



Specifics of Participation of Industrial Companies of the Railway Transport in Ukraine in Functioning of Innovation-Oriented Industrial Logistic Clusters

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Abstract

The article reveals the specifics of participation of industrial companies of the railway transport of Ukraine in the process of functioning of innovation-oriented industrial logistic clusters. The interpretation of the concept of a cluster and definition of its main components has been studied. The problems and prospects of development of industrial companies of railway transport of Ukraine have been studied. It has been determined that the new model of economic development of industrial companies of the railway industry should be based on interaction of all the participants involved at all stages of the life cycle of creating innovative products by forming innovation-oriented industrial-logistic clusters. It has been noted that innovation engineering centers that initiate and develop innovations and coordinate the entire innovative process of product creation are the core of innovation-oriented industrial logistic clusters.

The main problems that hinder the use of the cluster approach in management of regional systems in Ukraine have been revealed and active participation of the state in creation of conditions for development of innovations, cooperation of the state, science and business and creation of the national innovation infrastructure has been justified.

Keywords: Clusters; Formation of innovation-oriented industrial logistic cluster; Industrial companies; Innovation development; Logistic infrastructure; Railway transport.

1. Introduction

The fundamental changes in the world economy, caused by the rapid development of globalization processes, contribute to the formation of a new innovation and technological structure, creation of new structures in the world and European markets both in the areas of industry and transport sector.

Today, in developed countries, the industry operates on the 5th and 6th technological waves [1]. Large-scale infrastructure projects are accompanied by investments in construction, and further in reconstruction of buildings, thus causing demand for the products from related sectors. Thus, global demand for investments in the infrastructure for the period from 2013 to 2030 amount to 57.2 trillion dollars provided annual GDP growth makes 3-5% [2]. The directions of cooperation between Ukraine and EU in the field of railway transport focus on the need for its integration into the European transport network and, accordingly, achieving qualitative changes in the system of organization of the railway transportation.

The modern strategy of neo-industrial development of the developed European countries is based exactly on the large-scale development of science-intensive industries and strengthening of the role of information and knowledge in ensuring sustainable economic growth. This means that the system of scientific knowledge, information technologies and innovative processes implemented in the production processes, means of production and industrial science-intensive products is the dominant of the modern economic growth.

Under such conditions, stable development of industrial railway companies and support of long-term competitive positions are more and more dependent on the quality of the information environment and level of intellectualization of production processes, creation thereof will ensure manufacture of innovative products, and thus creating prerequisites for the innovative development of the railway transport of the state [3-5].

Industrial companies of the railway transport of Ukraine have a developed industrial base and quite a high resource potential. But for the moment the possibilities of their inertial growth have been substantially exhausted, what is confirmed by the contraction of the external demand and excessive saturation of the domestic market with imported goods. Today, the economic situation in the country and the task of restoring its economic growth dictate the necessity to intensify structural transformations both in the industrial complex of the entire country and industrial companies of the railway transport. Therefore, the specifics of participation of domestic industrial companies of the railway transport need to be studied in the current conditions of deepening of transformational changes in the technological, organizational and management spheres of the economy.

2. Analysis of the Research and Publications on the Cluster Development and Formation of Cluster Structures

In terms of globalization, the implementation of fundamentals of innovation development of industrial companies of the railway transport is inextricably linked with the cluster approach in management of the processes of innovation and technological modernization. The concept of the cluster approach comes down to the clusters considered as the most important factor in increasing the competitiveness of companies, regions and industries. The cluster approach is based on the consideration of the positive synergistic effects of regional agglomeration, network effects and diffusion of knowledge and skills on account of the staff migration and allocation of business, as well as multiplication effect through distribution into related areas [6].

In general, according to the experts, so far, clusterization has covered about 50% of the economies of the leading countries of the world [7]. The share of clusters with a legal entity around the world is approximately 65% [8]. In the USA, over half of the companies work within framework of clusters, and the share of GDP produced in them has exceeded 60%. The European Union has about 3 thousand clusters, employing about 40% of the workforce [9]. China today counts more than 60 special cluster zones, with about 30 thousand companies and 3.5 million persons of the staff and sales volume of about 200 billion dollars per year [7].

The scientific fundamentals of the cluster approach were formed under the influence of several scientific schools and, of course, are different. According to M. Porter's theory, a cluster is a group of geographically neighboring companies (suppliers, manufacturers and intermediaries) and related infrastructural, educational institutions, public administration and other companies that operate in a certain field and complement each other [10]. The structure of the cluster, according to M. Porter, comprises:

- 1) the "core" of relations of the leading participants in the economic sector or type of activity;
- 2) a set of "complementary companies" – entities, activity thereof directly ensures functioning of the "core";
- 3) "service" facilities, which are not mandatory, but their activities are not directly related to the functioning of the "core" objects;
- 4) "auxiliary" objects, which are desirable, but not necessary for the functioning of the cluster [10].

