

# Territorial cluster management digitalization

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**Abstract** — The digitalization process covers all society spheres, in particular, it requires economic systems to restructure and revise traditional approaches to the economic process management. Cluster formations, as well as other systems, are focused on new technology penetration into the mechanism of management and interaction between innovative activity subjects. The main task of the actors responsible for the information flow coordination and the communication link establishment is to create conditions for the favorable functioning of information entities that provide services for the creation of IT-products, data collection, storage and analysis, as well as their dissemination among stakeholders. In this regard, there is a need to develop approaches to the information technology integration with the cluster management system, as well as the revision of existing and potential relationships between the cluster innovation subjects. The existing cluster approach analysis has allowed to identify the innovative activity key subjects that determine the effectiveness of the actors included in the cluster, together with scientific and educational organizations, industrial enterprises, public authorities (regulator), as well as a coordinating body (most often, the Cluster Development Center). Unfortunately, the innovation cluster creation does not pay much attention to the appropriate infrastructure formation.

**Keywords** — regional economy clustering, digitalization, territorial cluster, region innovative development

## I. INTRODUCTION

Developed by the Russian Federation Government the program "Digital economy of the Russian Federation" is aimed to achieve competitiveness in the world market by entering the innovative economic development path during 2017-2030. At the same time, the main task is to create the digital economy ecosystem of the Russian Federation, where digital data is a key production factor in all socio-economic activity spheres and where effective interaction is ensured, including cross-border, business, scientific and educational community, and state and citizen interaction [1]. The solution of this problem is best correlated with innovative Russian economy development strategy, which also states the need to create a system to integrate scientific research into the real economy sector through the territorial clusters creation and operation. These conditions require revising the interaction between innovation clusters actors.

*The purpose of the study* is to identify the territorial cluster features when functioning in the digital conditions.

In accordance with the purpose, the following tasks are set:

1. To analyze the territorial cluster management system approaches;
2. To determine the directions of the IT-actor development in the territorial cluster framework;
3. To formulate the territorial cluster management improvement in the conditions of digitalization.

## II. MATERIALS AND METHODS (MODEL)

The analysis of the existing approaches to the clusters formation allowed to identify the key subjects of innovative activity that determine the actor effectiveness included in the cluster, together with scientific and educational organizations, industrial enterprises, public authorities (those acting as a regulator), as well as a specially created body (most often, the Cluster Development Center) [2]. Unfortunately, the innovation cluster establishing does not pay much attention to the appropriate infrastructure formation [3]. When analyzing the methodological approaches to the cluster formation M. B. Alekseeva [4] focuses on the fact that in the innovative development conditions of the regional economy, these social relations are inter-sectoral by nature.

Stable information flows within the digitalization framework are the basis of the territorial cluster efficiency, since in this case the building a digital format of interaction between the economic systems participants is provided [5]. The information sources for the actor cluster are either direct contact between them or coordinated flows through the cluster development center (CDC), which acts as a regulator. The functions of the centre include providing methodological, organizational, expert-analytical and information support for the functioning of the territorial cluster [6]. However, in the digitalization context, it is necessary to expand these functions in terms of the relevant information infrastructure. In most regions that are implementing the cluster way of the economy, the CDC is an organization that promptly distributes the information received according to the accepted format of

interaction between the actors. Thus, there is a risk of lengthening the production process, as well as the loss of some information during transmission.

Regional economy clustering implies to build fundamentally new institutions to ensure the mutual integration of innovation subjects [7]. First of all, these processes should solve direct functional problems and meet the latest technological, economic and geopolitical challenges. This will require to optimize the existing development institutions and additional ones and to implement the following tasks:

- to create an information resource that accumulates the existing information for regional development institutions and Executive authorities.
- to make communication platforms and social networks for communication between scientists and inventors with business representatives.

### III. RESULTS AND DISCUSSION

Being an independent actor of the territorial cluster, the information and analytical center solves a number of strategic tasks predetermined by the trends in the information market. The information technology market trend analysis has allowed to identify the main development and restructuring directions of the stakeholder interaction system and to determine the key stakeholder activities [8].

One of the key trends is the need to develop industry solutions, i.e. to make universal products that can improve the efficiency of business processes [9]. Processes optimization is also relevant for large and medium-sized businesses, although in their case, on the contrary, we can talk about the data storage transfer and processing functions to outsourcing, and in clustering we should talk about internal outsourcing (insourcing) [10]. At the same time, small enterprises belonging to the cluster get access to the common cloud storage, which will greatly speed up production and management processes.

It is also advisable for the information and analytical center to transfer the functionality to create its own technologies that serve production enterprises belonging to the cluster according to the import substitution program [11].

An urgent task is also the outsourcing of equipment maintenance, which is called Asaservice (Softwareaservice SaaS, Platformaservice, PaaS, Infrastructureaservice IaaS) [12]. The application of this approach is organic to the cluster functioning, as it implies a single environment necessary to implement the development strategy for the whole cluster formation. The necessary equipment and software for the effective cluster enterprises can be concentrated on the basis of an IT-actor and can be a lease. This will reduce the enterprises cost, as well as provide a cohesive information and communication environment [13].

