

# Public Administration Impact on Industrial Clustering Processes in Ukraine

MYKOLA KOVALENKO<sup>1</sup>, KATERYNA KHODIAKOVA<sup>1</sup>, NATALIA RYZHIKOVA<sup>2</sup>,  
NADIIA MYRNA<sup>1</sup>, SERGIY KALINICHENKO<sup>2</sup>, OLHA KORNEVA<sup>1</sup>

<sup>1</sup> Kharkiv Regional Institute of Public Administration of the National Academy for Public,  
Administration under the President of Ukraine, 75 Moskovsky Avenue, Kharkiv, 61001,  
UKRAINE

<sup>2</sup> Kharkiv Petro Vasylenko National Technical University of Agriculture,  
Alchevskih street 44, Kharkiv, 61002  
UKRAINE

*Abstract.* The article brings up to date the problem of ensuring modern development of the domestic industry. The value of clusters as a tool for implementing state industrial policy is substantiated. The role of public administration in the process of clustering the industry of Ukraine is explained. The current international practices of applying a cluster approach to solving regional socio-economic problems are analyzed. A system of measures to be taken by public authorities to create and develop clusters is determined. A model of forming Slobozhansky machine-building cluster as a high-tech scientific and production association has been developed. The concept of cluster policy is formulated. The expediency of using public-private partnership in the context of innovative cluster system formation is considered. Proposals for intensification of the process of industrial clustering in Ukraine are provided. The study uses the following methods: historical, logical, analytical, graphic, comparative, abstraction, specification, and generalization.

*Key-Words:* public administration, industrial development, cluster, cluster approach, cluster policy, socio-economic development of regions, improving production efficiency of domestic enterprises.

Received: June 9, 2021. Revised: January 15, 2022. Accepted: March 13, 2022. Published: March 24, 2022.

## 1 Introduction

At the time of gaining its independence, Ukraine had one of the largest and structurally well-developed industrial complexes in Europe, which satisfied the needs of the country in industrial products and had a powerful export potential. Its production capacity and ability to create innovative products were the most important factors of economic development, which ensured the socio-economic growth of society.

Since 1991 up to present, the country's industry has been characterized by a catastrophic fall in volumes of production and a complete loss of a great many of enterprises, a large number of which had a glorious history of their rise and got world-famous. Privatization of state enterprises did not resolve the important issues of increasing their efficiency, nor did it ensure their development and competitiveness.

A distinctive feature of a modern advanced state is a high level of development of its industry. Along with this, there is not a single great power that would achieve significant success in the reconstruction of its industrial sector without a

comprehensive support from the state, formalized in an economic policy and state regulation mechanisms.

Historically, machine-building has always been one of the leading industries in Ukraine. Considering the great influence of machine-building on solving socio-economic problems, the state should be interested in developing industry, purposefully promoting and providing support for innovation. Therefore, the definition of forms and actions of state participation, taking into account the current socio-economic crisis in Ukraine, is quite relevant.

## 2 Problem Formulation

Today in Ukraine, there are factors that come in the way of industrial restoration and development, the most significant ones being: the actual disengagement of the state from governing industrial development; monetary famine; decline of science and education; unsatisfactory structure of the country's import and export; a significant moral and physical depreciation of fixed assets; an

avalanche outflow of labor force; lack of a full-fledged system for forming innovative production; inadequate and incomplete legislation. All this means that sporadic local measures are not enough to help industry emerge from its current crisis. There is an urgent need for a comprehensive strategy of domestic industry development, stipulating specific state programs and measures for achievement of the set goals.

A decisive role of industry in ensuring effective development of the world economy is emphasized by the leading scientists and experts of the global community: D. Barsukov [2], R. Brown [3], L. Deineko [4], Ch. Ketels [12], M. Kizim [13], A. Marshall [16], O. Nykyforuk [17], M. Porter [18], M. Enright [7], and some others.

