

Model of Formation of Innovative Culture as a Key Factor of Innovative Development of the Region

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Abstract — In the knowledge economy, the concept of "culture" is becoming an increasingly necessary attribute of the region. Culture is gradually filled with innovative content in accordance with the formation of a new system of interconnected spatial and technological chains. For any region, the process of interaction between participants in innovation activities is of particular importance. Moreover, the innovation activity of the regional level itself is largely determined by the level of innovation culture. For the majority of Russian regions, we can note a low level of such culture, which caused the urgency of studying this problem. The aim of the research is to provide theoretical justification and develop a model solution for the formation of an innovative culture in the region that meets the requirements of the knowledge economy. The leading approaches to the research are comparative and system analysis, which allow us to fully take into account regional specifics, as well as to form a system of parameters that are relevant for assessing the innovation culture and the level of its impact on the innovative development of the region. To achieve this goal required the following tasks of research: to determine the factors of innovation culture in the region; to prove the structure of the modern paradigm of innovative development of the region taking into account the importance of the cultural dimension; to develop a model of formation of innovative culture of the region; to propose a method of constructing a structural profile of innovation culture in the region taking into account its specificity. The recommendations will help to increase confidence in the creation of the necessary potential for innovative development of the region, as well as to ensure security control when implementing innovations in various sectors of the economy. The research materials can be used as methodological support in substantiating the directions of innovative development of regions.

Keywords — *innovative culture, region, mechanism, innovative development, key priorities, regional specifics.*

I. INTRODUCTION

Cultural aspects in the modern knowledge economy play a crucial role in economic development, and the ability of society to perceive certain cultural values in all spheres of life is a necessary condition for the implementation of innovation policy in the region. An immanent component of the process of innovative development of the region is the presence of a developed innovation culture that contributes to the saturation of the region with new knowledge, technologies, and ideas.

The formation and continuous development of the regional innovation culture is designed to promote the effective introduction of new technologies and inventions, to achieve a balance between the existing potential in the region and the level of its innovative activity.

II. METHODS AND MATERIALS

In the process of research, modern tools used in the management of innovative development of regions, scientific works, monographs and articles by foreign and domestic scientists on the subject under study were used.

The works of various scientific schools and directions, in particular D. Cowes, D. North, and O. Williamson, are devoted to the problems of forming an innovative culture. Such domestic scientists as S. Bykonya, I. Ivanyuk, A. Nikolaev, V. Noskov, V. Solovyov, and L. Kholodkova [1, 12] studied the essence and content of innovation culture in depth.

In our opinion, the solution of the issue largely depends on

the qualitative diversity of theoretical and methodological foundations that support the process of forming an innovative culture. The scientific works of I. Ansoff, R. Akoff, T. Peters, R. Waterman, A. A. Pogoradze, V. Rudnitsky, G. L. Bagiev, V.A. Tomilov, C. Barnard and G. Simon, E. Shane, P. Drucker, T. E. Dale, A. A. Kennedy and many other foreign researchers are devoted to various aspects of this problem [1, 2, 6, 11, 14].

The formation of the scientific position of the author's team was significantly influenced by the works of E. Karayanis, E. Grigorudis, and G. Hofstede, whose ideas are rightfully the basis of theory and practice [8, 15].

Despite a serious study of the theoretical foundations of this problem, the issues of theoretical and methodological nature for the formation, maintenance and development of regional innovation culture have not yet been resolved. At the moment, there is no systematic understanding of the concept, structure, and mechanisms for the formation and functioning of an innovation culture.

III. RESULTS

The modern model of innovative development assumes the formation of innovative space for territories of different levels: supranational, national, regional, and subject (organization

level). All components of the model should be in close interaction, which results in innovative processes that develop the economy. National and regional innovation systems that are formed in such conditions should become a "driver" of innovation development and a "motivator" of innovation activity [3].

