MODELING OF THE CLUSTER STRUCTURE IN THE SYSTEM OF SUSTAINABLE DEVELOPMENT OF THE REGION

Abstract. The article examines the essence of clusters and their role in achieving the goals of sustainable development. The advantages of the transition to a cluster model of sustainable development at the regional level have also been substantiated. A model of the structure of a cluster in the system of sustainable development has been developed.

Keywords: sustainable regional development, cluster, cluster structure, social environment, economic environment, Digital environment, ecological environment, institutional environment.

The problems of globalization, climatic changes and exacerbation of socio-economic and environmental contradictions in many countries of the world necessitate the search for new models of sustainable development. One of the most common and effective ways of dealing with the uncertainty and volatility of the external environment is to attract individual enterprises to various kinds of cooperative and integration relations. Such relationships provide certain advantages in the field of saving transaction costs, improving the exchange of innovative knowledge, consolidated growth of market power, or gaining effect from the scale of production. Cluster development is one of the characteristic features of a modern innovative economy and a prerequisite for structural changes in the era of the spread of advanced digital production technologies.

Clusters represent an important part of modern sustainable development in
most countries and regions of the world. Clusters are considered as a means of accelerating development, which serves as one of the most common policy instruments to stimulate economic growth and innovation [2, p. 54]. Clusters can be considered one of the most advanced forms of organizing efficient production, which combines science, research and development, innovation, environmental solutions and technology. Therefore, for the domestic economy and its individual sectors of strategic importance, it is important to substantiate the scientific foundations of the transition to a cluster model of sustainable development and its implementation at the regional level.

Clusters have a positive effect on economic performance both directly and indirectly due to the spread of new knowledge. The direct effect can be explained both from the standpoint of the institutional approach and the theory of endogenous growth, according to which technological changes contribute to imperfect competition, which can increase the incentive to invest in new technologies [7, p. 62].

Clusters play a decisive role in achieving sustainable development goals at the regional level. Since today there is an urgent need to substantiate an innovative model of economic and environmentally friendly production and socially responsible development of territories. Clusters should receive priority development at the regional level, along with small, medium and large economic complexes. The development of clusters contributes, first of all, to leveling the economic conditions of management and providing support to weaker small and medium-sized businesses, as well as closer integration of science and business.

The proposed general model of the structure of a cluster in the system of sustainable development consists of five main elements that conceptually characterize its essence (Fig. 1).

The basis of the cluster structure in the system of sustainable development is formed by the core of the cluster, around which other participants are grouped. At the regional level, the main cluster can be: universities, scientific institutions, innovative enterprises or public organizations (for example, a union or association of manufacturers), depending on the goals and objectives. The social environment
is represented by human and intellectual capital. This is the most important part of the cluster structure.

![Cluster structure model in the system of sustainable regional development](image)

Fig. 1. **Cluster structure model in the system of sustainable regional development** *(developed by the authors)*

The economic environment is an important element for cluster formation. There are various components of the economic stability of the region - price, financial, technological, organizational. They affect the economic stability of the region in different ways. For example, with the development of new areas of activity, commercial risk increases, economic indicators and financial stability may decrease. The same can take place with the deepening of specialization, the curtailment of activities or the re-profiling of individual regional subsystems [1, p.33].

The economic environment is a set of economic factors that characterize the economic activity of the region and its investment attractiveness.

It is already impossible to imagine our world without information technologies. Information technologies have become an organic and integral part of civilization, have entered our daily life, science, technology, business. The digital economy makes it possible to ensure the maintenance of the stability of the Earth's ecosystem, the transition to a green economy, as well as to restore destroyed areas in this area,
for example, by monitoring green “big data”, including online screening of a whole range of profile indicators. Planetary boundaries define biophysical boundaries within which humanity can flourish. There are many advantages that can provide inclusive and sustainable development in this space [6, p.40].

The ecological environment characterizes the human environment and is an important element in the formation of a cluster [3, p. 57].

The institutional environment has a qualitative impact on the socio-economic space of the territories, ensures sustainable development. The institutional environment is a set of fundamental political, economic, social and legal norms that form the basis for the production of goods and the provision of services, exchange and distribution in a cluster. Without a developed institutional environment, the development of clusters will be rather slow and will not provide the expected effect from it [4, p.195].

Thus, the introduction of a cluster model at the level of individual sectors of the economy will significantly contribute to an increase in the level of sustainable development of the region. Thanks to a targeted policy of promoting the development of clusters, the following key problems can be solved:

1) build supply chains for goods and services based on domestic high-tech industries with their subsequent integration into European value chains;

2) implement regional strategies of "smart specialization" for sustainable development, use the strengths of the region, search for hidden opportunities and create a foundation on which regions can build a competitive advantage in activities with high added value [5, p. 1459]);

3) solve the problems of ecology and efficient use of resources by introducing environmental innovations, eco-industrial clusters and parks.

References:
3. Данилов-Данильяна В. И., Пискулова Н. А. Устойчивое развитие: Новые вызовы.. М.

