

UDC 334.732

JEL Classification: F02, F63

*Karpenko A.V., Sevast'yanov R.V.***DEVELOPMENT TRENDS OF THE CLUSTER MOVEMENT IN THE ECONOMY OF UKRAINE****National University «Zaporizhzhia polytechnic», Zaporizhzhia, Ukraine**

Clusters in Ukraine have problems with the rupture of production and distribution chains. To solve these problems, it is necessary to correct the activities of clusters under martial law. Violations of transport routes and relocation of business have a significant economic impact on the formation of global value chains. It is important to assess the political and economic factors influencing changes in global and regional value chains. In 2022, there have been significant changes in the global distribution of resources. The invasion of Russian troops into Ukraine has prompted the developed world community to push Russian and Belarusian companies out of the global value chain. Such changes provide new opportunities for Ukrainian business. Creating new global and regional value chains can be based on innovative industrial high-tech ecosystems. Developed industry and regional clusters can be based on such ecosystems. It is proposed to consider new proposals to adjust the areas of cooperation of Ukrainian clusters and refocus their activities in the new economic situation. Integration into global and regional businesses may include the development of services, the development of international cooperation between enterprises on global business platforms. The article aims at study of the innovative development of clusters as the basis of economic recovery of Ukraine. Actual is to research the foreign economic activity factors of Ukraine within the framework of development of clusters. Innovative development is an important component of the country's economic growth. The development of innovative industrial high-tech clusters for successful integration into the global economy is important for Ukraine. Clusters consolidate the existing potential of companies in order to obtain synergies. The authors try to formulate modern directions of development for further integration of the Ukrainian clusters into EU economics. Clusters should also be open to participation in new projects related to the restoration of Ukraine's infrastructure. The article examines the examples of integrating Ukrainian companies into international cooperation and the structure of regional cluster of Zaporizhzhia "Engineering – Automation – Machinery" (EAM).

Keywords: cluster, ecosystem, global value chains, innovation development, cooperation.**DOI:** 10.32434/2415-3974-2022-16-2-144-157***Formulation of the problem***

Transforming of world economic system actualize the need for a perspective of the innovation context. The aim of the research is to analyze current and to characterize the comparative features of

supporting innovative development of clusters for the purpose of integrating promising sectors of Ukraine's economy into international economics.

Such integration significantly accelerates their development and level of competitiveness. Clusters

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are a powerful driver of productivity growth, job creation, and increased living standards. Countries that develop cluster ecosystems grow faster, import skills and technology, and boost employment. Ukraine's clusters can generate growth by moving to higher-value-added tasks and by embedding more technology and know-how in all their agriculture, manufacturing, and services production.

Ukraine has borders with Belarus, Hungary, Moldova, Poland, Romania, Russia, Slovakia by land and Georgia and Turkey by sea. Since the beginning of the war, Ukraine has severed economic relations with Russia and Belarus. Therefore, economic development is critically important with friendly countries.

Ukraine has stable economic potential to integrate into global production networks. Economic integration is not a linear process with only positive result. Clusters are important to global trade. In the current conditions trade in finished goods and services grows at almost the same rate as trade in intermediate products. Therefore, the structure of the world economy gains the features of multi-levelness and interdependence.

In modern economic conditions business activity of clusters can be outsourced. The development of clusters an impact on the international division of labor and on trade in intermediate goods and services.

Ecosystems of clusters can accelerate economic growth. It can be presented as gradually rising of productivity and incomes.

The issues of creation and development of clusters, formation of value chains and consolidation of local community efforts to develop territories were studied on the basis of scientific materials, author's research of Zaporizhzhia cluster "Engineering – Automation – Machinery" and Ukrainian Cluster Alliance. Methods of theoretical generalization, system analysis, comparative analysis, classification were used for publication. These methods justify the directions of further integration into global and regional value chains.

Analysis and research of publications

Clusters are important elements of the development of regional innovation ecosystems. Clusters also increase the competitiveness of enterprises, facilitate access to resources and technologies, reduce financial risks and promote innovative development of territories. The clusters provide collaboration and synergy of scientists, business, government and the public. The study of clusters as part of ecosystems, global networks, chains of added value was considered by such scientists as

Dicken, P., Geodecki T., Henderson, J., Jurchak O., Pidoricheva J., Zawicki M. [1, 2, 3, 4, 5, 6]. The category of «global production networks» was introduced by scientists J. Henderson and P. Dicken [1]. M. Zawicki [6] investigates business processes, outsourcing centers, shared services centers, global business services. Different groups of scientists researched the parameters for managing by the state in the interaction with the international business in managing the processes of global value chains functioning. These parameters include ensuring employment, security of local investors, national security, foreign trade, fiscal policy, priority directions of development, political stability and other benefits. J. Pidoricheva researches the concepts of "ecosystem", "business ecosystem", "industrial ecosystem", "digital ecosystem" and the concept of innovation ecosystem in her scientific works [4]. Also, the problems of innovative development of associations of enterprises were considered in their works by such scientists as Naumchuk T., Karpenko N., Kuzmina M., Tabunshchuk G. [7,8,9]

An economic cluster is a network of enterprises and institutions in a certain geographical environment. The cluster consists of manufacturing companies, suppliers of raw materials and services, enterprises working in related fields and public institutions (for example, research centers, universities, etc).