### 3 The Theoretical Aspect

The development of the country's industry on the basis of a cluster model is one of the characteristic features of the modern innovation economy and a prerequisite for structural changes in the era of digital technology diffusion. The state policy of developing machine-building, being an element of the industrial system of Ukraine, provides for the formation and implementation of national and sectoral projects and programs in the following priority areas [1]:

- meeting the country's needs for competitive domestic products, based on the needs of customers and capacities of enterprises;
- converting domestic raw materials of various sectors of the economy into the ultimate product with a high added value;
- development of exports of domestic products with a high added value and measures for import substitution;
- reconstruction and technical re-equipment, increase of the technological level of enterprises in knowledge-intensive industries for achievement of modern global standards;
- modernization of existing and creating new high-tech manufactures;
- increasing the level of the country's provision with machine-building production;
- development of power engineering;
- modernization, reconstruction of production, technological alterations, taking out of obsolete and production of new types of products;
- a gradual transition to digital production, accelerated development of IT technologies and artificial intelligence, computer-integrated production;

- creation of nanomaterials and establishing manufacture of products made of them;
- development of big, medium-scale, and small manufacturing business.

Implementation of any projects and programs in these areas may be possible, provided that an adequate state industrial policy is pursued, the precondition of which should be provision of a required amount of resources for modernization of the existing and creation of new industrial enterprises which will necessarily introduce the latest achievements of scientific and technological progress [5].

As evidenced by international experience, support for industrial development has always been in the focus of the national governments of the leading European countries (Germany, France, Switzerland, etc.) which set the benchmarks for shaping the agenda of economic policy implementation. Accordingly, the updated strategy of the European Union's industrial policy regards industry as a foundation for economic prosperity and seeks to support and enhance the industrial leadership of Europe in the era of globalization, rapid technological changes and challenges to sustainable development.

The state industrial policy should provide for organization of a system of relations between the public and power bodies, which involves participation of numerous stakeholders in political decision-making. The form of the relations that optimize the partnership between the subjects of power and civil society can be successfully realized through a cluster approach.

Michael Porter [18], Professor of Harvard Business School, one of the founders of the cluster theory, defined a cluster as a network of suppliers, manufacturers, consumers, elements of industrial infrastructure, research institutes interacting in the process of creation of surplus value.

The interest that the state and business take in clusters is due to their high level of competitiveness in the global and national markets. The theory of clusters has been elaborated by several outstanding scientists [26]: M. Enright, M. Lorenzen, P. Maskell, S. Rosenfeld, M. Storper.

Generally speaking, the cluster model is not an abstract theoretical idea. It is well-suited to operationalization, with a clear orientation towards governance practice, a practical lever of influence essential to forming effective innovative and highly competitive enterprises [14].

Clusters have become most common in Scandinavian countries where the level of business entities' clusterization amounts to 65 to 100% [8].

Another ardent supporter of the cluster approach is Germany, where 3 of the 7 world largest high-tech clusters are successfully operating. These are located in Munich, Hamburg, and Dresden, called the “Silicon Valley of the 21st century” [11], [19], [20]. The industrial clusters of Bavaria also enjoy the world fame. The leading clusters of the country were organized from the ‘ground-up’ on the basis of existing network links and interactions that have gradually expanded, covering the related and service industries.

The experience of the US economy development since the 1970s, indicates a high efficiency of industrial cluster associations and cluster policy as an alternative to a traditional sectoral approach [13]. According to the cluster model developed by Michael Porter [18], a significant number of clusters was created in the states of California, Florida, Minnesota, North Carolina, Ohio, Arizona, Connecticut, Oregon, Washington, Texas. Also, these states have designed individual programs for the development of specific cities and territories and identified their development strategies [2].

A cluster initiative may be launched by different organizations. These may be companies that see their benefits of cluster formation. However, recently, most of the clusters in the world’s leading countries are created from top to down on the initiative of local or central authorities. The initiative can be taken even by local self-government bodies of the lowest level, as well as by certain structural units of the regional and national levels [22].