The current model of innovative development of regions involves the interaction of four groups of stakeholders: government authorities; the business community; science and education; and the civil society. For the purpose of research, the interaction is based on the "four-link innovation spiral" model, described in the works of E. Karayanis and E. Grigorudis as an architecture for developing regional innovation strategies [8]. Combining social ecology, the production of knowledge of the third type and innovation into a single innovation system, the four-link spiral ensures the circulation of knowledge between its participants as the basis of innovation activity. Collective interaction and exchange of knowledge in the format of innovation activities are carried out in the educational, economic, political and social innovation subsystems. The model of such a system is shown in fig. 1.

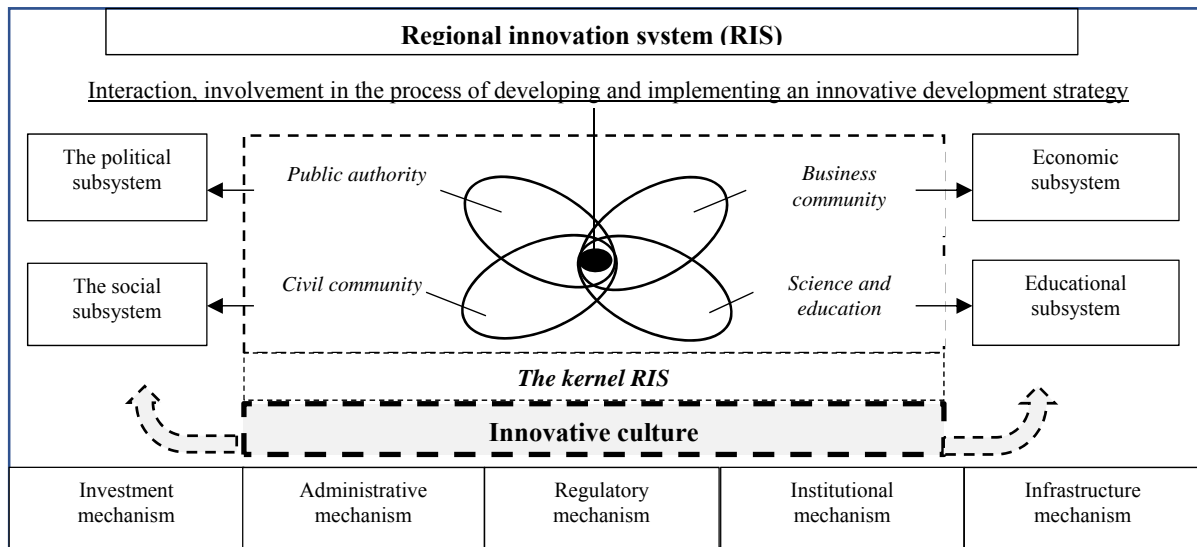


Fig. 1. Innovative culture in the structure of the regional innovation system

The peculiarity of the four-link innovation spiral model is the possibility of forming the region's innovation potential as a synergistic effect arising from the interaction of components (groups of participants in the innovation process). The regional links formed by the interaction of components within the system are a key resource for the process of creating innovations. However, in the scientific literature, serious attention has recently been paid to the study of the problem of interaction between participants in the innovation process, their involvement in the development and implementation of the region's innovation development strategy, and the organization of an "entrepreneurial search" to identify areas of specialization in which the region can gain competitive advantages.

The basis of innovative development of the region is its features that are formed historically and geographically. The specificity of a region that determines its competitive advantages depends on cultural and social factors, which is confirmed by many studies. In this regard, we note the important role of cultural models of innovation and cooperation. By analogy with the organizational culture that develops in any modern company, it is worth paying the most serious attention to the innovative culture that develops in each region. A review of literature sources suggests that it is necessary to study and develop an innovative culture in the region as a driving force for achieving success in order to develop the territory innovatively. In our opinion, the innovative culture of the region should be considered as a

valuable, rare, unique and irreplaceable non-material resource peculiar to a particular territory [7].