According to Michael Porter's theory, a cluster is a group of geographically adjacent interdependent companies (suppliers, manufacturers, etc.) and related organizations (educational institutions, public administration bodies, infrastructure companies) that work in a certain field and complement each other [10]. In other studies, one can see such a position regarding clusters as "geographical concentrations of related industries and related institutions. In regional clusters, firms and related institutions (i.e., trade organizations, universities, and local governments) can work more efficiently and innovate faster by sharing common technologies, infrastructure, knowledge and skill pools, resources, and responding to local customer demands" [11].

The purpose of the article

The article aims at study of the innovative development of clusters as the basis of economic recovery of Ukraine. Actual is to research the foreign economic activity factors of Ukraine within the framework of development of clusters.

Presentation of the main research material

Innovative clusters can lead to increased job creation and economic growth. In order to reap the gains from value chain participation, countries must

put in place the right kind of trade and investment policies. The COVID-19 pandemic and military aggression of Russia has highlighted the urgent need to understand the dependency of many countries on suppliers across the world.

In recent years, there has been a geographical reorientation of Ukrainian industry to global production networks. According to the article, Ukrainian exporters are gradually becoming part of European production chains.

The direction of supporting the Ukrainian economy is the integration of Ukrainian companies into global value chains. The role of consolidating the efforts of the human community and business is important. This contributes to the development of clusters. Clusters form new areas of cooperation. In this way, value chains are built. Clusters create new opportunities to combine the competencies of different actors (business, education and science, government and the public) and to form value chains. Therefore, the study of the integration of Ukrainian clusters into global value chains is relevant in modern conditions.

Competition and changes in world global processes against the background of growing consequences of the military invasion of Ukraine by Ukraine force us to consider economic recovery mainly on an innovative basis in the framework of cluster development. Clusters are formed in order to strengthen the own position of small and medium enterprises and gain market advantage. Clusters allow companies to combine all levels of innovation policy. Clusters provide a concentration of resources and create the conditions for economic breakthrough in the form of innovation.

Ukrainian companies are integrating into global value chains. After the annexation of Crimea (2014), the integration of Ukrainian enterprises into the markets of developed countries accelerated. During the period 2018-2021, Ukraine demonstrated positive dynamics of foreign trade. However, Ukrainian enterprises mainly exported low value-added goods and imported high value-added goods. Ukrainian exports are dominated by metallurgical and agricultural products. A feature of Ukrainian exports is the high share of intermediate goods used as raw material for the production of other final consumer goods. Current circumstances give hope for a change in the situation, as the markets of developed countries are opening up. The development of clusters in Ukraine helps the development of Ukrainian business. This development is ensured by integration into global production and distribution networks with a reduction in the processing of raw materials with low added

value.

The Ukrainian economy has certain advantages over the EU countries. Such advantages include low labour costs, quantity of labour resources and logistics. The economic relations between Ukraine and EU can be characterized as gradually growing. Let's take a closer look at this relationship.

More than 70% of Ukrainian IT exports are outsourced software development services. Ukrainian developers are integrated into more developed ecosystems and chains of other countries. Large companies such as Luxoft, Softserve, Eleks, Global Logic, Infopulse and others create software products for major global brands.

The basis for the successful integration of industry into global value chains is innovation ecosystems. Developed sectoral and regional clusters can be based on such ecosystems.

Ukraine is one of the emerging markets in Europe. This market provides a wide range of economic opportunities. Location, talented human capital, cost-competitiveness, and availability of free trade agreements with many global markets can ensure rapid growth and a high return on investments in key sectors like information technology, agriculture, energy, manufacturing and infrastructure.

The integration of Ukrainian clusters into value chains is fundamentally important for the development of Ukrainian industry. Participation in such chains allows participants to join forces to improve competitiveness. There are international value chains on the basis of Ukrainian companies. Thus, SCM's metallurgical group of companies uses the full cycle of production of metallurgical products and assets abroad. SCM is part of global value chains.

