important to use «end-to-end» digital technologies and new management tools. This is especially true for regions as drivers of innovative development of territories and engines of economic growth, prosperity, and social progress (Schwab, 2016). The research task is to find an up-to-date approach to the process of ecosystem formation and management to maximize value, gain competitive advantages and achieve synergy effects.

2. Problem Statement

There is an objective need to move to a new model of cooperation that meets the modern requirements of the digital economy and the challenges of the external environment. This is because the new model of cooperation should have a different goal, objectives, structure, result than the previous models because thanks to digitalization, sectoral and territorial boundaries are becoming increasingly blurred. The issues of adaptation of ecosystems and their participants are becoming relevant, forming the ability to quickly respond to changes in demand, customer preferences, and, in general, to a changing competitive environment.

The study of theoretical aspects and practical examples of the formation of economic systems of various types in the domestic and foreign literature allows us to conclude that at the moment there are significant gaps in the methodological issues of the functioning and development of ecosystems based on an effective model of cooperation. In the course of the study, we were faced with the lack of well-developed algorithms for the formation of ecosystems, although the importance of this process is described very well. Therefore, the relevance of the topic of this study is related to the need to develop a new approach to the implementation of the ideas of innovative development of the territory based on the concept of «smart specialization» and the «quadruple innovation helix» model.

3. Research Questions

Within the framework of this study, the following important issues can be identified for study, formulated in the format of tasks: the study of the theoretical foundations and methodological aspects of the formation and development of the concept of ecosystems in the scientific literature; the search for an up-to-date approach to the process of formation and management of ecosystems in the digital economy; the development of a model solution to the problem of the functioning of a «smart» ecosystem and the

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definition of the basic principles of ecosystem management of a new model; characteristics of the current level of cooperation of potential ecosystem participants in the issues of innovative development of the territory on the example of stakeholders of the Orel region.

4. Purpose of the Study

The purpose of this study is a theoretical and methodological justification of the use of a «smart» approach to the innovative development of the territory of the regional level as an ecosystem in the digital economy.

5. Research Methods

To achieve this goal, during the preparation of this article, modern theoretical material and methodological scientific groundwork were used, which allows studying the problems of innovative development of the territory from the perspective of the concept of ecosystems, scientific works of domestic and foreign scientists on research issues. Methods of logical and structural study of the problem, system, comparative, critical analysis, and synthesis, general scientific and expert-analytical methods, as well as methods of graphical description and interpretation of information, were used in the research process.

6. Findings

Modern ecosystems in the digital economy should by definition become digital, intelligent, smart. The analysis of the existing scientific literature on the functioning and development of ecosystems allows us to conclude about the diversity of opinions in their terminological characteristics (Makarov et al., 2016; Popov et al., 2019; Ramenskaya, 2020). The concept of «ecosystem» in modern scientific literature is considered from several analytical positions:

- analogies with biological ecosystems (the presence of interdependence and coevolution is assumed, the relationship between the interactions of participants, cooperation and competition between them is taken into account);
- comparative differences between natural and artificial ecosystems (emphasis is placed on the initial structuring, the lack of localization of the ecosystem in a certain area, changing the roles of participants in the development process);
- historical chronology (study of the essence of the concept of the ecosystem from the historical origin of the prefix «eco» in the terminology of economics and ecology by time lags with refraction through changing environmental conditions);
- the basis of institutional theory (assessment of the impact of institutions on the possibility of formation and effective development of ecosystems with the simultaneous description of institutional conditions that positively and negatively affect the system);
- the study of dynamic abilities (the issues of competitiveness and creation of competitive advantages of system participants through dynamic abilities that allow modifying competencies taking into account the influence of environmental factors and their changes are considered);

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- development of economic and organizational-managerial thought (as a continuation of the organizational-ecological tradition with the formation of a separate concept of ecosystems and the accumulation of basic methodological tools).

In any case, the ecosystem concept is interesting and relevant for the study of the processes of functioning and development of territories, as well as the formation of theoretical and methodological structures based on the creation of a new model of cooperation and partnership. That is why the ecosystem concept allows us to take a fresh look at the mechanism of interaction between participants in several cross-sections: level (global, national, regional, municipal), industry (according to the classifier of industries and spheres of activity), target (entrepreneurial, innovative, digital) (Kuzmenko, 2017; Raunio et al., 2018).

Choosing your cross-section for conducting research, it is important to take into account the possibilities of using hybrid forms of inter-organizational and inter-firm relations as a factor in the formation of a new model of cooperation and partnership, as well as rethinking the evolutionary role of strategic niches. For each case, the ecosystem is studied as a set of autonomous organizations - stakeholders of modular architecture, producing complementary components of shared value, forming a certain structure of relations and a mechanism of interaction based on cooperation and partnership, without the need for a vertical hierarchy. Strengthening horizontal links in such a system allows organizations to maintain their autonomy, requiring participants to create and implement innovations. The leader of the ecosystem sets the architecture and the main parameters that determine the general rules and ways of interaction of participants. The other participants independently determine the configuration and management of their modules. As a result, an ecosystem of «exogenously» set environmental parameters and stakeholders is formed, «endogenously» acting together as a whole, receiving benefits and achieving synergy from the interaction.