In the scientific literature, innovative culture is a collective terminological image. This is a combination of the value system of innovation stakeholders, which encourages their innovative activity to exceed the "quality of life" in general. With this approach, we can talk about the formation of aspects of the competitiveness of a particular organization, industry, region, or even country. Scientists and researchers identify an unlimited range of manifestations of innovative culture—from creating conditions for effective use of innovative potential (individual, organization, region) in the interests of society's development to ensuring maximum balance in its reform. Therefore, in our opinion, it is the innovative culture that can be considered a catalyst for innovation and a driver for the development of the innovation process in the region. A developed innovation culture can change inappropriate bureaucratic trends in management; activate the innovative activity of participants and reveal the innovative potential; ensure the balance of existing traditions and new changes in the trends of the new time [11, 12].

Given the variety of approaches to the study and the controversy surrounding the definition of "innovative culture", for the purpose of this study, we will introduce the following definition. The innovative culture of the region is its formed readiness for purposeful search and acquisition of knowledge. It is also important to pay attention, on the one hand, to the process of interaction of participants in the innovation process based on the "four-link spiral of innovation" model. And on the other hand – updating the strategy of innovative development of the region. This is necessary to balance the interests of innovation stakeholders in the region. Accordingly, a high level of innovation culture should increase the interest of stakeholders in innovation, while a low level will lead to the stagnation of the regional innovation system. Experience shows that the following trends should be balanced in regional development: the trends of decentralization, when regions seek self-government and independence, as well as the trends of centralization, which preserves and strengthens the center and its key positions in state regulation.

The study highlights the following aspects of regional development:

- identify priority areas in the regions and priority resources (economic, social, intellectual, scientific and technical, etc.);
- determine the necessary management measures aimed at overcoming the results of negative state policy that led to the outflow of the population to large entities;
- form the state policy of regional revival based on the implementation of the principle of creating "nodes of stabilization and development" in the form of new territorial production entities (TPE) with a new innovative culture.

To achieve the goals of innovative development of the region, it is necessary not only to create conditions for implementing changes, but also to reduce the gaps between regions. It is necessary to transfer breakthrough technologies to the periphery, and not outdated and "used" in the leading regions. In this case, cultural issues are given close attention as the driving force behind many companies' success and high performance [10].

The Russian national innovation system does not have a commuting environment or special innovative public relations. Innovation policy of the state and regions is built "from above", and innovation culture – "from below". Cooperation and dialogue are very important here, both in the scientific community (project teams) and in the business community. And the role of the unifying innovation culture is crucial here [4].

The formation of an innovative culture is necessary for a daily working dialogue and the development of special innovative "social" relations. However, we must take into account the fact that there are many factors that can significantly contribute to or hinder the effectiveness of innovation in the region, and as a result, the formation and development of an innovation culture (Fig. 2).

Based on this, we present the structure of the modern paradigm of innovative development of the region (PIDR), taking into account the importance of the cultural aspect (tabl. 1).

