Development of regional clusters based on the use of specialized digital tools

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Abstract. The accelerating processes of regionalization and glocalization of national economies are gradually changing the globalization path of development, as they fit more into the transforming picture of the new world order, in which not only geopolitical and economic aspects are changing, but also approaches to understanding the essence and practical implementation of the concepts of sustainable development, environmentally friendly development and socially oriented behavior. But despite a fairly large-scale change in development trajectories, absolutely all subjects of the world economy are influenced by digitalization trends, which are becoming almost the main tools for implementing political, economic and other types of national strategies. Thus, the formation of regional clusters is occurring on the basis of the influence of two strong factors at once – the widespread glocalization of the economy and the digitalization of all spheres of society, enabling regions to strengthen their specific territorial competitive advantages, including through the use of modern digital tools, since despite the ambiguity of the goals of Industry 4.0, it is impossible to avoid its influence, which means that it is necessary to use the advantages that it provides for the development of both individual economic entities and their associations within cluster formations. The paper attempts to consider the digital tools currently available for use by regional clusters and find out what competitive advantages their competent application can provide.

1 Introduction

Today, regional clusters can already rightly be called an effective tool for the development of strategically important industries in a region or a tool for the formation of technological specialization of a territory and its innovative development, designed to ensure not only the transition of a regional industry to a qualitatively new level of development, but also to

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create a synergistic effect for a region’s economy, which will favorably affect its economic, social and environmental subsystems. Most of the cluster programs currently being implemented seek to implement an effective industrial transformation based on the transition to advanced management technologies, and the introduction of production innovations [1], including the best available technologies, as well as increasing the reliability and automation of production systems. The implementation of each of these tasks is quite strongly related to the need to introduce digital technologies into the production process, not to mention the fact that the digital space is currently becoming the main platform for interaction with partners, potential investors and other stakeholders.

2 Materials and methods

To obtain reliable research results, the authors analyzed the processes of supporting cluster initiatives in Russia and the implementation of cluster development programs in Russia, during which the authors studied the mechanisms for supporting regional clusters. Noting the undoubtedly high role of financial support for clusters, especially those of priority importance in the framework of the implementation of import substitution programs and ensuring technological sovereignty, one should note that organizational and information support to help clusters in the implementation of digital tools, is starting to play no less importance, enabling to create a digital cluster ecosystem that provides effective cooperative and communication links between its members and the external environment.

Since the activity of a regional cluster is somehow connected with the processes of development and implementation of innovations, in this case the cluster approach becomes the methodological basis of the innovation policy of a region [2], the application of which allows ensuring successful interaction between the industrial and scientific policy, as well as integrating advanced management practices into the regional system based on the use of the same digital tools.

Understanding the advantages that the use of digital tools provides to a regional cluster makes this topic quite popular for research [3-7], indicating that an important area for promoting and supporting clusters and individual economic entities included in their structure is precisely the use of digital tools, however, the issue of the effectiveness of using some of them is not always unambiguous, which actualizes the need for discussions and value judgments in this direction.

3 Results

Due to the use of digital tools by a regional cluster, its members receive a number of advantages over those clusters that ignore digitalization trends. First of all, they are associated with the costs that arise when scaling up the cluster and congestion of its infrastructure due to the growth in the concentration of companies. Such a problem often provokes the emergence of other negative consequences – an increase in real estate prices, ancillary services, exacerbation of environmental problems, etc. Proper use of digitalization tools can reduce the costs of cluster members, and first of all, this concerns management and commercial costs, since the digitalization of logistics and organizational functions greatly simplifies and reduces the cost of their implementation.

Digital tools provide great opportunities for new members to enter the cluster – administrative barriers are eliminated, the procedure for considering the application of a new member is simplified and accelerated, and the process of joining the cluster becomes more transparent. This is especially significant in modern conditions, when in a short period it is necessary to carry out a fairly serious structural transformation of the economy and
launch a large number of high-quality domestic products on the market, including those in high tech. It is impossible to do this in a weakly competitive market – enterprises will not have incentives for development. Since cluster member companies have more opportunities to make it difficult for new members to enter it, the level of competition within the cluster may decrease, which will lead to a drop in its efficiency, while digital tools, such as monitoring and controlling tools, can ensure the procedure for entering into the cluster is transparent and accessible to every potential participant.

One of the most serious limitations of a traditional cluster is the binding of its members to a certain territory, which causes the problem of limited access to resources, and this, in turn, leads to the fact that cluster members are forced to choose contractors for cooperation nearby, even if this is not very beneficial for them. The use of such digital tools as a digital cluster platform or a “virtual” cluster allows going beyond the region and establish communications without being tied to a specific territory. In addition, for clusters with a large number of members, it is no longer possible to do without the use of modern digital tools – communications through the usual video chats and e-mail become ineffective and take a lot of time.