Therefore, the state still plays the key role in creating clusters. Its essence lies in the fact that the state, by forming and implementing industry development policies, is able to create a favorable institutional environment to accelerate the innovative and investment-led development of industry, eliminating potential barriers of different origin [10], [28]. Accordingly, the lead in this process is taken by the Government [29].

A study of cluster-building initiatives in different countries, conducted by Ö. Sölvell, G. Lindqvist, and Ch. Ketels, shows that all cluster initiatives are unique. They vary depending on the level of socio-economic development of the country where a cluster is formed. In addition, in 32% of cases, it is the Government that is responsible for forming cluster initiatives, since it has the capacity to finance over half of them. In the European Union, the rules for an effective cluster formation are set forth in the Cluster Initiative Greenbook [23].

Over recent years, the Ukrainian industry has been going through a deep crisis (the fall in

industrial output in 2013 amounted to 4.3%; 2014 – 10.1%; 2015 – 12.3%; 2019 – 0.5%; 2020 – 4.6%; specifically, in machine-building: 2013 – 13.6%; 2014 – 20.6%; 2015 – 14.8%; 2019 – 2.2%; 2020 – 17.6% [24]. According to the State Statistics Service, the actual GDP of Ukraine in 2020 decreased by 4%, compared to 2019. Therefore, the Government should abandon the failure practice of libertarianism, which has led to the socio-economic disaster, and implement systemic changes based on protectionism principles, introduction of a responsible strategic planning and comprehensive support for innovation and investment activity of domestic business entities. Clustering of the economy through a system of public authorities’ measures should become an important factor of introducing a new state regulation of cluster creation and development. The actions of the Government, regional authorities, and local self-government bodies should be synchronized and targeted at attainment of the following specific goals:

- formation of new chains of goods and services production by domestic industries with a subsequent world market placement;
- development and implementation of research and innovative projects of regional cooperation and specialization;
- a planned increase in the number of jobs and a rise in people’s incomes with a simultaneous reduction of their inequality, depending on labor input in production efficiency;
- facilitating the solution of social and environmental problems by introduction of eco-industrial clusters, aimed to maintain high standards of corporate social responsibility of business entities.

It is no coincidence that supranational regulators place high emphasis on the issues of clustering the economies of developing countries. Specifically, there is a specialized international institution – the United Nations Industrial Development Organization (UNIDO), which cooperates with the United Nations Organization based on special agreements with its Economic and Social Council (ECOSOC). Regarding the development of clusters, UNIDO advises the governments of the interested countries to adhere to the following principles:

- appropriate support to currently operating clusters that have a significant unrealized potential;
- promoting the growth of private business with a simultaneous poverty reduction;
- encouraging collective efficiency through joint actions of cluster stakeholders;
- introduction of mechanisms for effective

cluster governance. The effective cluster governance is based on planning and coordination of joint actions to build consensus between all the stakeholders with the aim of providing a high level of performance [25].

The main factor of cluster functioning is ensuring constructive cooperation among all its participants. This could be expressed as follows: public authorities are fully configured to the needs of the enterprises; scientists are in a continuous dialogue with business; educational institutions communicate with the enterprises and determine the best ways to provide them with labor resources having the necessary skills and competencies; investors, including, inter alia, the Government, interact with the enterprises to provide the necessary capital.

Thus, the state plays the leading role in cluster formation and development, which consists in establishment of a continuous and clearly defined interaction between regional and central executive authorities, scientific and educational institutions and business, financial institutions and all other cluster stakeholders as regards the necessary measures to introduce a cluster form of business organization.

#### 4 The Practical Aspect

Any scientific paradigm becomes justified if it is possible to put it into practice; and it is practice that can act as a criterion of the paradigm veracity.

In Ukraine, industrial cluster formation is at an early stage. As a rule, the registered Ukrainian clusters are created through a prescriptive top to down process. They are formalistic and essentially are not clusters. There is no state policy of cluster development in the country. At the same time, as evidenced by world experience, to increase the industrial production of Ukraine requires strengthening of domestic producers' competitiveness, which is hard to do in the current context without forming clusters.