The attempts of the author's team to systematize the flow of research related to the formation of the concept of ecosystems allow us to separately note the following types of ecosystems, most often found in modern scientific literature and causing a large number of discussions: regional ecosystem, innovation ecosystem, digital ecosystem.

The regional ecosystem is a subsystem of the national economic system of production forces based on the specifics of the use of the region's resources. This ecosystem strives for sustainable development by strengthening its capabilities and competitive advantages based on taking into account the uniqueness and improving the characteristics of the region. The main role in the implementation of the interaction of participants in regional economic systems is played by the state (Tronina et al., 2019).

An innovation ecosystem is a favourable model of a system for the creation and development of innovations, formed by the stakeholders of the innovation process, in which a central entity is allocated - a company or a digital platform around which this ecosystem is built, as well as agents who are outside the ecosystem but have a certain influence on its activities. The efficiency and speed of the ecosystem depend on how the stakeholders of the ecosystem are located and how their interaction is carried out. The fundamental elements of the innovation ecosystem are the common goal of its members and their integration into the overall innovation process (da Silva et al., 2021; Gatina, 2013; Murata et al., 2021).

The digital ecosystem is a project to create conditions for the operation of a technology platform that combines various interrelated and complementary services and business processes, with access to all services through a single account. A collaboration of services under one brand is also being formed,

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which allows participants to effectively use the services, having the opportunity to freely switch between them. Organizations from various fields take part in the formation and development of digital ecosystems. Their distinctive feature is the huge customer base, which in turn allows us to develop and offer various services based on their preferences (Geliskhanov et al., 2018).

The scientific research of the team of authors concerning the issues of innovative development of the territory based on the European concept of «smart specialization» and the model of the «quadruple innovation helix» model allows us to conclude that the prerequisites for the emergence of a new natural type of ecosystem – a «smart» ecosystem. The scientific reserve on «smart» ecosystems in the theoretical and methodological aspects of the ecosystem concept has not yet been accumulated enough, therefore, the author's main provisions are formulated within the framework of this article. Figure 1 substantiates the possibility of using the concept of «smart specialization» and the «quadruple innovation helix» model in the development of ecosystems.