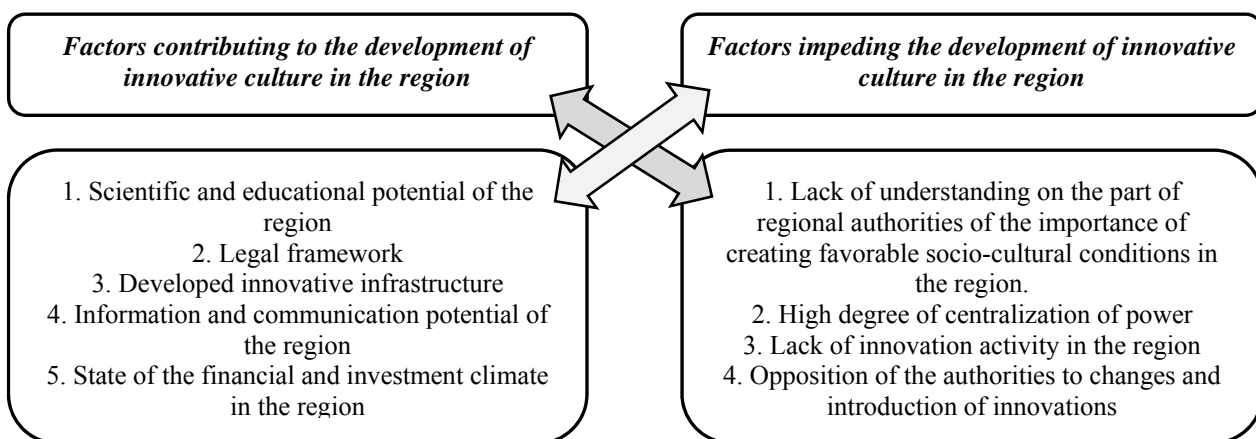


Fig. 2. Factors affecting innovation culture in the region

TABLE I. THE STRUCTURE OF THE MODERN PIDR TAKING INTO ACCOUNT THE SIGNIFICANCE OF THE CULTURAL ASPECT, COMPILED BY THE AUTHORS

Elements of the paradigm structure	Characteristics of paradigm elements
1. The level of regional development with an emphasis on the knowledge economy and cultural transformations	Formation of modern standards of quality of life in the conditions of turbulence of the knowledge economy and cultural development of territories
2. The level of scientific, technical and technological development of the region in terms of creative thinking	Formation of subsystems for the introduction of advanced technologies in all sectors of the economy in order to increase the level of competitiveness
3. The level of educational and intellectual development of the civil society in the region	Creating conditions in the region for the continuous development and improvement of the intellectual capabilities and abilities of the community
4. Level of legislative and political development of regional systems	Optimization of interaction between regional authorities, business communities, national-territorial communities and citizens in order to achieve the most effective result

Numerous studies show that the susceptibility of industries, sectors of the economy, regions and society to innovative trends depends on the innovation climate. The innovative climate, representing a certain environment, allows the regional infrastructure to develop itself, and be ready for non-standard and creative activity. At the center of this process is always a person who can influence the process of forming and changing the innovation culture, as well as promoting it to the public masses [9].

Changing one of the components of the innovation culture entails a gradual change in other elements, which leads to the need to bring the innovation culture into an organized and orderly process with new relationships, rules and norms of behavior, as well as the responsibility of participants.

As noted above, the level of innovation culture in most regions remains low, which is more in line with the term "anti-innovation culture". In most cases, this is due to the existing gap of interests between stakeholders, as well as scientific, technical and industrial activities, and a significant lag behind the leaders of global innovation development. This trend is

typical both for the country as a whole and for Russian regions.

The main driving force of the innovation process in the region should not be the technologies themselves, but the people who are able to create, implement and use them. And here an important aspect is the process of training and retraining of personnel, which are one of the main elements of the mechanism for creating an effective innovation culture [13].

A key role in the regions should also be played by issues of systemic vision on the part of government authorities and business communities that are actively involved in creating the appropriate innovation infrastructure [7]. With the development of innovative culture as a creative charge, the following can be achieved at the regional level (Fig. 3).

However, in the process of innovative development of territories, they still face conservatism in the thinking of authorities, lack of creative approach in solving both political and socio-economic problems, which is the reason for the delay in the development of innovative culture and as a consequence of the formation of a favorable innovation climate in the region [5].

In our opinion, the effectiveness of the innovation activity itself is mainly determined by the state of the society's innovation culture, which, along with economic, political, social and other factors, greatly affects the innovation climate and the innovation infrastructure of a particular region and the state as a whole [14]. The results of the study are the basis for developing a model for the formation of an innovative culture of the region, taking into account its specifics, presented in figure 4.

The innovative culture of cooperation is part of the innovative potential, and characterizes the level of educational, general cultural and socio-psychological preparation of the individual and society for the perception and creative implementation of the idea of developing the country's economy and its individual regions in accordance with innovative trends. Therefore, the development of the society's innovation culture is one of the strategic priorities of the region's innovation activities.