Orian Solwell in his work "Clusters. Balancing Evolutionary and Constructive Forces" (Redbook, 2008) defines the cluster via a broader term of agglomeration, considering the interconnection between innovation and technologically related types of activities [11, 12].

R. Breault ("The Evolution of Structured Clusters") defines the cluster as "the inter-industry concentration of companies that creates jobs, exports goods and services, has common basic economic needs, and integrates the public sector of economic development, legislature of different levels, universities, colleges, educational community, funds and all others stakeholders" [cited, 13]. According to R. Breault, the economic sense of the cluster's association is to use benefits of synergy arising from the interaction between companies in the related areas, concentrated in one territory, and public and private sector organizations. It is the successful partnership of all stakeholders in development of the local economy, in his opinion, is the decisive feature of the cluster [cited, 13].

At the same time, many researchers are quite skeptical of the very existence of the cluster theory. Thus, according to R. Martin and P. Sanli, "literature on clusters is a fragmentary compilation of ideas that does not provide sufficient evidence that economic development is a consequence of the use of cluster forms" [14, cited, 8].

The modern interpretation of the cluster approach in accordance with the established scientific trend is related to researches in several areas:

- new paradigms of the region;
- spatial organization of the economy;
- location of activity; and
- interregional interactions [15].

Modern Russian scientists, in particular, A.A. Battalova and A.M. Battalov refer the cluster to a separate territorial set of legally independent companies that effectively realize competitive benefits of this territory as a result of their interaction on contractual terms [16].

P.T. Sabluk, M.F. Kropivko determine that "the cluster structures are the embodiment of a combination of scientific, industrial and commercial structures that, on the basis of the use of the benefits of cooperative interaction, contribute to the formation and effective use of the real competitive benefits of individual companies, industries, regions, national economies in terms of increased world competitive opposition" [17].

Quite a large number of scientists associate the clusters with the common territorial production complexes, causing formation of various approaches to the definition of the content of this economic category. However, agreeing with the scientists of this scientific direction, one needs to point out the fundamental difference between clusters and territorial-industrial formations. It is the difference in the spheres of their formation (clusters are functioning in the market system, while territorial production complexes - in the state planned economy), as well as place of their formation and functioning, structure of participants and branch specialization [18, 19].

Based on the experience of foreign countries, the cluster may be determined as the core of an innovation-oriented and investment-attractive economy, as a manifestation of integration trends. Currently, two main approaches to clustering are most popular:

- a cluster as a production network that unites the interrelated companies within a value-added chain;
- a cluster as a local innovation system that unites industrial, research, educational and other organizations.

It is worth noting that the dominant position of the cluster in the regional market has nothing to do with the monopoly, as the cluster is the set of organizations that are related by cooperation and competition. The cluster model involves attracting investments and development of the infrastructure on the basis of state-private partnership. Internal competition, as well as any other competition, causes a certain pressure on the companies, making them innovate and improve, lower prices, improve quality and service, and create new products and course of their development. Successful co-competition is determined as relations characterized by trust, commitment and mutual benefit [20].

Taking into account the above mentioned, the key aspects of the essence of the term "cluster" at this stage are as follows: territorial-production cooperation, innovative nature of technological relations of participants and orientation of business processes to meet the needs of certain regional markets and increase the production and social-economic potential of the territory. Meanwhile, it should be borne in mind that, first of all, the business in general develops regardless of whether it is described by a cluster or not, so equivalent terms should be created for all the business entities. Second, it is important not to ignore the idea of clustering, despite the differences in the views of researchers and practitioners on the construction of the cluster, and hold researches to increase the significance and level of understanding of the specific features of clusterization and cluster policy.

3. Study of the Problems and Perspectives of Development of Industrial Companies of the Railway Transport of Ukraine

The current state of economy of Ukraine today is characterized by the process of industrial deindustrialization, which is accompanied by a decline in the industrial production. Unfortunately, the domestic industrial complex is in a crisis today. This is confirmed

by the prevalence of low-tech production with the use of outdated technologies, predominance of the processing industry, export of raw materials, as well as a decrease in the financial performance and liquidity of industrial companies. The long-term recession in the domestic industry has led to the degradation of the industrial potential, what significantly limits the opportunities for economic development, in particular industrial companies of the railway industry. Existing problems escalate such aspects as significant depreciation of the fixed assets, stagnation of investment processes of production restoration and gradual loss of scientific and staff potential [1, 21].