Kernel is the world's leading and Ukraine's largest producer and exporter of sunflower oil, and a major supplier of agricultural products from the Black Sea region to international markets. Ukrainian company Luxoft develops car control technologies, including unmanned ones, for German car manufacturers. Potentially, Ukraine has a full cycle and numerous advantages in the production of aircraft (Antonov). However, this circuit does not work effectively due to system problems. Ukraine has great opportunities for integration into global value chains of such sectors as machinery for the agro-industrial complex, railway cars, sea and river vessels. Ukraine has the potential to supply products to the EU at links from metal and to complex components of construction and finished machines, units, vehicles. Manufacturers of specialized software and hardware also have economic potential. It is important to consider the favorable factors for the entry of

Ukrainian industrial enterprises into value chains. Such factors include proximity to European markets, developed transport, energy infrastructure; high potential for the development of information and communication technologies). The cluster “Zakarpattya” is represented by links of international chains of brands, such as “Eurocar”, “Jabil”, “Yazaki”, “Fischer” and others. This cluster was one of the first to move to a system model of global integration. Progrestech-Ukraine cooperates with Boeing. The company specializes in design, engineering consulting and software development in the field of aircraft construction. C-Engineering (Odessa) is a Ukrainian engineering company represented on the world market by the SE Group International brand. A feature of integration into global chain networks is the partnership with Siemens. “MDEM” (Nikolaev city). It is a partner of the Dutch concern “DAMEN”, which specializes in ship design. In the context of the topic of integration into global chain networks, it is necessary to highlight such an important feature as “technological multiservice”. Infocom Ltd (Zaporizhzhia city) offers the market products and solutions in the field of specialized software development, alternative energy, electric vehicles, robotics, computer vision, drones, etc. For this company it is exports and integration into global value chains that are the source of its innovative development.

The basis of the integration of Ukrainian clusters into global value chains should be the following components: bringing in conformity the Ukrainian technical norms and standards the European ones; development of innovative ecosystems of industrial hi-tech. Developed sectoral and regional clusters can be based on this. Deeper specialization can take place in these clusters. Clusters should operate on the principles of integration and smart specialization; integration into regional chains such as Eastern European one.

The development of clusters in Ukraine occurred in 2020. This year, a draft National Strategy for Cluster Development until 2027 was developed. Almost simultaneously, the German Society for International Cooperation (GIZ) supported the cluster development initiative. This support allowed to start a project for the development of EAM (Engineering – Automation – Machinery) clusters in the Zaporizhzhia and Kharkiv regions.

More than 50 clusters are registered in Ukraine. On March 24, 2022, 16 clusters and cluster organizations of Ukraine merged into the Ukrainian Cluster Alliance. This alliance undertook the mission

of developing the entire cluster movement in Ukraine [12]. The cluster movement helps increase exports for the business community. There are additional opportunities to include clusters and their members in global value chains.

Clusters are important organizational associations for combining the expertise and resources of small and medium-sized businesses. To this end, the unification of clusters into the Ukrainian Cluster Alliance was Clusters are important organizational associations for combining the expertise and resources of small and medium-sized businesses. This Alliance of Clusters facilitates the ability to integrate into global value chains through Cluster2Cluster meetings.

The cluster community unites about 1800 enterprises from different regions of Ukraine at 35 clusters. These companies have their own specialization, resources and experience, the potential for joint growth. The expert environment expands, acquires new knowledge and initiates exchange and cooperation. Increasing the scale of the cluster community gives results in the search and implementation of projects, the formation of partnerships. Such processes take place in the national and international economy with business and clusters. Coordination of common priorities, loyalty to new participants, building trust against the background of current threats should ensure the development of the cluster movement. Integration into the GVC is able to stabilize economic relations and contribute to the recovery of Ukraine’s economy.

The knowledge economy is an important realization for human potential in the innovation system. The formation of the innovation system is based on the close interaction of structures involved in the production and commercialization of scientific knowledge and technologies. Therefore, their collaboration is important to achieve common goals.

Ukraine has a high educational and scientific potential. The development of these potentials is a prerequisite for the creation and implementation of innovations in the form of ideas, scientific developments and patents. Among the competitive advantages of Ukraine, one can single out market capacity, quality of higher, secondary and professional education.

Among the main barriers to the development of innovations in Ukraine, the authors single out the imperfection of regulatory institutions and insufficiently developed innovation infrastructure.

In 2010-2020, there is a trend of growth in the R&D expenditure indicator. However, the devaluation and inflation processes in 2018-2020 did not allow fundamentally improving the innovation

system.

In Ukraine, there is a Strategy for the development of the sphere of innovative activity for the period until 2030. The dynamics of costs for the implementation of scientific research and development in the dollar equivalent did not even reach the level of 2010.

Consider the indicator of the Global Innovation Index. It highlights the productivity of innovation ecosystems of 132 countries and tracks global innovation trends (Fig. 1).