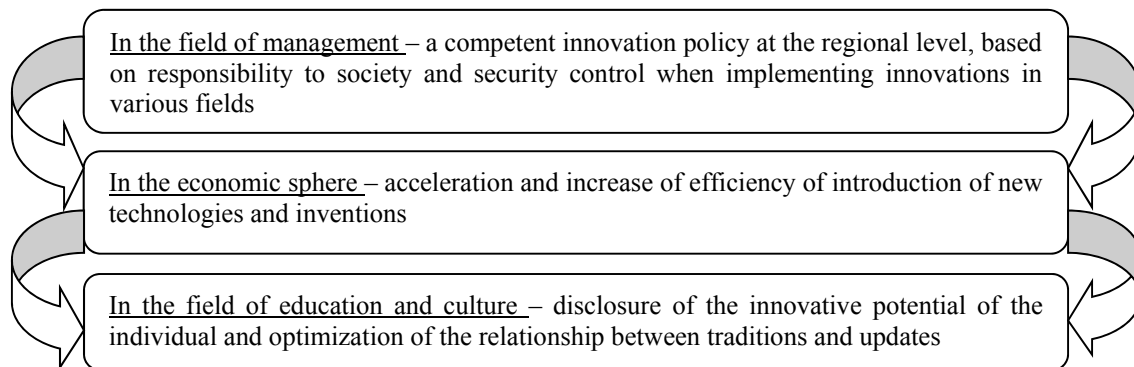


Fig. 3. Advantages of a developed innovation culture at the regional level

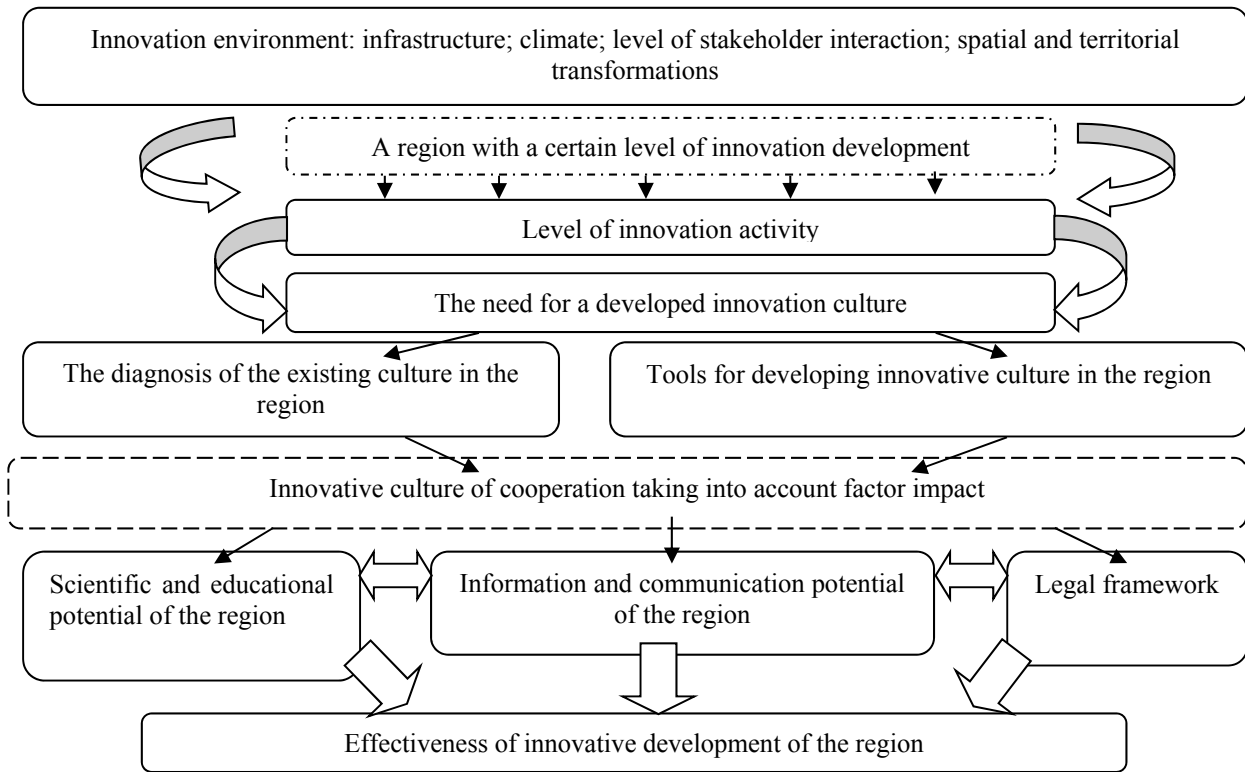


Fig. 4. Model of formation of innovative culture of the region taking into account its specifics (developed by the authors)