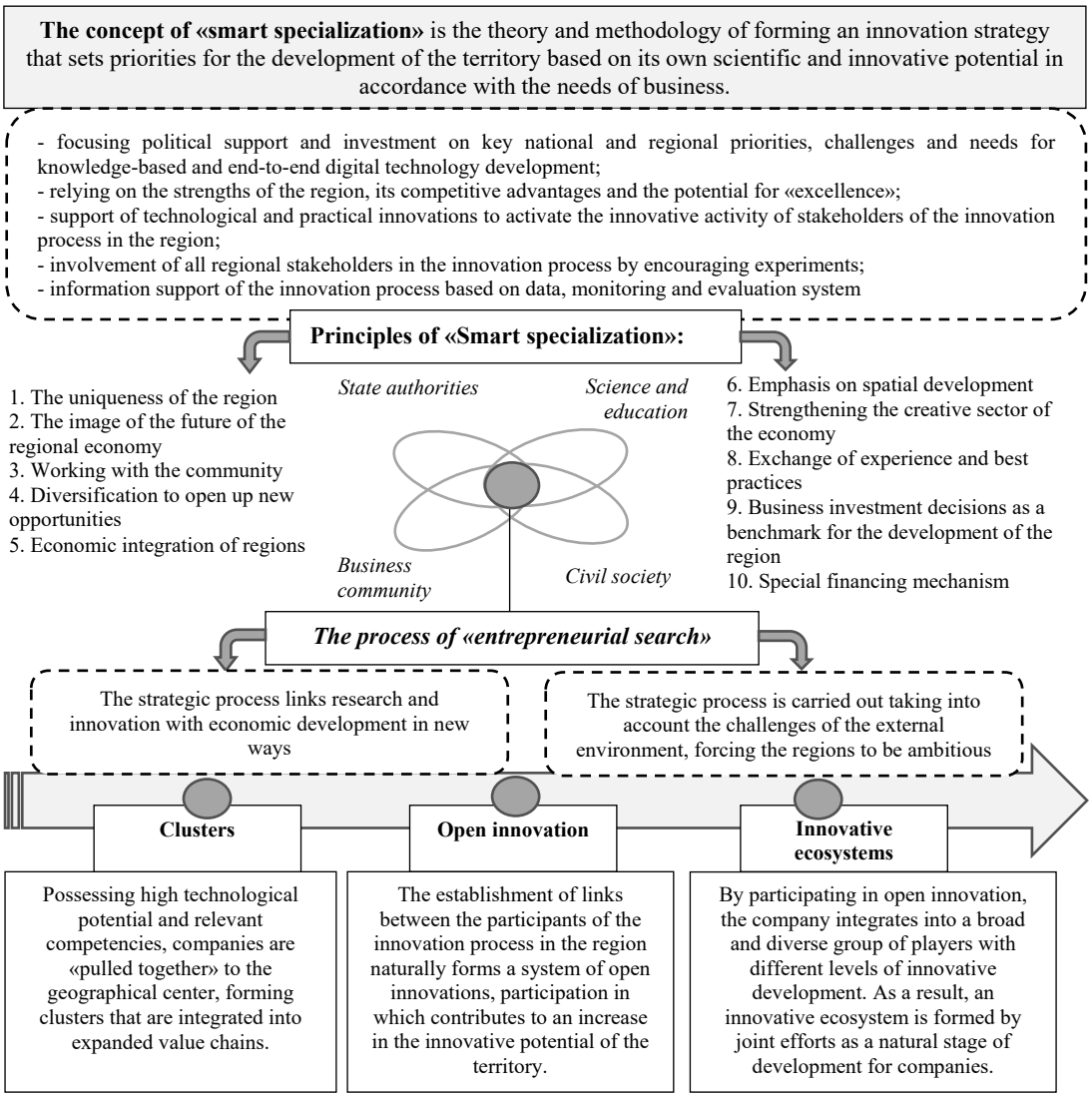

Figure 1. The concept of «smart specialization» in the development of ecosystems, *compiled by the authors*

The concept of «smart specialization» is interesting for its topical approach of using the unique features of the territory in the development of competitive advantages for the formation of an innovative

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development strategy. In addition, smart specialization is focused on the continuous improvement of the model of cooperation and partnership, relying on the «quadruple innovation helix» model, involving representatives of four groups of stakeholders in the innovation process (business community, science and education, state authorities, civil society). The essence of the interaction of participants in the innovation process in the region is determined by the competent organization of the process of «entrepreneurial search», taking into account the interests and using the competencies of different groups of stakeholders in the development and implementation of the strategy. One of the main tools of the concept of «smart specialization» is a cluster as a format of interaction between participants (Carayannis & Grigoroudis, 2016; Kutsenko et al., 2018; Tronina et al., 2020). At the present stage of development of this concept, we can talk about the need to use the ecosystem as a new format of interaction between stakeholders of the innovation sphere.

By «smart» ecosystem, we mean the centre for the formation of the synergy of participants as stakeholders of the innovation process according to the model of a «quadruple innovation helix» model operating based on the principles of «smart specialization» and using a digital platform for interaction based on cooperation and partnership, solving competition problems through the coordination of interests (Figure 2).