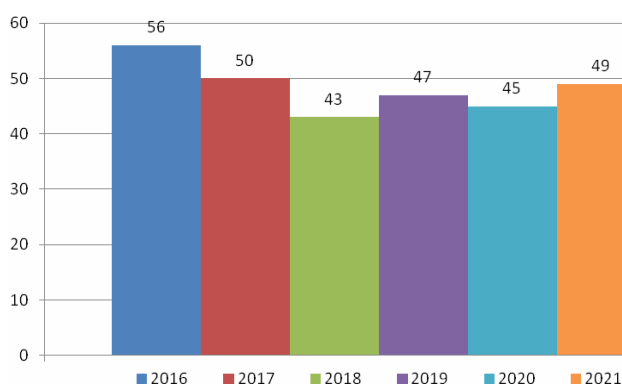


Fig. 1. Ranking of Ukraine in the Global Innovation Index

Source: formed by the authors on the basis of information from the World Intellectual Property Organization [13]

In 2021, Ukraine ranked 49th in the Global Innovation Index. The best year according to this indicator is 2018 with a rating of 43. Until the 2022 war, Ukraine was unable to fundamentally improve its innovation activity and kept its position in the range of 40-60 places in the Global Innovation Index.

Economic losses as a result of the military invasion of Russian troops in Ukraine are deepening the crisis in the economy. Therefore, the authors propose to consider economic growth mainly on an innovative basis with the active use of the potential of cluster development. Clusters are formed with the aim of strengthening the own positions of mainly small and medium-sized businesses, obtaining more significant advantages on the market.

Ukraine will be one of the emerging markets in Europe. This market provides a wide range of economic opportunities. Location, talented human capital, cost-competitiveness, and the availability of free trade agreements with many global markets can all ensure rapid growth and a high return on investments in key sectors, such as information technology, agriculture, energy, manufacturing, and infrastructure.

The integration of Ukrainian companies into

international economy is fundamentally important for the development of Ukrainian industry. Participation in such chains allows the participants to join forces to improve competitiveness. There are international value chains based on Ukrainian companies. Thus, Metinvest uses the full cycle of production of metallurgical products and assets abroad. Metinvest is part of global value chains. Table 1 presents Ukrainian companies participating in international economic cooperation, including with the EU's countries.

Table 1 shows successful examples of integrating Ukrainian business into global value chains. In fact, these companies are cluster associations. However, successful examples mostly concern big business. And for small and medium-sized businesses, there are few such examples. According to the authors, the solution to this problem is the development of cluster associations. These associations promote further integration into regional ones and global value chains.

Ukrainian company Luxoft develops car-control technologies, including unmanned ones, for German car manufacturers. Ukraine would also be capable of supplying products to the EU from metal to complex components of construction and finished machines, units, vehicles. Ukrainian manufacturers of specialized software and hardware also have the economic potential. It is important to consider the favorable factors for the entry of Ukrainian industrial enterprises into GVCs. These factors include the proximity to European markets, developed transport, energy infrastructure and a high potential for developing information and communication technologies. The cluster "Zakarpattya" is represented by the associations of international chains of brands, such as "Eurocar", "Jabil", "Yazaki", "Fischer", and others. This cluster was one of the first to move to a system model of global integration.

In the Zaporozhzhia region in 2020 the cluster "EAM" was created [15]. This cluster includes 20 companies and organizations. Leading in the EAM cluster are the fields of industrial engineering, automation, IT and mechanical engineering. Such cooperation allows to increase the economic potential of the Zaporizhzhia region through the formation of competitive advantages of cluster members (Table 2).

The National University "Zaporizhzhia Polytechnic" is a member of the Zaporizhzhia Cluster "Engineering – Automation – Machinery" (EAM). The aim of this cluster is to become a cross-border excellence organization with high quality services for international demand orientation. This organization is based on a collaboration of a wide variety of players in engineering as well as automation

Table 1

Examples of integrating Ukrainian companies into international cooperation as of 2021

Company	Sphere of activity	Partnerships with companies in the EU	Partnerships with companies beyond the EU
Metinvest	mining, metals, sales, logistics, service	Bulgaria, Italy	Belarus, Switzerland, the UK, Russia, the United States
Aeromeh	engineering	Bulgaria, Germany, Greece, Italy, Latvia, Lithuania, Poland, Romania, the Czech Republic, Finland, Estonia	Australia, Armenia, Belarus, Bolivia, Brazil, China, Great Britain, Georgia, India, Israel, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenia, Turkey, Switzerland
Motor Sich	aircraft and engine building	Poland, Czechia, Slovakia	Bangladesh, Belarus, Canada, Ethiopia, Myanmar, Pakistan, Singapore, South Korea, Sri Lanka, the UAE, the UK
Ukrainian Automobile Corporation	automobile maker	Poland	Egypt, Uzbekistan
Konecranes Ukraine	cranes, lifting equipment and crane services	Austria, Belgium, the Czech Republic, Denmark, Germany, Greece, Finland, France, Hungary, Italy, Latvia, the Netherlands, Poland, Portugal, Romania, Spain, Slovakia, Slovenia, Sweden	Australia, Bangladesh, Brazil, Canada, Chile, China, Colombia, India, Indonesia, Hong Kong, Mexico, Morocco, New Zealand, Norway, Peru, the Philippines, Russia, Singapore, South Africa, South Korea, Thailand, Turkey, Switzerland, the UAE, the UK, the USA, Venezuela, Vietnam, Japan
Kernel	food processing	Germany, Israel, Latvia, Lithuania, Estonia, Sweden	Bangladesh, Canada, South Korea, Norway, the USA
EKTA	LED displays, imaging equipment/software	France, Estonia, Sweden	Norway, the UAE, the UK
Luxoft	software development	Bulgaria, Germany, Italy, the Netherlands, Poland, Romania, Sweden	Australia, Canada, China, India, Malaysia, Mexico, Russia, Singapore, South Korea, Switzerland, the UK, the USA, Vietnam
Nibulon	grain and oilseeds, shipbuilding, logistics	Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, the Netherlands, Poland, Romania, Sweden	China, Norway, Turkey, the UK
MHP	crop production, poultry, meat processing	Germany, the Netherlands, Slovakia, Slovenia, Romania	Armenia, Azerbaijan, China, Iraq, Hong Kong, Kuwait, Moldova, Morocco, the Philippines, Saudi Arabia, Singapore, South Korea, Tunisia, Vietnam, the UAE, Japan