For clusters aimed at creating complex mechanisms, such as aircraft engineering, engineering, defense, it is relevant to

transfer the creating virtual reality platform function to the information and analytical center, which acts as an independent commercial service aimed at the cluster contractors, and not only at the actors [14].

In the context of digital transformation, one of the key directions is the "smart city", which is especially important in terms of clustering. This type of technology allows to obtain data from various factors, extracts information from them, and transforms it into knowledge, making management decisions [15].

The program "Digital economy of the Russian Federation" adopted by the Russian Federation Government provides an appropriate infrastructure that will contribute to the research development in the field of digital economy. Assessing the digitalization pace in Russia, it should be noted that by 2025, the digitalization of the Russian economy will allow to increase country's GDP by 4.1–8.9 trillion rubles, (from 19 to 34% of Russian GDP), and the digital economy share could reach 8-10% in the GDP [16]. The formation of an appropriate innovation infrastructure will allow concentrating the available resources to overcome the existing barriers and the implementation of this program. In the regional economy clustering research C. B. Golovanova, S. B. Avdasheva, S. M. Kadochnikov [17] analyzed the factors influencing innovative activity of the enterprises and came to a conclusion that this regional economy organization allows to receive positive effect from cooperation and competition of firms if innovative infrastructure elements are available [18].

In the context of regional economy clustering, there is a potential for the information concentration through the information and analytical center, whose tasks include the accumulation of information flows, the database creation, the analysis of the information received and the prediction of potential needs of the cluster actors.

Creating its own information and analytical center within the cluster as an IT-actor is functionally similar to creating an IT-integrator. Integration is a service to create a staff functioning, independent, technically and financially optimized, managed and documented information technology system for the customer as a whole or its stage fragment [19].

The main tasks to be solved by transferring them to an IT-actor in territorial cluster:

- service for business consulting and technical consulting - assistance in choosing the optimal solution, computing platform, software, analysis of information processes, development of various financing schemes, forms and methods of payment, leasing;
- integrated enterprise management system implementation;
- network projects (structured cabling systems design);
- backup systems and structured information storage system implementation;
- application software supply, installation;
- computer maintenance and support.

The territorial cluster actor interaction in the conditions of digitalization is determined, first of all, by the presence of the potential to restructure social ties that already exist between the participants [20]. The restructuring road map for innovative activity subjects should highlight the following stages:

Stage I. To identify process participants (interested cluster actors, public authorities (regulators), local governments, non-profit organizations).

Stage II. To identify the links which are subject to digitalization (communication system, data collection and storage system, creation of a social network of contractors).

Stage III. To define the admissible digitalization strategies (institutional, technological and other restrictions and regulations for actor activities).

Stage IV. Carrying out analytical activities (to find out information about essential parameters possessed by the system participants at the time when they make decision on the chosen strategies).

Stage V. Determining the sequence of obtaining information and selecting strategies by the system participants.

The implementation of these stages is directly dependent on the conditions in which the cluster formation operates. At the first stage, it is important to identify the main actors responsible for restructuring the stakeholder interaction system included in the cluster (first of all, the management company (The Cluster Development Center) and the information and analytical center, if it is on. At the second stage, the responsible entities should analyze the existing relationships between the cluster actors and identify which of them can be restructured. On the basis of the data obtained in the next stage, a strategy is developed to perform the further transition to a digital economy. The choice of the necessary strategy takes place at the fourth stage and is based on the analysis of the actor potential, as well as the need to implement specific trends in the cluster functioning. At the last stage, the restructuring road map for the actor interaction in the cluster formation is being formed.

Thus, the key actor task, which is the task of cluster education management, is to respond to the changing socio-economic conditions, which should include the economic system digitalization. Trends follow-up will help to maintain the economic development pace and ensure to achieve long-term strategic plans at the regional and national levels.

#### IV. CONCLUSION

- directions of cluster actors activity, which are affected by the process of digitalization and can be transferred to a specially created entity – the IT-component of the cluster – are revealed;

- main trends in the IT-service market, which determine the functional characteristics of cluster IT-components, are identified and justified;

- market trend influence on the cluster functioning, which has allowed to justify the need for an information and

analytical center as a cluster IT-component for cluster development in economy digitalization conditions.

Digitalization creates favorable conditions for social relations formalization within the economic process framework, making it transparent and more understandable. In this context, cluster entities are able to optimize the business processes of its constituent actors through an IT-platform formation within their own innovation infrastructure. Most innovation clusters have sufficient potential (financial, scientific, educational, personnel) to create an information and analytical center, but such structures are formed only within the declared IT-clusters framework. At the same time, regardless of the cluster direction, there is a need to accumulate a large amount of information, its storage, transmission and analysis of large amounts of data belonging to different actors. The lack of a unified information system in this case complicates the processing and can lead to incorrect decision-making.

Prospects for further research - to develop a system of cluster actor interaction, taking into account the creation of IT-component and present its model.

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