Management of cluster-network structures sustainable development

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Abstract. The article concentrates on development of methodological tools for creating a model of cluster structures sustainable development in shipbuilding of Russia through the example of the shipbuilding cluster of the Primorye Territory. The proposed tools can complement the existing methods for clustering industries and regions in business processes scientific and professional sphere. The proposed method of assessing regional economic system availability for clustering and algorithm for its implementation allowed to identify risks and limitations of the regional shipbuilding cluster sustainable development.

The results of the research are: allocation of target structure on the cluster strategic map in terms of a balanced system of indicators, manifestation of in-system characteristics of the cluster structure model, definition of key directions for development of cooperation and collaboration relations. Further, the prerequisites were established for development of network interaction, cooperation and collaboration between the participants of the shipbuilding cluster and the parties involved in Russia and Asia-Pacific countries.

The author's contribution to the development of scientific knowledge in problems of clustering and professional sphere is formulation and manifestation of in-system components of cluster structure business model, initiation of target structure of their statistical, controlling, dynamic and predictive changes, which makes it possible to form monitoring systems at the stages of a cluster life cycle and ensure timely managerial action. The approach proposed by the author allows to reduce risks of uprising institutional trap and management disorders in the decision-making process on cluster-network structures establishment and functioning.

Keywords: regional economic system, clustering, shipbuilding clusters, networking.

1   Introduction

Today, new principles of national industrial policy are being formed, aimed at introduction modifications, currently important and relevant to contemporary challenges, to target settings and industrial structure of economy (crisis phenomena, political situation and sanctions, trade and hybrid wars, etc.).

To that end, each state has a goal, determines the form, role and contribution of intervention in the economy, or operating an integral policy aimed at business environment enhancement, implementation of structural changes in the economy to improve the prospects for economic growth and social welfare, competitiveness support.

In Russia, it is reflected in adoption of a number of principal political decisions at the country level that determine further economic and social development of the country in the midterm, including shipbuilding and ship repair industries [1,2,3,4]. Development of shipbuilding industry in Russia is resolved among other things through forming-up a cluster economy in this industry with complex network connections and integration policy of private and private-public companies in Russia, as well as foreign partners.

2 Relevance, scientific significance of the issue with literature review

Up to the present time, the state of the shipbuilding industry in the Russian Far East was estimated as unsatisfactory. There are still a number of critical factors hindering the development of the industry. [5,6]. Many issues of administration and functioning of the shipbuilding cluster remain unresolved, thereby increasing applicability of scientific knowledge and professional practice development in securing the sustainable development of the shipbuilding cluster on the basis of network structure interaction between its participants and parties concerned [7, 8, 9].

During transformation of the global industrial policy, modern world economic intercourse is also changing [10]. Its basis is more and more information flows now, in point of fact predetermining emergence of a new "network" way of life. Network structures and new forms of networking appear, network logic in information use prevails [11, 12]. New types and forms of integration processes and strategic partnerships, organizational-economic and financial relations on the basis of networks are taking the leading role in solving management problems of regional economic changes [13].

The transition to the knowledge-driven economy implies that productivity and efficiency of companies in modern conditions increasingly depend on knowledge, skills, competencies, not only obtained in the course of education, but also as a result of communication with other market participants [14].

According to N. V. Smorodinskaya, network development is a new way of coordination of relations and achieving a balance of interests, which allows to create structures more adaptive than hierarchy, and at the same time more integrated than the market model [9].

The authoring team under the direction of N. N. Masyuk concluded that for successful adaptation to the new paradigm, regional economic systems should be moving on to cluster structure, based on development of network interaction in economic activity and formation strategic alliances between the state, business and science [15, 16, 17, 18, 19, 20].

Thus, the thesis actuality is confirmed that coming wave of global crisis trends will make the existing business models of companies, regions and territories all in all ineffective, and they will be replaced by structures based on network interaction.

3　　Setting goals

The purpose of the research is to develop scientific knowledge and professional practice in theoretical and methodological support of processes for regional cluster structures establishment and functioning.