Production of railway rolling stock is one of the most perspective export-oriented branches of mechanical engineering. The current potential of domestic producers in the freight carriage industry is about 45% of the total production of the CIS countries, while the domestic freight car fleet accounts for approximately 15% of the total fleet of the freight cars of the CIS countries. 1520 mm width of the track connecting the CIS countries is a significant factor affecting the interdependence of the companies of the domestic machine building from the railway industry and consumers of the CIS countries and distinguishes them from other countries of the world [22].

It is significant that most of the carriage products (80-90%) are sent for export. Geographically, among the regions, the CIS countries and the EU may be distinguished by their share in the volume of exports of carriage products from Ukraine. They account for 60% and 26% of exports, respectively. At the same time, for the period of 2010-2015, Ukrainian car-building plants reduced their production of cars by 28 times. It should be emphasized that the situation is caused by the external circumstances, rather than just internal preconditions for development of the car-building companies. The loss of the Russian market is the main reasons for the difficult situation in the industry [21, 23, 24].

Despite of the Association Agreement signed with EU, that opened the trading borders, supplies of Ukrainian cars to Europe have reduced significantly. It is explained by the fact that the requirements for cars in the European Union are different, and the volume of orders is 10 times lower. The cost of the product life cycle, rather than the low cost of the cars (the competitive advantage of domestic producers) is the determining factor in EU countries when making decisions on procurement of Ukrainian rolling stock [23]. This necessitates the use of a new model of economic development for industrial companies of the railway industry, which should be based on the interaction of all participants involved at all stages of the life cycle of creation of the innovative products, including designers, innovators and end-users. Such an increase in the integration processes in the field of production is closely related to the cluster approach. The latter involves organizational and technological cooperation between industries, companies and organizations, based on the unification of their economic interests.

In Ukraine cluster initiatives were implemented as early as late 1990's and were accompanied by the formation of programs for the economic rehabilitation of the Podillya region with the financial support of the US Agency for International Development of the Sewing, Building, Food, Tourism, Food Clusters and Village Tourism Cluster in Khmelnytskyi region. Supporting these initiatives, clusters were gradually created in other regions of Ukraine.

In general, according to various experts, currently our country counts 50 clusters, most of which are still under construction and operate in the field of tourism, food and machinery [25], while cluster initiatives in the field of high technologies have not been sufficiently widespread.

Integration of transport with industry and science via creation of national and international scientific-innovation-production clusters in high-tech industries; simplification of the procedures for creating innovative clusters, etc. have been marked as the direction of the development of integration processes in Ukraine, the Concepts of the Cabinet of Ministers of Ukraine on the

National Program for Development of Small and Medium-Sized Companies in 2014-2024, regarding the National Target Economic Program for Industrial Development for the period up to 2020, regarding the reforming of state policy in the innovation sphere [25]. However, despite of the declared diversity of organizational and economic forms of development of clusters, the practice shows their weak use and low efficiency. First, these documents only superficially reveal the mechanisms for creation of clusters in the economy of Ukraine and focus mainly on the need for clusterization of the economy and regions of the country. Second, the failures are caused mainly by the lack of real economic conditions for their functioning, lack of the rules of the game to attract any investors, lack of detailed legislative documents, privileges and preferences. Often, associations are formed under the guise of a cluster, simulating external cluster signs without meaningful transformations, and cluster policy becomes a politically convenient cover for a traditional branch approach [26]. The data of rating of the Global Competitiveness Index and Global Innovation Index prove the low level of cluster development in Ukraine. In 2017, Ukraine ranked 60th in the ranking of the most competitive economies and rose from 56th to 50th place in the ranking of innovative countries (among 127 states). [27]. At the same time, unfortunately, Ukraine has one of the worst results in the world (112th place) because of the creation of business models based on information and communication technologies, as such innovations normally do not reach level of small and medium businesses [28].

As the successful experience of the developed countries of the world shows, the clusters based on the triple spiral model – partnership of the state, business and science, or the “pentasprial” - science - education - business - government - civil society institutions prove to be the leaders in the growth of competitiveness. Such a spiral is a mechanism for achieving the synergistic effect of continuous updates and accumulation of knowledge base in the knowledge economy and gives a particular stability and mobility in the global competition. Ukraine has all the bases for developing the market for the scientific products, but one has to take into account the lack of links between science, education, business, government and civil society institutions.