To study the innovation culture, we can use existing research methods that identify the ways and consequences of interaction between the stakeholders of R. Inglehart and G. Hofstede. The method of R. Inglehart is based on data from the study of values and demonstrates a strong correlation between values and the economic essence of countries. Hofstede surveys allow you to create comparative portraits of Nations, showing the role of cultural characteristics in competition [1, 15].

In the framework of this study, we will use the method of diagnosing the innovative culture of Hofstede, breaking it under our own tasks of building a model of the regional level. The diagnosis is based on five key parameters:

- "power distance" – shows the degree of inequality between employees (specialists, civil servants, managers), which they consider acceptable or absolutely normal;
- "avoiding uncertainty" – defines the degree to which goals are clearly defined without a specific description of how to achieve them or significant regulation of innovation activities by rules and procedures;
- "individualism-collectivism" is the degree to which people prefer to act as individuals rather than as members of a collective (community) in innovative processes;
- "masculinity-femininity" – defines the motivational orientation of people to achieve a goal (including innovation) or complete a task;

- "long-term orientation" – shows the time reference points for innovation and other activities.

In Russia, there are a large number of first-person orders, and the power distance is shorter in comparison with the system of delegating responsibility. If the West turns to formal rules, then the Russian goes to the chief.

The western management system at all hierarchical levels is based on the formation of an organizational order, that is, a system of rules, rules, and relationships that make the organization function as a clear and coherent mechanism in which innovations can easily fit. The role of the manager is primarily to develop and improve this order, with minimal personal interference in the work of subordinates.

Orders also differ in function. In Russia, orders are not only the main means of management, but also the main way to inform people about events, management intentions, implementation of innovations, etc. In the West, a system of information in the form of information flows is developed.

Analysis of the "avoiding uncertainty" parameter in Russia and abroad shows that differences within the country (including at the regional level) are stronger than those that exist between countries.

Russian culture as a whole is characterized by collectivism, while Western culture is characterized by individualism. However, many Western companies have very strong collectivist tendencies when developing solutions. Whereas in Russia, management decisions are in most cases made by the head alone.

Comparison of Russia and Western countries in the "masculinity-femininity" parameter in the context of attitudes to innovation shows that they are manifested in completely different ways when horizontal or vertical distribution of tasks and powers prevails in the implementation of innovative activities.

Despite the apparent universality of the approach to the diagnosis of innovative cultures both at the country level and in individual regions, there are fundamental differences. To diagnose the innovation culture of the regional level, the authors proposed the following method based on the parameters of Hofstede, which assumes the following steps:

- determination of the enlarged characteristics of the evaluation of the parameters of the innovative culture of cooperation;
- selection of criteria (indicators) and their weighting to describe each of the characteristics for groups of stakeholders;

- preparation of questionnaires and questionnaires to assess the characteristics of the selected criteria (indicators) for expert evaluation by groups of stakeholders;
- collection and analytical processing of information;
- building profiles of stakeholder groups based on Hofstede parameters;
- building a General model that reflects the current level of innovation culture in the region, according to the assessment of stakeholders;
- determining the characteristics that need to be developed to move to an effective level of innovation culture in the region that meets the requirements of the modern economy.

Enlarged characteristics of Hofstede parameters for expert evaluation by stakeholder groups are presented in table 2.