4　　Theory

Creation of cluster-network structures involves a number of sequential steps:

1 Collection and preparation of data base for assessment of regional economic system potential and readiness to establish a cluster. This stage involves the formation of full, relevant and reliable data base for management decision-making.

2 Implementation of analytical procedures to assess the potential and readiness of the regional economic system to create cluster-network structures, in the light of specific features of a cluster specialization, conditions of its foundation and functioning.

3 Elaboration and rationalization of a business model of the cluster network structure, taking into account objectives and tasks to be achieved as part of the regional cluster policy.

5　　Practical value

As stage 1 of the algorithm execution, it was substantiated to use quantitative and qualitative indicators, on the basis of which it is possible to assess the degree of region readiness for clustering. Their trialability was carried out on the basis of statistical data and data from open sources [21].

Quantitative indicators:

1 Production concentration coefficient according to the cluster specialization. It allows to estimate localization of production on the region's territory in terms of volume of manufactured goods according to cluster specialization with respect to the volume of gross regional product. The indicator reflects the degree of production development according to cluster specialization, which allows to assess the degree of concentration of region's industrial potential in light of the cluster specialization.

2 Coefficient of investment activity in development of cluster-network structures of the region. The indicator allows to evaluate the amount of finance for implementation of clustering in the region of the total cumulative investment in the region.

3 Share of competent personnel of cluster-network structures in economically active population of the region, which allows to assess the level of concentration of human capital assets.

4 Coefficient of localization (by area) of companies-cluster members on the territory of the cluster location. The indicator allows to weigh density of cluster member companies allocation on site.

Qualitative indicators:

1 Availability of land (water) resources.

2 Availability of roads (transport routes).

3 Availability of material and technical base (raw materials, components).

4 Availability, involvement, activity rates and assistance of public agencies and professional non-profit incorporations (associations, unions).

5 Availability and activity rates of scientific-research and educational organizations according to cluster specialization.

6 Competitiveness of the region on comfort level for doing business (respective to cluster specialization).

The results obtained during this procedure use can be presented in different forms (recommended: swot, pest, space).

At the next stage, simulation of core business processes in establishing cluster structure was carried out. For this purpose, a strategic map of the shipbuilding cluster was constructed. The main objective of the strategy is to ensure sustainable development of the shipbuilding cluster. It is achieved through resolving interrelated functional tasks as pertaining to finance, customers, processes, development (Balanced Scorecard).

The prerequisites for achieving the goal are establishment of mechanisms for involving resources of the region and participants of the cluster in the economic turnover. The income volume from turnout depends on it, which affects providing orders for shipbuilding, extension of contributory industries at the enterprises participating in the cluster, growth of gross regional product, etc.

The involvement of resources in the economic turnover also depends on mechanisms of orders for R&D and Research and Technological Development, training of skilled workers, advancement of knowledge-driven economy through networking, cooperation and collaboration of cluster members. In this interaction, synergy and multiplicative effects appear which, among other things, allow to reduce transaction costs, ensure products competitiveness.

Further, a matrix of system characteristics of the shipbuilding cluster business model was composed on the ground of development of the approach proposed by N. D. Strekalova [22]. The author's contribution consists in follow-up revision and adaptation of general (standard) approach to the goals and tasks of the cluster structures management.

In the closing stage, a model of network interaction of the shipbuilding cluster with the Asia-Pacific countries was formulated; proposals were made for establishment of joint activities of network organization entities to solve common problems, for product development based on resources and functionality exchange basis. The key points of network interaction with the parties concerned, including foreign partners of the cluster: science and education, production of materials and equipment, engineering, development of suppliers and subcontractors pool, etc. Forms of network interaction

within the shipbuilding cluster can be: contractual relations and strategic partnership; outsourcing; doing the pools (associations, networks, economic interest groupings).

6 Conclusion

Executed research contains theoretical and methodological provisions that are capable of incrementing scientific knowledge and professional practice for adaptive management of cluster structures sustainable development.

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