4. Specifics of Participation of the Industrial Companies in Functioning of Innovation-Oriented Industrial Logic Clusters

Based on the study performed, one may conclude that integrated management of the processes of innovation activity: production, transfer and application of the scientific knowledge, creation of science-based technologies on their basis, as well as the possibility of innovative development of the railway transport of Ukraine to a large extent depends on the level of the innovation activity of industrial companies of the railway transport. And first and foremost – from the ability of the latter to realize strategically significant innovation projects for the industry and provide an integrated management of the life cycle of the emerging innovations. The products of the industrial companies of the railway transport is the material and technical basis for the implementation of main functions by the railway transport, and, consequently, the level of economic development of the industry as a whole depends on its level of progressiveness and innovation. The current situation may be changed on account of implementation of a qualitatively new model of development of the industry - formation of innovation-oriented industrial and logistic clusters, which should become the basis for implementation of the innovative model of development and increase of the competitiveness of the industrial companies of the railway transport in the European market of transport machine building [29].

Creation and development of innovation-oriented industrial-logistic clusters is aimed to increase the competitiveness of industrial companies of railway transport on account of formation

of the unified research and production environment for the implementation of innovative projects of industrial companies of the railway transport. It will provide access of the latter to innovative samples of high-tech railway products and create conditions for intensifying investment processes in the industry. Such an integrative possibility of innovation-oriented industrial-logistic clusters will be ensured on account of formation of close links between all the participants of the creation and production of innovation, what will enable adjusting scientific researches, research and development and production process in accordance with the needs of the railway transport in particular and market requirements in general [26].

The organizational structure of the innovation-oriented industrial-logistic clusters is based on the model of the life cycle of the innovation process, which involves creation, production setup and escalation of innovations and requires formalization of the relations of companies-participants through the implementation of an innovation partnership. The organizational and management structure of the innovation-oriented industrial logistic clusters will comprise such components as innovation research, information-coordination, production, marketing and service (fig. 1).

Innovation-engineering centers are the core of innovation-oriented industrial logistic clusters that initiate and develop innovations and coordinate the entire innovation process of product creation [26, 29].

The innovation and engineering center, based on marketing research of the demands of the railway industry and requirements of the market of products of the railway machine building, will develop a concept and business plan of the innovative product and will place an order for development of new types of materials, equipment and technologies for the future innovative products to the participants of the innovation research unit of the cluster.

The innovation research unit will comprise research and development institutes, centers, higher educational institutions, design and development bureaus of industrial companies of the railway transport.

The information and coordination unit of the cluster will comprise marketing companies, information and marketing and consulting centers. These participants of the cluster will perform functions of searching, assessment of the manufacturing capabilities of the railway companies and other participants of the cluster and involving them in the production process, accordingly, as well as providing material and technical support to the process of innovation release in serial production.

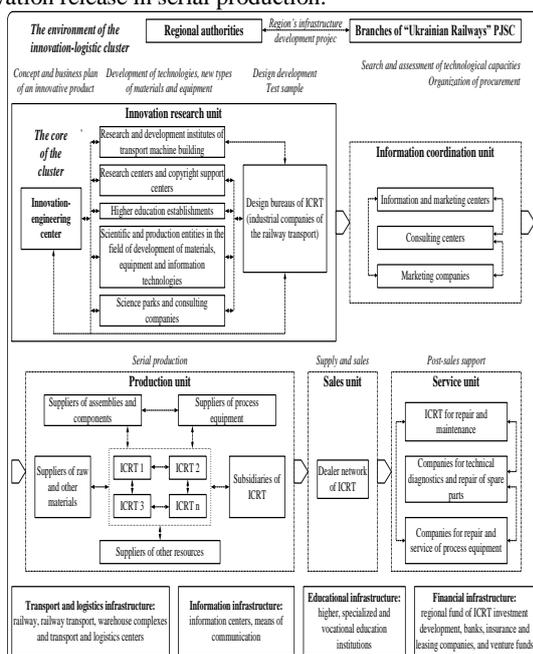


Fig. 1: Organization and management model of the innovation-oriented industrial logistic cluster.

The industrial companies of the railway transport, as well as suppliers of raw materials, technological equipment, assemblies and components will be participants of the production unit. They will ensure direct manufacture of the innovative products, what will allow them moving to a qualitatively new level of functioning, and increasing their own competitive rating. It is through assimilation of manufacture of the innovative products and gradual increase of its volumes, these companies will be able to enter the international market of the railway machine building, positioning themselves as high-tech competitive partners.

The existing dealer network of the industrial companies of the railway transport will be the sales unit of the cluster. Its main task will be to find customers of the innovative products and new markets for its sales.