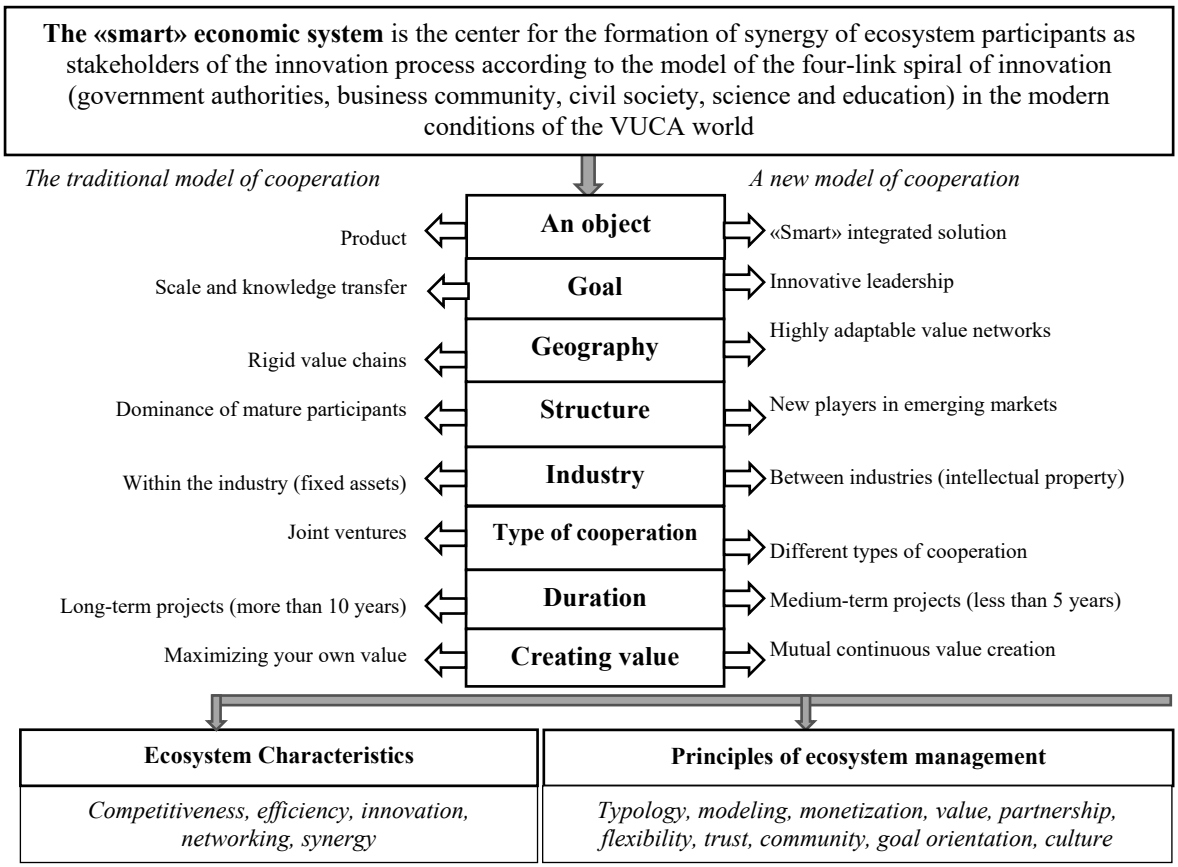

Figure 2. A model of cooperation in a «smart» ecosystem, *compiled by the authors*

It is possible to formulate the basic principles of ecosystem management of the new model:

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- the principle of typology (the correct choice of ecosystem type is necessary for the initial compliance with the compliance regime between the strategic goals and capabilities of the ecosystem and its participants);

- the principle of modelling (a management model that depends on the type of ecosystem ensures an effective distribution of roles between participants and the mechanism of their interrelation and interaction);

- the principle of monetization (the ecosystem should form a profit formula and bring income to all its participants);

- the principle of value (the ecosystem should ensure the creation of mutual value for the participants, which makes the system attractive);

- the principle of partnership (the interaction of ecosystem participants is formed based on the priority of partnerships with a focus on innovation and commercial potential, strategic importance for maximizing value creation);

- the principle of flexibility (for a quick response to changes in the external environment of macro and meso levels in the ecosystem, flexible partnership agreements should be established with the possibility of creating new partnerships and exiting existing ones);

- the principle of trust (ecosystem participants interact based on mutual interest, mutual trust, and mutual benefit, which implies effective methods of working with information);

- the principle of the community (it is necessary to ensure a sense of cohesion and create a feedback system for a joint innovation process for the ecosystem);

- the principle of goal orientation (goals for the ecosystem are a guideline for the development and implementation of activities that can be described through the achievement of performance indicators);

- the principle of culture (the mechanism of interaction of ecosystem participants forms a certain culture that adds uniqueness to the system and contributes to the development of its new properties and characteristics).

We consider it important to note the need to build the potential for cooperation and partnership in the «smart» ecosystem of innovative development of the territory (Figure 3).

It is the accumulation and development of such potential that is the catalyst for the process of «entrepreneurial search» as a technology for organizing a constructive dialogue between stakeholders to develop a strategy for innovative development of the territory. A feature of the «entrepreneurial search» 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» - actions and opinions of the civil community. In Russian practice, there are no examples of active participation of citizens in a reasoned discussion of initiatives and the creation of innovations. In European practice, it is possible to distinguish such forms of interaction with the participation of the civil community as territorial poles of economic development, territorial development projects, territorial development houses. Such forms of interaction are used in the EU against the general background of the independent development of the civil community through the activation of their innovative activity. The involvement of the population is stimulated through various services, and the local economy receives a boost in the form of more intensive contacts and

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communications. Therefore, we consider this experience interesting for research and application in Russian practice.