Let us consider machine-building which is traditionally more advanced among the Ukrainian industries. Calculations of 'clustering potential' showed that a number of the Ukrainian regions possesses the necessary potential for creation of clusters in different segments of machine-building. The index was determined by formula (1):

$$LQ = (Emp_{ig} / Emp_g) / (Emp_{iU} / Emp_U) \quad (1)$$

where LQ is cluster potential coefficient,  
Emp<sub>ig</sub> – the number of employed in g-segment of

machine-building in i-region,

Emp<sub>g</sub> – the number of employed in g-segment of machine-building in Ukraine,

Emp<sub>iU</sub> – the number of employed in i-region,

Emp<sub>U</sub> – the number of employed in Ukraine.

The value of LQ>1 indicates the presence in the region of the preconditions for forming a sectoral machine-building cluster, since the level of labor resource concentration in this segment of machine-building in the region exceeds the level of labor resource concentration in this segment of machine-building in Ukraine. This methodology is used by the European Cluster Observatory to identify the main development areas of sectoral clusters in the EU-28 [8].

The regional clustering potential in the segment of production of machines and general purpose equipment is as follows: Sumy region (LQ = 6.0; pumps and compressor equipment); Mykolaiv region (LQ = 5.6; compressor equipment); Kirovohrad region (LQ = 2.2; hydraulic and pneumatic equipment); Vinnytsia region (LQ = 1.6; hydraulic and pneumatic equipment); Rivne region (LQ = 1.6; cranes and valves), and Kharkiv region (LQ = 1.2; engines and turbines) [6]. However, today, in fact, there are no organizational forms of clusters in the specified segments of the machine-building industry.

Simultaneously, it should be noted that the criterion for cluster formation should be not only the clustering potential of the 'n'-segment of production in one or another region, but, above all, the public authorities' strategic planning (choice) of another cluster creation according to production priority, taking into account the most favorable (in economic and social terms) characteristics of its location. Such an approach requires significant investments; therefore, in the first stage, it is more efficient to implement cluster policy on the clustering potential principle.

Using the example of Kharkiv region, let us consider the possibilities of forming a machine-building cluster. Kharkiv region is known to encompass the key enterprises of power engineering. This region has sufficient capacities to increase the competitive advantage and aid the development of the machine-building complex. Realization of this project is certain to contribute to the formation of a powerful socio-economic base that would provide more comfortable conditions for work and life in Kharkiv region.

Within the framework of this study, we have analyzed the existing production enterprises belonging to various industries of Slobozhansky region. Today, the region's most productive

machine-building enterprise is a world-famous JSC “Turboatom”, around which it is proposed to form a separate cluster group. JSC “Turboatom” refers to the largest enterprises of the world to design and produce steam and hydro turbines, hydraulic gates for hydroelectric and hydro accumulating power plants, and other types of power engineering equipment. Its production

capabilities allow the enterprise to produce annually steam and hydro turbines with a total required capacity of 8 mln. kW and 2 mln. kW, respectively. Net revenue from the sale of the products of JSC “Turboatom” for the period from 2007 to 2020 amounted to about UAH 22.8 billion or \$ 1.54 billion (see Fig. 1).