Source: [14]

and machinery. Members of the cluster include the Zaporizhzhia Chamber of Commerce and Industry, industrial enterprises (Triada Ltd Co., Blysk metal service pro), IT companies (Infocom Ltd), industrial parks (Konecranes), and other organisations. Infocom Ltd (the city of Zaporizhzhia) offers market products and solutions in the field of specialised software development, alternative energy, electric vehicles, robotics, computer vision, drones, etc. For this company, it exports and integration into global

value chains that are the source of its innovative development.

Zaporizhzhia cluster “EAM” is included in the regional development strategy until 2027. The draft action program for the development of small and medium enterprises in the city of Zaporizhzhia for 2022-2025 has been included in the action plan. Zaporizhzhia cluster “EAM” has initiated cooperation between all members of the cluster. A joint innovation ecosystem of the region was also

created for the purpose of innovation and R&D (research and development), production of new generation products ("Industry 4.0"), as well as joint implementation of engineering projects. Enterprises and organizations of the cluster created more than 1.6 thousand jobs and paid about 70 million UAH taxes (2020). The basis of the cluster formation is the coordination, coordination and synchronization of cooperation of participants in the following areas: definition of common goals and needs; building trust through networking and regular communications; launching a specific action plan, etc.

Members of the Zaporizhzhia EAM cluster regularly hold networking meetings, consult with each other, visit new enterprises, work on joint projects and discuss opportunities to create joint products, constantly study and participate in organized professional events, participate in exhibitions, etc. An important activity of the cluster is the formation of regional value chains and joining the global value chains.

In order to solve the tasks, National University "Zaporizhzhia Polytechnic" participates in the cluster development of the Zaporizhzhia Cluster "EAM" (Engineering-Automation-Machinery). The implementation of this project contributed to the development of cluster processes in the specified regions. There have also been positive changes in innovation ecosystems and influence on the development of the cluster movement in Ukraine.

The National University "Zaporizhzhia Polytechnic" is a member of the Zaporizhzhia Cluster "Engineering – Automation – Machinery" (EAM Zaporizhzhia). This organisation is based on a collaboration of a wide variety of players in

engineering as well as automation and machinery. Such measures are relevant in terms of developing global and regional value chains in the context of Ukraine's cooperation with the EU's countries.

A visual representation of the logos of Zaporizhzhia Cluster "EAM" participating companies is presented in Fig. 2.

Zaporizhzhia Cluster "EAM" is included in the regional development strategy until 2027. The draft action program for the development of small and medium enterprises in the city of Zaporizhzhia for 2022-2025 has been included in the action plan. A joint innovation ecosystem of the region was also created for the purpose of innovation and R&D (research and development), production of new generation products («Industry 4.0»), as well as joint implementation of engineering projects. Enterprises and organizations of the cluster created more than 1.6 thousand jobs and paid about 70 million UAH taxes. The basis of the cluster formation is the coordination and synchronization of cooperation of participants in the following areas: definition of common goals and needs; building trust through networking and regular communications; launching a specific action plan, etc.

In September and November 2021, cluster representatives visited Lithuania and the Czech Republic and signed 2 memoranda of cooperation with two clusters (INDUSTRY CLUSTER 4.0 and Lithuanian Automotive Export Association LAuGEA Cluster) on cooperation and development of global value chains with more than 50 participating companies. The INDUSTRY CLUSTER 4.0 presents the Czech association of engineering and IT companies. Such measures are relevant in terms



Fig. 2. Logos of members of the Zaporizhzhia Cluster "EAM" and GIZ (supported the institutionalization of the cluster)

Table 2

Structure of regional cluster of Zaporizhzhia regional Cluster “Engineering – Automation – Machinery” (EAM) as of 2022