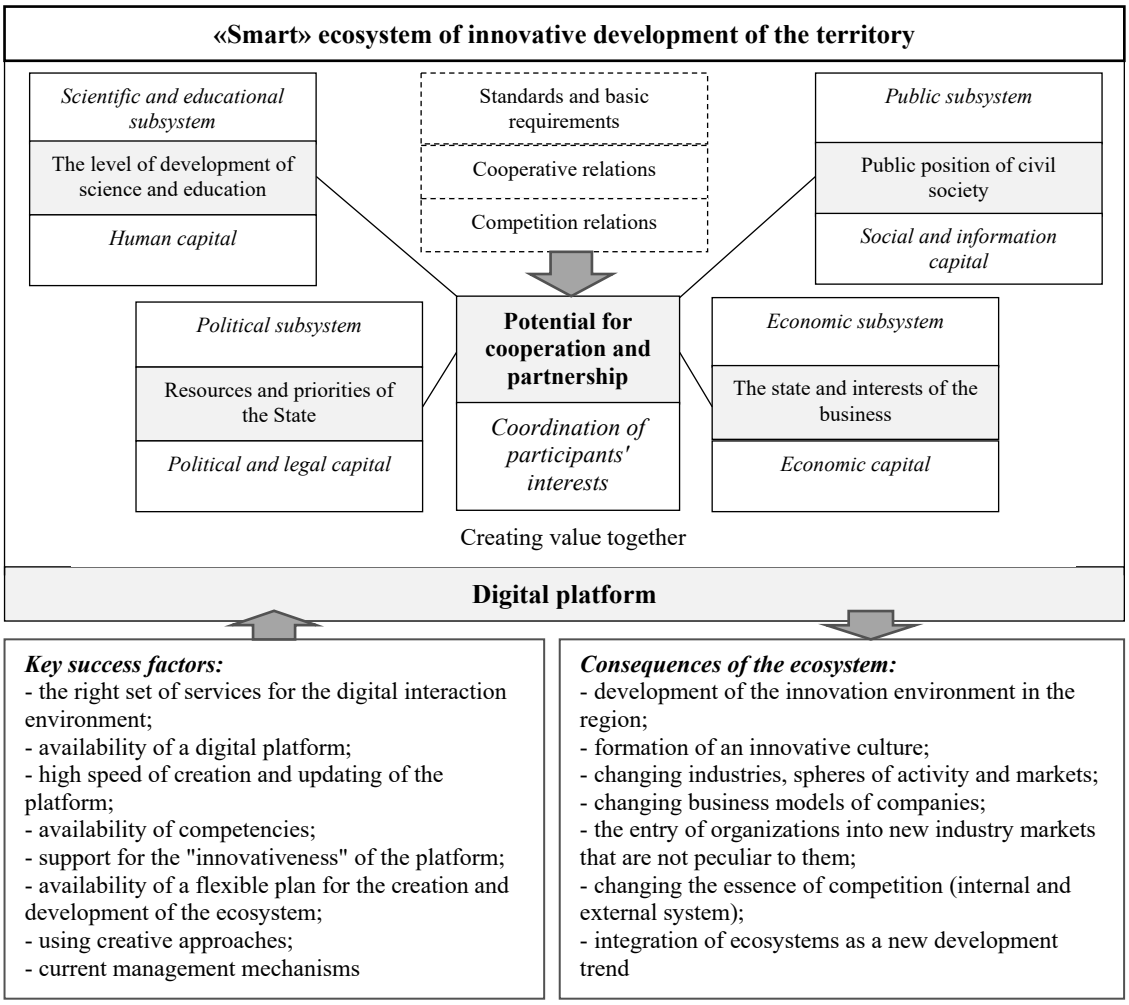

Figure 3. The potential of cooperation and partnership in the «smart» ecosystem of innovative development of the territory, *compiled by the authors*

The priorities for realizing the potential of cooperation and partnership in the smart ecosystem are as follows: expanding the space of the municipal economy; balancing local regional and federal resources and interests; attracting additional budget and investment resources to regional development; joint implementation of innovative programs and projects; growth of innovative activity of business structures and increasing their competitiveness; stimulating the knowledge economy (strengthening the knowledge resource); formation of a smart specialization strategy.

In this case, the digital platform acts as an information and communication tool to support the interaction of stakeholders in the innovation process in the region. As a result, not just a new communication process of interaction in the innovation sphere is being formed, but an innovation culture with a mechanism for coordinating open innovation activities of ecosystem participants.

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Creating a «smart» innovation ecosystem at the regional level is a difficult task. In this regard, there is an objective need to identify unused opportunities for building an effective ecosystem at the regional level. Based on the understanding of the new logic of interaction of stakeholders in the innovation sphere, combining partnership and competition, the study attempts to characterize the current state of the innovation ecosystem in the region. The study is based on identifying the weaknesses and strengths of the regional ecosystem and identifying opportunities and threats for its further advanced development.

If in principle, everything is logical and understandable in matters of competition between representatives of stakeholders (companies, universities, organizations strive for leadership, including in the innovation sphere), then there are significant difficulties in matters of cooperation and interaction. In this regard, we will focus in more detail on studying the current level of interaction between stakeholders in the innovation sphere at the regional level. For this purpose, the study conducted questionnaires, statistical data processing, identification of opportunities and threats (barriers) for further cooperation of stakeholders in the innovation sphere. The questions for the survey of representatives of different groups of stakeholders of the innovation process in the direction of «cooperation and cooperation in the innovation sphere» are presented in Table 1.