The service unit will comprise the companies that will perform functions of after-sales service of the innovative products, i.e., servicing the products and technological equipment involved in its manufacture, and perform diagnostics and repair of parts [26, 29].

The innovation-oriented industrial logistic cluster of the Slobozhanskiy region could be a bright example of implementation of organizational and management model of the Innovation-oriented industrial logistic cluster. Historically, the Slobozhanskiy region, comprising Poltava, Sumy and Kharkiv regions, has had a huge potential, represented by a powerful production complex, as well as considerable intellectual potential [26].

Since the cluster approach stipulates a combination of interests and cooperation between business entities and authorities, the latter are provided with the main role in implementation of such type of cluster initiatives. In our opinion, regional authorities that are entrusted with the task to overcome fragmentation of development of the industrial companies of the railway transport and increase their competitiveness through the implementation of regional development projects, including those aimed at infrastructure development. This will be ensured on account of implementation of the development plan of the region.

Thus, the possibility of creation, setup in production and escalation of innovations within the framework of innovation-oriented industrial logistic clusters is ensured on account of cooperation of the production, intellectual, innovative potential of the participants of the cluster, each of which has the opportunity to realize its own production goals, and get a certain social and economic effect.

In general, it should be noted that the process of cluster formation in the regions of Ukraine is at an initial stage, what makes it difficult to determine the general vector of clusterization. The main problems hindering the use of the cluster approach in the management of the regional systems are as follows:

- lack of trained specialists with the required skills and qualifications on the issues of cluster formation;
- lack of sufficiently high competition;
- borrowing foreign experience and transferring it without taking into account social and cultural features and economic development priorities. The main priority abroad is the establishment of interaction between the various participants of the cluster, whereas in the domestic structure it is the interspecific interaction between the state and science, business and science, state and business;
- insufficient development of small and medium business, and complexity of involving large companies;
- the problem of the information asymmetry: lack of required knowledge, lack of interaction, poor coordination of actions of the cluster participants ultimately result in the innovative incapability of the cluster [13, 18].

All of the above problems of formation of innovation-oriented industrial logistic clusters in Ukraine at this stage of management may not be solved without active participation of the state. This is confirmed by the studies of the specialists of the Cluster Initiatives Green Book, who, having analyzed activities of more than 200 clusters, came to the conclusion that with most of them ensure investments at the expense of the state, though its organizational

role is much weaker. In the developing countries and countries in transition, despite the excessive state influence on the economy in most of these countries, the role of the state in them as a source of investment in cluster projects was significantly lower compared to the developed countries. At the same time, it should also be noted the similar extent of business involvement in investing cluster projects in countries in transition, developing and developed countries [30].

In Ukraine, the system of relations between the state, business and the scientific community is poorly established, although the government acts as the initiator of cluster policy, business is liable for implementation of the cluster projects. At the same time, the role of the state in development of clusters is significant, especially at the initial stages of the cluster formation, which is to eliminate any obstacles and constraints for innovation, development of infrastructure, formation of norms and values of collective responsibility of companies-participants of the cluster for the overall results of operation and sustainable balance of interests.

5. Conclusion

The current state of the Ukrainian economy, due to social-political and social-economic crises, is characterized by a recession. The process of industry deindustrialization contributing to the technological gap with other countries is the negative factor that exacerbates the urgent problems in the economy. Unfavorable situation of world commodity markets causes a sharp drop in the competitive position of the railway transport both in the external and domestic markets. Existing problems are exacerbated by factors such as technological significant depreciation of fixed assets, stagnation of investment processes in the restoration of production and gradual loss of scientific and human resources.

The deepening of the economic integration of Ukraine with the EU, which will facilitate expansion of the domestic market by foreign manufacturers is an important risk. The domestic products will not be able to compete with European goods, as the level of innovation of developments and quality of products differ much not in Ukraine's favor.

Implementation of the principles of innovative development of the industrial companies of the railway transport is closely related to the cluster approach in managing the processes of innovation and technological modernization.

The formation of an innovation-oriented industrial-logistic cluster as an organizational basis for generation and implementation of scientific ideas and knowledge in constructively perfect high-quality products of the industrial companies of the railway transport has been proposed. An innovation-oriented industrial-logistic cluster is an association of geographically localized railway industrial companies in the region, suppliers of material, labor, scientific and investment resources that form the basis of a single research and production environment for implementation of innovative projects of the industrial companies of the railway industry and implement a common strategy ensuring their competitiveness in terms of European integration. The main role of the state should be reduced to establishment of general rules for the economy of the country, and regional and municipal authorities may be entrusted with implementation of specific cluster initiatives.

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