Name	Services	Countries where the cluster operates	Market presence (years)	Official site
1	2	3	4	5
ZAPORIZHZHIA CLUSTER "ENGINEERING – AUTOMATION – MACHINERY" (EAM ZAPORIZHZHIA)	A platform for companies in the Zaporizhzhia region working in the Engineering, Automation and Machinery sectors to share best practices and create a consolidated industry position	all below	1	https://www.iamcluster.zp.ua/
NATIONAL UNIVERSITY "ZAPORIZHZHIA POLYTECHNIC"	Basic and applied research; training. The university prepares specialists for the aviation, aerospace, electrical, electric power, metallurgical, machine-building, radio-electronic industries	Austria, Belgium, Bulgaria, Belarus, Kazakhstan, Georgia, Spain, Germany, United Kingdom, Poland, Romania, Slovakia, Turkey, Czech Republic, Azerbaijan, Ukraine	122	https://zp.edu.ua/
ASSOCIATION OF INDUSTRIAL AUTOMATION OF UKRAINE (APPAU)	Development of the local market through set-up of professional standards in technical field and in business development. It represents the interests of the Ukrainian industrial automation community.	EU, USA, Ukraine	11	https://appau.org.ua/
ZAPORIZHZHIA CHAMBER OF COMMERCE AND INDUSTRY (CCI)	Certification of origin of goods Customs broker services ATA carnets Legal Services Translation agency Organization of international economic cooperation Implementation of quality management systems Certification of commercial documents Educational programs Conference service Conference halls for rent Public procurement Commodity expertise Price examination Patent and license services Definition of codes.	Argentina, Australia, Bulgaria, Brazil, Czech, Canada, India, France, Finland, Georgia, Germany, Lithuania, Poland, Slovakia, Spain, Syria, Tajikistan, Turkey, Ukraine, Venezuela	81	https://www.cci.zp.ua/

Continuation of Table 2

1	2	3	4	5
LLC "TRIADA LTD CO"	Development and creation of welding technologies, design of robotic technological complexes. Laser cutting, Metal casting, Metal forming, Plasma cutting, Electroplating services	Kazakhstan, Ukraine	30	http://www.triada-welding.com/
LLC "BLYSK METAL SERVICE PRO"	Production of polypropylene equipment for galvanic processes, supply of voltage rectifiers	Sweden, Ukraine	6	http://bmservice.pro
LLC "ROLL GRAND"	Manufacturer of components for all types of gates	Italy, Ukraine	19	https://rollgrand.com/
LLC "PC KOTLOMONTAZH"	Boilers utilizers, deaerators, gas cleaning equipment, building metal structures	Ukraine	30	https://steel-work.com.ua/
PRIVATE SMALL INDUSTRIAL AND COMMERCIAL ENTERPRISE "ASSOL"	Production of bulldozers, modernization and overhaul of equipment.	Italy, Slovakia, Ukraine	31	https://assol.com.ua/
LLC "LIZMARK"	Production of freight elevators and cottage elevators.	Ukraine	4	https://lizmark.in.ua/
LLC "SATURN"	Production of auto parts and spare parts for agricultural machinery; service services for the production of equipment and machining of metals.	Ukraine	20	https://saturnavto.com.ua/
LLC "TERMOLIT"	Production of innovative equipment for melting, heating and hardening of metals	Azerbaijan, Armenia, Uzbekistan, Estonia, Kazakhstan, Poland, Moldova, Germany, Israel, Turkmenistan, Latvia, Italy, Finland, Lithuania, Ukraine	25	https://termolit.com/
LLC "TAVRIA FOUNDRY COMPANY "TALCO"	Foundry production of aluminum alloys	Italy, Germany, Ukraine	25	https://talko.com.ua/
LLC "THERMO-ENGINEERING"	Design and construction of industrial and civil construction facilities; modernization or repair of industrial equipment	Kazakhstan, Mongolia, Ukraine	61	http://niiterm.com/ru/kompaniya/o-nas
PRIVATE ENTERPRISE "YUZHTRANSPOLIS PLUS"	Gates of various levels of complexity for domestic and industrial purposes	Italy, Germany, Ukraine	20	https://www.vorota-utp.zp.ua/

Continuation of Table 2

1	2	3	4	5
LLC "GREEN SYSTEM"	Turnkey solar power plants, service in the field of alternative energy and energy efficiency	China, Poland, Ukraine	10	https://greensystem.com.ua https://teplonasos.biz https://electro-auto.com.ua
LLC "INFOCOM LTD"	Automation software development (MES, ERP)	USA, Japan, Germany, Bulgaria, Egypt, France, Great Britain, Zambia	25	https://ia.ua/ru/
LCC "IT PROGET"	Design and implementation of IOT at facilities of industrial complexes, agriculture, transport, housing and communal services	Ukraine	12	https://www.atiko.com.ua/
HR COMPANY "WORLD WIDE OPPORTUNITIES"	Employment, training and retraining services for specialists.	Germany, Ukraine	3	https://wwop.com.ua
LLC "Ecotechnology company "Granik"	Collection and removal of various types of garbage and waste in Zaporizhzhia and Ukraine (separate waste collection).	Ukraine	21	https://granik.com.ua/
LLC "Brightmedia Company"	Brightmedia is the agency that creates values: from creating a name to shooting a commercial featuring (rebrand, launch new product, roadmap for the project)	Ukraine	15	https://brightmedia.ua
LLC "UKRSTANDARTSERIFI KATCIYA"	Company services: CE certification (for export to the EU), a full range of work on CE marking; Consulting on ISO standards; Certification in accordance with standards; Assessment of conformity (declaration) of products in accordance with the technical regulations of Ukraine; Product testing; Production attestation; Certification of internal auditors.	Ukraine	15	www.ukrstandart.net