Table 1. List of questions for surveying stakeholders of the innovation process

Stakeholder Group	Questions for the survey
Business community	1) Do you interact with representatives of science and education in the process of product development? (never, once, if necessary, permanently).
	2) Do you interact with representatives of science and education in matters of training qualified personnel for your production? (never, once, if necessary, permanently).
	3) Do you interact with other manufacturers at the regional level of similar products on the exchange of experience? (never, once, if necessary, permanently).
	4) Do you interact with other manufacturers of similar products at the regional level on issues of joint production? (never, once, if necessary, permanently).
	5) Do you interact with other manufacturers of related products at the regional level on the exchange of experience or joint production? (never, once, if necessary, permanently).
	6) Do you interact with regional authorities on business development issues? (never, once, if necessary, permanently).
	7) Do you interact with consumers on improving the quality and expanding the range of products? (never, once, if necessary, on a permanent basis).
Science and education	1) Are you a member of a regional cluster and /or carry out systematic work with the business in another form? (yes, no).
	2) Is your work coordinated with the authorities on the issues of advanced training, which should develop the region? (No, partially, yes)
	3) Do you use modern tools of interaction between local businesses and universities, for example, a basic department, a target set, etc.? (no, once, on an ongoing basis)
	4) Does your organization provide fair collective access to resources created at public expense: libraries, laboratories? (No, on request, yes)
	5) Do you implement joint projects with other universities to train personnel for the innovative economy? (Yes, no)
	6) Do you implement joint research projects with other universities, scientific and industrial enterprises? (No, once, yes)
State authorities	1) Has a set of measures of state support for innovation activity been developed for the current and short-term period, taking into account the cooperation of science, business, and government? (No, partially, yes)

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	2) Are representatives of science and education involved in the development of the innovative development strategy of the region? (No, partially, yes)
	3) Are business representatives involved in the development of the innovative development strategy of the region? (No, partially, yes)
	4) Are representatives of civil society involved in the development of the innovative development strategy of the region? (No, partially, yes)
	5) Is there work on the formation of innovation clusters in the region (no, at the initial level, clusters have already been created)
	6) Is work underway in the region to create other forms of innovative cooperation? (Yes, no)
Civil society	1) Do you know about the surveys of civil society representatives in the region on regional development issues? (No, yes, I wasn't interested)
	2) Do you follow the development of your region? (No, periodically, yes)
	3) Are you a member of the Council of Public Representatives of the Government of the region in any direction? (No, yes)
	4) Have you participated in surveys of civil society representatives on regional development issues? (No, yes)

The results of the survey of representatives of each group of stakeholders are shown in Figure 4. On the **x**-axis – the percentage ratio of the survey results obtained, provided that the entire group of respondents is 100% (the sample was conducted in the Orel region); on the **y** axis - questions for the survey of representatives of a) business community; b) science and education; c) authorities; d) civil society in the direction of «cooperation and cooperation in the innovation sphere».