TABLE II. ANALYSIS OF THE PARAMETERS OF INNOVATION CULTURE TAKING INTO ACCOUNT REGIONAL SPECIFICS

Parameters G. Hofstede	Characteristics for defining indicators	Weight	Index indicators	
			<i>High</i>	<i>Low</i>
"Power distance" (PD)	Availability of top management	0.2	- the hierarchical structure first of all, the inequality; - top management is not available; - orders are not discussed, force is more important than law	- the organization clearly indicates the inequality of roles; - top managers are available; - priority is given to the right over the power of power
	Predominance of centralization/decentralization of power	0.2		
	Frequency of subordinates expressing their disagreement with the Manager's opinion	0.1		
	Predominance of horizontal / vertical links	0.1		
	Flexibility of the control unit	0.2		
	The degree of socially approved inequality in the status of employees when setting innovative tasks	0.2		
	Total: Integrated assessment	$\Sigma=1$		
"Avoiding uncertainty" (AU)	The degree of comfort of people's behavior and work in an innovative environment	0.2	- managers are busy with private issues and details; - managers are constant in the management style; - managers don't like to make risky decisions	- managers prefer to deal with strategic issues; - managers are people-oriented and use a flexible management style; - managers take responsibility and make risky decisions
	The ability to violate orders, instructions, regulations	0.2		
	The degree of clarity in defining goals without a specific description of how to achieve them	0.2		
	Level of full responsibility of managers for decisions made	0.2		
	The degree of readiness to risk	0.1		
	Willingness to compromise with the environment	0.1		
	Total: Integrated assessment	$\Sigma=1$		
"Individualism- collectivism" (IC)	Degree of employees' preference to work in an innovative team	0.2	- the relationship between the administration and employees is based on the employee's personal contribution; - the personality itself is evaluated; - the main focus on the formal business principle when making decisions	- relations between the administration and employees are formed on the basis of relationships; - assesses the activity of the individual; - making decisions based on personal relationships
	Predominance of individual / group project results	0.2		
	Level of stimulation of innovative activity of employees and groups	0.1		
	Opportunities for training and professional development in the field of innovation	0.1		
	The level of social connections through cohesion and team building	0.2		
	Accounting for personal contribution to the overall result	0.2		
Total: Integrated assessment	$\Sigma=1$			
"Masculinity-femininity" (MF)	Level of awareness of the achievements of STP and innovations	0.2	- humanization is considered as an opportunity to successfully and successfully advance in the service; - when solving complex tasks, the emphasis is on individual solutions; - "advanced" employees should dominate	- humanization as the existence of good relations between employees; - solving complex tasks through group integration; - equality of employees is valued
	Level of motivation to achieve a goal or complete a task	0.2		
	Prevalence of rational innovative solutions /intuitive solutions	0.2		
	The level of humanization as a factor of successful teamwork	0.1		
	The degree of focus on the integration of group/individual result	0.1		
	Possibility of career growth taking into account the innovative component of activity	0.2		
	Total: Integrated assessment	$\Sigma=1$		
"Long-term orientation" (LO)	The level of strategic vision	0.2	- focus on achieving strategic long-term goals; - value orientations for the future	- focus on operational tasks; - traditionalism
	Availability of an enterprise goal system	0.2		
	The level of "thickness" of innovation culture	0.1		
	Availability of "corporate style"	0.1		
	Traditionalism	0.2		
	Level of development of the system of innovative communications	0.2		
	Total: Integrated assessment	$\Sigma=1$		

Weight coefficients are determined by the author's team for each parameter, taking into account the degree of their significance in the level of development of innovative culture in the region. In total, all weights must be 1 in equity equivalent or 100 %. The integral indicator is determined based on the sum of factor weighted average estimates, and allows us to judge the level of development of innovative culture in the region.

Table 3 shows possible values of the level of innovation culture in the regions.

Within the framework of the study conducted by the authors, respondents who hold the positions of heads of departments, Directors of large production companies, heads of scientific communities, heads of leading universities, and key figures of regional business communities were interviewed. All of them are stakeholders in regional innovation development in order to integrate the activities of government agencies, civil society organizations and private companies in the field of project and other activities. The presented method was tested by the example of the Orel region.

The results of integrated assessments of the level of development of innovative culture in the Orel region are shown in table 4.