In this regard, one can conclude that the introduction of digital tools into the practice of regional clusters allows:
- reducing the influence of the geographical location of economic entities on the effectiveness of their interaction;
- improving the quality and speed of transfer of information, knowledge, experience and technologies by facilitating access to them for all cluster members;
- separating of information production, including intellectual production, from material production through the creation of digital models, digital twins, etc.;
- if necessary, changing the place of centralization of key production processes, as well as attracting the widest range of participants from different regions and even countries to the cluster;
- simplifying management and financial transactions that are now carried out in the digital environment [8].

Specific digital tools that domestic regional clusters can use are described in sufficient detail in the National Project “Digital Economy” and include four large groups:

1. Digital platforms. Their main purpose, as a rule, is to promote the cluster and create its positive image among investors. This tool is designed to search for new private investors, but should be used when submitting applications and selecting projects to receive budget financing – in this case, the required transparency of the selection will be ensured, and the procedure for obtaining state financial support for the cluster will be simplified.

2. Digital models. They can also be called digital counterparts or digital twins of cluster projects. They allow potential investors to get acquainted with the activities of the cluster, its products, innovative developments, production assets, technological processes, presenting an exact copy of the cluster and its individual enterprises in the virtual space. It is the use of digital models that opens up great prospects for the use of artificial intelligence in production. So, for example, in this direction, it is interesting to study the experience of Gazprom, which is implementing the Digital Technologist project, which involves the construction of a mathematical model that will look for a correlation between the characteristics of feedstock and finished products based on the analysis of a large amount of statistical information and, using the data obtained, create new recipes that surpass all existing ones in terms of characteristics (Fig. 1). Thus, the introduction of digital models is the first step towards a larger use of artificial intelligence to improve the efficiency of enterprises within a cluster.
3. CRM systems. These include all digital tools that increase the efficiency of control of all communication channels with customers and sales automation. The use of such systems is indispensable for cluster members in case of joint investment and/or innovation projects.

4. Digitized information databases. The information database is one of the most important components of any economic system, so the speed of access to information, its completeness and reliability for each member of the cluster becomes the basis for its successful operation and development.

In general, all digital tools allow the participants of a regional cluster to increase the orderliness of the workflow when implementing a portfolio of projects; to save time spent on working with a separate project; to increase the number of internal and external experts involved in the project; to introduce the principles of digital transformation [10]. At the same time, the large-scale introduction of digital tools is hampered by the need to train personnel to work with such systems and their high cost, making them practically inaccessible to small enterprises, which, as a rule, are the majority in the cluster.

4 Discussion

The modern digital agenda has predetermined the change in methods and technologies for the concentration of production and the formation of a competitive environment within regional clusters. The use of digital technologies is increasingly associated with the emergence of opportunities to improve the efficiency of production processes of all cluster members by reducing logistics and management costs, improving the production technologies in order to reduce product costs. In addition, digital technologies contribute to the expansion of the service sector in the regional economy, in which completely new industries are emerging related to the sharing economy, e-commerce, Uber economy, and online education. The ongoing changes lead to the changing of the very process of regional clustering.

First, this is related to a change in the place of capital centralization. The use of digital technologies allows the use of human capital resources remotely, enabling to develop high tech projects without the physical participation of developers in the field. The close proximity of intellectual resources and production when using digital tools is no longer the main condition for creating, for example, an innovation cluster.

Second, digital tools allow to increase the information intensity of goods produced by cluster members, enabling to abandon the territorial principle in the formation of regional cluster policy and attract the necessary resources and services everywhere.
Third, the growth of the knowledge intensity of products made in the cluster allows transferring the information, managerial and financial transactions of the cluster members into the digital space, which becomes the “core” of the cluster’s functioning and ensures its competitiveness.

5 Conclusion

The functioning of the economy in the conditions of Industry 4.0 directly determines the topics and direction of development of regional business and cluster ecosystems [11]. Now one can say that the systemic approach to assessing the role of digitalization in the processes of regional clustering has not yet been completed [12], but it is already becoming clear that the emergence of new digital tools is significantly transforming international value chains and existing production systems [13] towards creating highly adaptive networks of integrated enterprises, the basis of which are regional clusters, since they represent the same hybrid organizational format in which cooperation and competition are effectively combined [14, 15], which allows creating the most favorable conditions for a digital transformation of the regional economy and the acquisition of the necessary competencies by all cluster members.

In this regard, in the conditions of digitalization, a regional cluster began to represent a set of production enterprises and other organizations united by vertical and horizontal connections, including in the digital space, due to which a synergistic effect is achieved for all cluster members, which contributes to a digital transformation of the main business processes [16]. Therefore, the use of elements of the digital economy contributes to the formation of a single technical space of the cluster with the subsequent effect in the form of a reduction in costs for upgrading, the creation of a single personnel reserve and the provision of specialists with the data on the data on all business processes of the cluster’s enterprises, the formation of a developed and recognizable regional brand, and, of course, the receipt of governmental support for the implementation of promising innovative projects of paramount importance for the development of the region and the entire country.

References

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