Compiled by authors from open sources

of developing global and regional value chains in the context of Ukraine’s innovative cooperation with the EU’s countries. The purpose of the INDUSTRY CLUSTER 4.0 is to create an important center of

business in engineering, strengthening competitiveness and innovation activities, in particular through the implementation of the concept “Industry 4.0” (Digitization and automation of

manufacturing processes (Industry 4.0); Preparation of human resources in technical fields; Improvement of export capabilities of companies). The cluster is currently composed of leading production or technological companies and research facilities from the region [16]. Cooperation with the Lithuanian LAuGEA Cluster also seems promising. This cluster presents companies related to the automotive industry and science. LAuGEA Cluster members [17] are actively involved in international research and innovation program projects, international exhibitions and business missions, as well as collaborating with various companies, government agencies, non-governmental organizations, research and product development partners, and other institutions of similar activity. Research, development and innovation (R&D&I) activities are carried out by taking advantage of laboratories owned by cluster members and partners.

The development of the Zaporizhzhia cluster "EAM" demonstrates positive effects not only for the community of association participants, but also acts as a kind of bridge for the expansion of integration of other businesses of the region and the whole country, first of all, members of the Ukrainian Cluster Alliance. The mission of the Zaporizhzhia cluster "EAM", like most members of the Ukrainian cluster alliance, is to transform into such a consolidating structure that can be presented in the form of a cross-border organization with high-quality services for orientation to international demand, through integration into global chains of added value. The activity of the Zaporizhzhia cluster "EAM" is aimed at the development not only of the economy of the region, but also of Ukraine as a whole in the field of innovative activity. Such orientation is connected through close interaction with the scientific and educational environment, in particular through cooperation with the National University «Zaporizhzhia Polytechnic».

Conclusions

Significant efforts of active individuals and financial support for the institutionalization of cluster organizations in recent years contributed to the creation of various cluster organizations. The military aggression on February 24, 2022 pushed the clusters to further consolidation, which later, as early as March, will initiate the creation of the Ukrainian Cluster Alliance. The cluster community of Ukraine unites about 1,800 enterprises from different regions of Ukraine in 35 clusters. These companies have their own specialization, resources and experience, potential for joint development.

The expert environment expands, acquires new

knowledge and initiates exchange and cooperation. Increasing the scale of the cluster community gives results in finding and implementing projects, forming partnerships.

Such processes take place in the national and international economy with business and clusters. Coordination of common priorities, loyalty to new participants, formation of trust against the background of current threats should ensure the development of the cluster movement.

Clusters allow combining and coordinating all levels of innovation policy. Clusters ensure the concentration of resources and the creation of a favorable environment for economic development in the form of innovation. Interaction and synergy of scientists, business, authorities and the public can be achieved in clusters. The basis of cluster formation is the coordination and synchronization of cooperation of participants in the following areas: definition of common goals and needs; building trust through networking and regular communication; launching a specific action plan, etc.

In the current extremely difficult conditions for the national economy, it is the development of the cluster movement and innovative ecosystems of industrial high technologies that should become the basis of Ukraine's successful integration into global value-added chains. Clusters can significantly contribute to the development of services and production, the formation of international cooperation between enterprises on global markets.

Innovative changes and technologies are important for the integration of the Ukrainian economy into the world economy. It is the innovative development of Ukrainian enterprises that can ensure their equal integration into global chains of added value, the expansion of international partnerships through global business platforms.

The general trends in the development of innovative activities of enterprises in Ukraine over the last decade demonstrate slow rates of change. The lack of tangible progress is due to the reduction of spending on education and research as a percentage of GDP. The level of development of innovative infrastructure is insufficient to ensure the intensive growth of Ukraine's economy. Important positive changes in the components of the innovation infrastructure should be considered the promotion of the protection of intellectual property rights and the development of clusters. These processes are initiated and promoted mainly at primary levels.