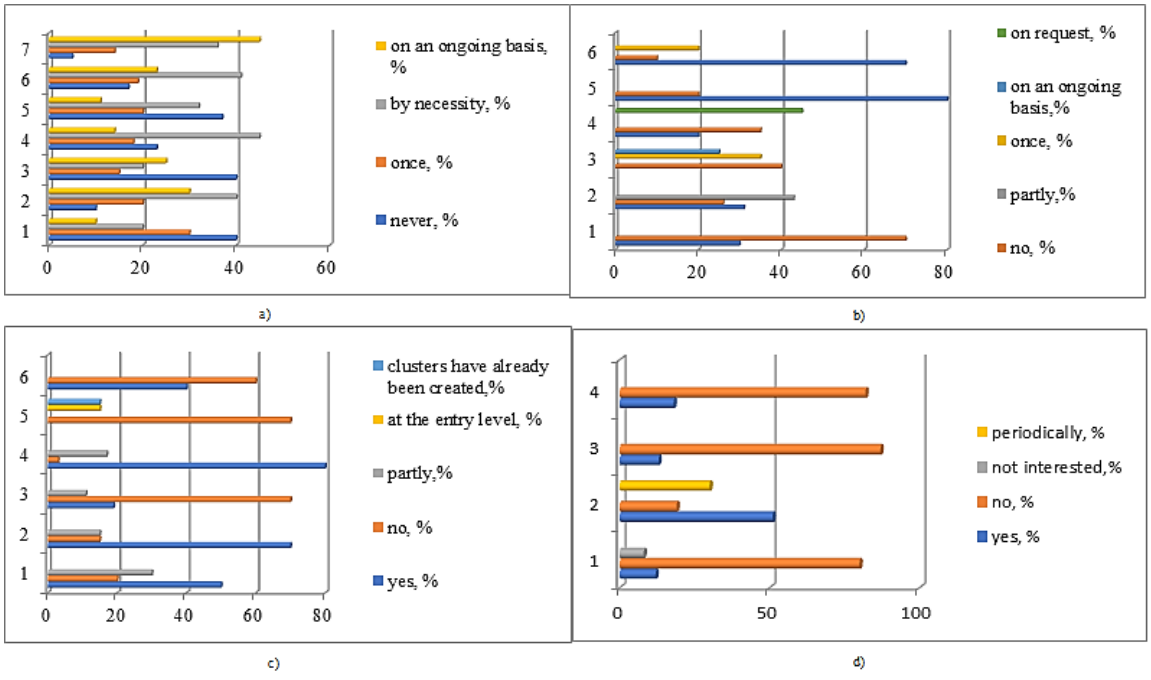

Figure 4. The results of the survey of groups of stakeholders of the innovation process in the direction of «cooperation and cooperation», *compiled by the authors*

The assessment of the degree of business cooperation comes from the understanding that the effectiveness of innovative business depends on the ability of the company to develop innovations in cooperation with external partners. Thus, innovatively active companies are distinguished by a clear

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involvement in networking and cooperation, especially in the process of developing and implementing innovations.

The assessment of the system of science and education in matters of cooperation in the innovation sphere proceeds from the understanding that Russian universities should become points of growth of regions and actively participate in solving their innovation agenda based on close cooperation with the government, business, and civil society. Thus, an effective education system should be integrated into a single innovation space of the region. At the same time, the education system itself needs rules of fair competition and open interaction in modern conditions.

One of the main factors in the formation of the smart ecosystem of the region is intended to be regional authorities and local self-government bodies. The success of innovation activity in Russian regions is largely due to the increased attention of regional authorities to the formation of financial support for scientific and technical developments, the strengthening of their cross-links with other structural elements of the regional innovation system developed institutional support for regional stimulation of innovative development.

Civil society is a key social resource for the innovative development of the region. On the one hand, society is the final consumer of innovative products, on the other hand, public opinion is important in the strategic planning of regional development. It is impossible to achieve a high standard of living for the population and the development of the country's regions without public participation. In modern conditions, it is necessary to build a dialogue between the public authorities and the civil community, especially in the regions.

The study also attempts to identify the advantages of the ecosystem and barriers to cooperation, taking into account the opinions of stakeholders of the innovation process in the region. The data sources were academic literature devoted to the issues of innovative development of territories, comments of specialists in foreign and Russian media, as well as the results of personal conversations of the authors with experts and representatives of stakeholders in the innovation sphere. Interviews with representatives of business and science took place in the first half of 2021 in full-time and correspondence forms. The discussion topics and key issues are presented in Table 2.

Table 2. Topics for discussion and key issues for stakeholders of the innovation process

Thematic block	Key issues for discussion
1. Challenges of the digital economy	- digitalization as a vector of innovative growth; - technologies for creating, processing, exchanging and transmitting information; - the demand for information and communication technologies; - barriers to the use of digital technologies
2. Development of the region in the digital economy	- the main problems of the digital region; - penetration of digital technologies into the business environment; - risks of innovation; - competition and competitive advantages of the region
3. The region as an ecosystem of innovative development	- the region as a «smart» ecosystem; - interests of ecosystem participants in the process of «entrepreneurial search»; - cooperation and partnership in the ecosystem; - competition in the ecosystem
4. Interaction of	- agents of the innovation environment (participants in the innovation process in the

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regional stakeholders in the innovation sphere	region); - - objectives of intra-regional cooperation for participants; - information and communication process in the innovation sphere; - the result of cooperation for the participants of the innovation process

Expert opinions were used to confirm and substantiate the theses of the article, which is exploratory and contains a conceptual analysis of certain aspects of the interaction of regional stakeholders in the innovation sphere. We tried to identify the strengths and weaknesses of interaction from the perspective of each group of agents of the innovation environment as participants in the innovation process in the region, as well as to formulate the opportunities and threats (problem points) of ecosystems from the perspective of innovative development of the territory, using the SWOT analysis methodology, which is reflected in Table 3.

Table 3. SWOT data characterizing aspects of ecosystem formation for innovative development of the Orel region

Strengths of the region	**Weaknesses of the region**
- favourable economic and geographical location: favourable climatic conditions; transport transit location; stable socio-political situation; - a developed educational base capable of providing training for specialists; - economic relations of economic entities with other regions of the country; - availability of functioning clusters (K-57 cluster (territorial innovation cluster for development (adaptation), introduction of advanced technologies based on GLONASS/GPS), instrument cluster, tourist cluster, IT cluster of light industry); - development of the Green Grove Industrial Park, which creates conditions for the creation of new industries	- insufficient share of innovative products in the production structure of individual enterprises; - unfavourable demographic situation; - infrastructure constraints that prevent the creation of high-tech energy-intensive production facilities with high labour productivity; - low liquidity of fixed assets of most enterprises; - competitive lag in the struggle for attracting investment resources with the leading regions of the country; - low innovation, investment and emission activity of enterprises
Opportunities (advantages of the ecosystem)	**Threats (barriers to cooperation)**
- internal cooperation; - growth of competitive advantages; - creation and implementation of innovations; - exchange of information flows; - resource sharing; - exchange of competencies; - creating value; - diffusion of technologies; - growth of the level of economic indicators; - minimizing costs when creating ideas, products and services that are in demand by the market	- the balance of interests of participants; - the interaction of participants; - competition for resources; - innovative culture; - organization of the "entrepreneurial search" process; - the willingness of participants to use new technologies; - innovative infrastructure; - regulatory and legal framework of ecosystem activity and interaction of its participants