TABLE III. POSSIBLE VALUES OF THE LEVEL OF INNOVATIVE CULTURE IN THE REGION, COMPILED BY THE AUTHORS

Interval of the integral indicator	The level of innovation culture in the regions
$I_n \in [0...0.25]$	invalid level
$I_n \in [0.26...0.5]$	low level
$I_n \in [0.51...0.75]$	average level
$I_n \in [0.76...1.0]$	high level

A graphical model of the structural profile of innovation culture in the Orel region is presented in figure 5.

The result obtained for all parameters of Hofstede is in the range [0.26...0.5], which indicates a low level of innovation culture in the Orel region, and as a result of insufficient innovation activity in the region. This, in turn, leads to the lack of effective interaction of all interested groups of participants in the region in order to ensure the circulation of knowledge as a basis for innovative development.

In order to increase the level of innovation culture in the Orel region, we should focus primarily on the parameters "avoiding uncertainty" and "Distance of power" by regulating innovation activities with rules and procedures, specifying goals and ways to achieve them, as well as optimizing the interaction of regional authorities, business communities, national-territorial communities and citizens.

TABLE IV. POSSIBLE VALUES OF THE LEVEL OF INNOVATIVE CULTURE IN THE REGION, COMPILED BY THE AUTHORS

Parameters G. Hofstede	The regional authorities	Business community	Science and education	Civil community	Structural profile of innovation culture
"Power distance" (PD)	0.35	0.24	0.27	0.22	0.27
"Avoiding uncertainty" (AU)	0.28	0.26	0.25	0.23	0.26
"Individualism-collectivism" (IC)	0.31	0.34	0.29	0.28	0.31
"Masculinity-femininity" (MF)	0.41	0.27	0.32	0.31	0.33
"Long-term orientation" (LO)	0.39	0.37	0.41	0.26	0.36

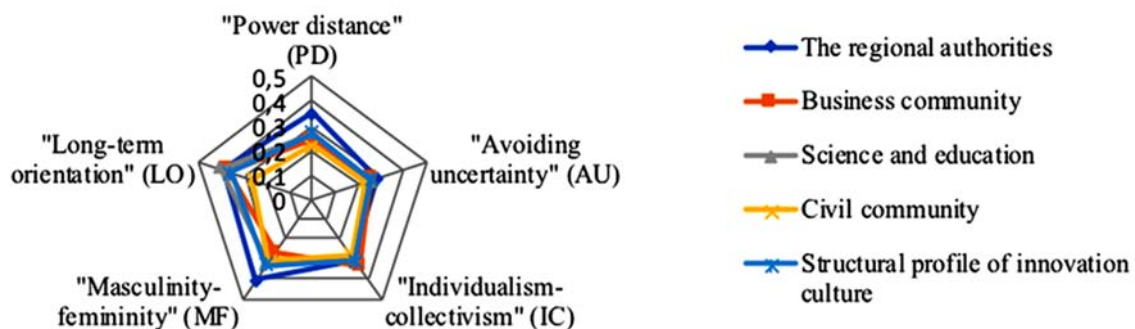


Fig. 5. Graphic model of the structural profile of innovative culture in the Orel region

IV. CONCLUSION AND RECOMMENDATIONS

Thus, the study allowed us to confirm the previously formulated statement that the innovative culture of the region is a valuable, rare, unique and irreplaceable intangible resource that is peculiar to a particular territory and takes an active part in the process of its innovative development.

The role and importance of innovation culture increases significantly as we move from an industrial society to a knowledge society. It is proved that the innovative activity of regions of Russia is determined by the level of development of innovation culture of collaboration, serving an integral part of the innovation potential and characterizing the level of educational, cultural and socio-psychological preparation of the individual and society to the perception and creative

expression in the development of the economy of the country and its individual regions in line with innovative trends.

The author's team proposed a model for the formation of innovative culture in the region, on the basis of which a method for constructing a structural profile of innovative culture with its specificity based on the parameters of Hofstede Was developed. The method was tested on the materials of the Orel region. The directions of further research are related to the development of tools for the development of innovative culture in the region on the basis of the "four-tier spiral of innovation".

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