The work examines the cluster movement in Ukraine and the activity of the Zaporizhzhia cluster «EAM» in particular. The important role of National

University «Zaporizhzhia Polytechnic» in the activities of the regional cluster is shown. The study of the development experience of the Zaporizhzhia cluster «EAM» allows us to substantiate certain conclusions regarding the importance of creating and developing relevant associations, stimulating the expansion of relevant practice by all levels of government. Clusters should play the role of consolidating structures with high-quality services for targeting international demand. This can be organized through integration into global value chains. Entering new markets, branding and building long-term business partnerships are important for clusters. The integration of clusters and their participants into global and regional chains of added value is a strategically important direction of the post-war recovery and development of the national economy of Ukraine.

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Received 03.09.2022.

ТЕНДЕНЦІЇ РОЗВИТКУ КЛАСТЕРНОГО РУХУ В ЕКОНОМІЦІ УКРАЇНИ**Карпенко А.В., Севаст'янов Р.В.**

Кластери в Україні мають певні проблеми у зв'язку з розривом виробничо-збутових ланцюгів. Для вирішення цих проблем необхідно корегувати активність кластерів в умовах воєнного стану. Порушення транспортних маршрутів і переміщення бізнесу мають значний економічний вплив на формування глобальних ланцюжків створення вартості. У 2022 році відбулися значні зміни у глобальному розподілі ресурсів. Вторгнення російських військ в Україну спонукало міжнародний бізнес витіснити російські та білоруські компанії з глобальних ланцюгів доданої вартості. Такі зміни відкривають нові можливості для українського бізнесу. Створення нових глобальних і регіональних ланцюжків доданої вартості може базуватися на інноваційних промислових високотехнологічних екосистемах. На основі таких екосистем можуть базуватися промислові та регіональні кластери. Метою статті є дослідження інноваційного розвитку кластерів як складової економічного відновлення України. Для України важливий розвиток інноваційних промислових високотехнологічних кластерів для успішної інтеграції у світову економіку. Кластери консолідує наявний потенціал компаній для отримання синергії. Кластери також дозволяють зменшити негативні наслідки недовіри та конкуренції на локальних територіях. Дослідження підтверджує позитивну динаміку зовнішньої торгівлі в рамках економічного співробітництва між Україною та ЄС. Українська економіка переважно експортує товари з низькою доданою вартістю та імпортує товари з високою. Розвиток економічного потенціалу України вимагає успішної інтеграції в європейські виробничо-збутові мережі з поступовим скороченням перероблення сировини з незначною доданою вартістю. Автори розглядають сучасні напрями розвитку для подальшої інтеграції українських кластерів в економіку ЄС. Також кластери мають бути відкритими для участі в нових проєктах, пов'язаних із відновленням інфраструктури України. Інтеграція кластерів у глобальні та регіональні ланцюги створення вартості є важливою. У статті розглянуто приклади інтеграції українських компаній у міжнародне співробітництво та структуру регіонального кластеру Запорізького регіонального кластеру «Інжиніринг – Автоматизація – Машинобудування» (ЕАМ).

Ключові слова: кластер, екосистема, глобальні ланцюжки створення вартості, інноваційний розвиток, кооперація.

DEVELOPMENT TRENDS OF THE CLUSTER MOVEMENT IN THE ECONOMY OF UKRAINE**Karpenko A.V., Sevast'yanov R.V.*****National University «Zaporizhzhia polytechnic», Zaporizhzhia, Ukraine***** e-mail: rvs_zp@ukr.net****Sevastyanov R.V. ORCID: <https://orcid.org/0000-0001-9088-4433>**

Clusters in Ukraine have problems with the rupture of production and distribution chains. To solve these problems, it is necessary to correct the activities of clusters under martial law. Violations of transport routes and relocation of business have a significant economic impact on the formation of global value chains. It is important to assess the political and economic factors influencing changes in global and regional value chains. In 2022, there have been significant changes in the global distribution of resources. The invasion of Russian troops into Ukraine has prompted the developed world community to push Russian and Belarusian companies out of the global value chain. Such changes provide new opportunities for Ukrainian business. Creating new global and regional value chains can be based on innovative industrial high-tech ecosystems. Developed industry and regional clusters can be based on such ecosystems. It is proposed to consider new proposals to adjust the areas of cooperation of Ukrainian clusters and refocus their activities in the new economic situation. Integration into global and regional businesses may include the development of services, the development of international cooperation between enterprises on global business platforms. The article aims at study of the innovative development of clusters as the basis of economic recovery of Ukraine. Actual is to research the foreign economic activity factors of Ukraine within the framework of development of clusters. Innovative development is an important component of the country's economic growth. The development of innovative industrial high-tech clusters for successful integration into the global economy is important for Ukraine. Clusters consolidate the existing potential of companies in order to obtain synergies. The authors try to formulate modern directions of development for further integration of the Ukrainian clusters into EU economics. Clusters should also be open to participation in new projects related to the restoration of Ukraine's infrastructure. The article examines the examples of integrating Ukrainian companies into international cooperation and the structure of regional cluster of Zaporizhzhia “Engineering – Automation – Machinery” (EAM).

Keywords: cluster, ecosystem, global value chains, innovation development, cooperation.

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