The construction of dichotomous pairs during SWOT analysis and their subsequent discussion with representatives of groups of stakeholders of the innovation process in the region allowed us to identify «problem areas» for the operation of the «smart» ecosystem in the Orel region. Among them, the problem of the low current level of cooperation of potential ecosystem participants in the issues of innovative development of the territory is particularly highlighted. As the stakeholders themselves note, the main reason is the lack of organization of the «entrepreneurial search» process, the importance of

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which was noted by all respondents. It is the process of entrepreneurial search as a necessary mechanism for involving stakeholders in the innovative activities of the region, according to the concept of «smart specialization» and the «quadruple innovation helix» model, that can become a catalyst for the innovative activity of participants in the «smart» ecosystem of the territory.

Based on the studied information, within the framework of the study, we have identified logical levels of development within regional cooperation, which are formed chronologically, based on the accumulated experience of building partnerships between stakeholders in the «smart» ecosystem:

- level 1 - *informational* (implies interaction based on the exchange of information between participants in the innovation process at the regional level);

- level 2 - *expert* (involvement of component agents of the innovation sphere as experts to solve current and strategic issues of territory development);

- level 3 - *project* (joint development and implementation of projects in various fields: scientific, educational, innovative, industrial, infrastructural, based on mutually beneficial cooperation and partnership and risk-sharing);

- level 4 - *integrated* (formation of integrated structures in the innovation sphere at the regional level; joint implementation of the regional innovation strategy).

According to the authors' team, the development of a «smart» ecosystem should be accompanied by a transition to the next level of cooperation of potential ecosystem participants in matters of innovative development of the territory. Therefore, it is necessary to work with the «problem areas» of the «smart» ecosystem, first of all, starting with aspects of improving the mechanism of «entrepreneurial search» based on the principles of partnership and cooperation.

An important aspect among the problems identified in the course of the study can be considered the balance of innovative development of the territory as the basic principle of ecosystem development. In our opinion, the balance for the «smart» ecosystem should be considered in the context of the following elements: balance of interests of participants in the integration model of innovation; balance of priority areas of development and opportunities of the region; balance of competencies of R&D workers and industrial enterprises; balance of functions of participants in the innovation network to gain access to additional resources. To achieve a balanced innovative development of the territory, it is necessary to develop comprehensive measures in the following areas:

- activation of the activities of economic entities of the region on the use of innovations to increase innovation activity;

- development of fundamental and applied science to increase patent activity, increase the quantity and quality of research for integration into the world science and innovation market;

- development of the innovation infrastructure of the region to support the innovation process throughout the life cycle of innovation;

- development of the innovative culture of the region is based on the involvement of stakeholders in the process of forming an innovative development strategy with a special role of the civil society in this process.

7. Conclusion

The analysis of domestic and foreign sources allows the authors to conclude about the popularity of the topic under study in modern scientific literature. In addition, it is possible to emphasize the pronounced interdisciplinary nature of most scientific works concerning the formation of ecosystems as drivers of the development of the digital economy.

Within the framework of this study, the theoretical foundations and methodological aspects of the formation and development of the concept of ecosystems in the scientific literature are studied, and the use of a «smart» approach to the process of formation and management of ecosystems is justified to maximize value, gain competitive advantages and achieve synergy effect. Based on the existing scientific groundwork, a model solution to the problem of the functioning of a «smart» ecosystem is proposed with the definition of the basic principles of ecosystem management of the new model. As part of the practical implementation of the author's ideas, a characteristic of the current level of cooperation of potential ecosystem participants in the issues of innovative development of the territory based on a survey of stakeholders of the Orel region was compiled. A serious lack of organization of the process of interaction of stakeholders of the innovation process in the region in the format of «entrepreneurial search» is noted. In addition, an important problem is the lack of involvement of civil society as an element of the «quadruple innovation helix» model in the innovation space of the region. In this regard, the directions of further research of the authors of the article will be related to the development of a methodology for conducting strategic foresight as a tool for strengthening cooperation in the ecosystem based on the process of «entrepreneurial search» and the mechanism of «co-production of knowledge» to ensure the balance of innovative development of the territory.

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