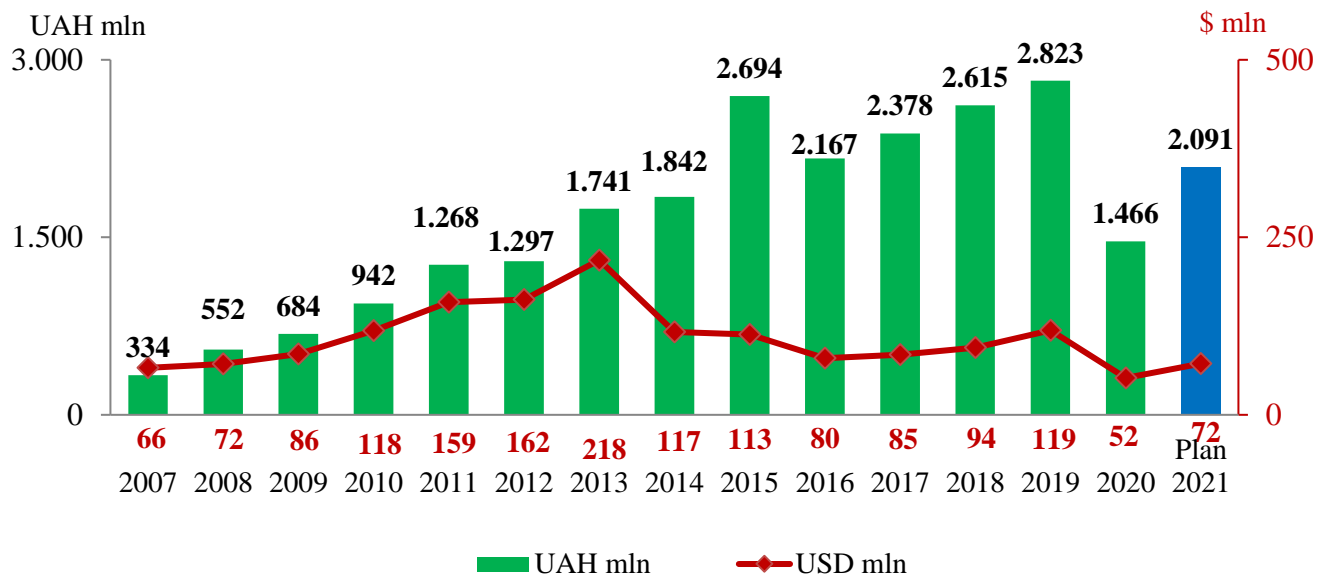


Fig. 1: Net revenue from the sales of products of JSC “Turboatom” in 2007 – 2020

The combination of the machine-building potential of Slobozhansky region with the organizational actions of public authorities seems practicable to form an appropriate cluster, taking into account the interests of both its participants and the territorial community. The model of Slobozhansky machine-building cluster for production of power plant equipment is presented in Figure 2.

Within Slobozhansky region, JSC “Turboatom” cooperates with its allied enterprises and raw material suppliers, namely: State Enterprise “Plant “Electrovazhmash”, Kharkiv; LLC “Metinvest-SMTs” (subsidiary), Kharkiv region; UA LLC Firm “KODA”, Kharkiv region; PJSC “Energomashspetsstal”, Donetsk region; CJSC “Novokramatorsk Machine-Building Plant”, Donetsk region; LLC “Sumy-Electrod”, Sumy region.

Also, JSC “Turboatom” cooperates with more than twenty scientific and designing institutions, higher educational establishments, vocational and secondary education schools within the framework

of a variety of research, design and technology, and educational programs. The main financial intermediaries that deliver a wide range of banking services for JSC “Turboatom” are the state banks JSC Ukrgasbank and JSC Ukreximbank.

Thus, a high-tech scientific and production cluster is being formed, which is strategically important for both the region and the country, offering prospects of a number of synergetic effects, namely: generation of new knowledge and technologies; an increase in investment funds; improvement of the efficiency of infrastructure facilities utilization (transport, communications, financial intermediation, etc.); reduction of transaction costs; rising of specialization and cooperation levels; and a growth of production concentration.

The cluster policy to be pursued by public authorities consists in the activities of public administration and local self-government bodies aimed at solving the tasks of socio-economic development of the regions and improving the efficiency of domestic producers through realization

of a system of measures to promote clusters. It follows from the definition that the improvement of domestic producers' efficiency is supposed to contribute to increasing the competitiveness of the main cluster stakeholders. As has been demonstrated internationally, in the conditions of

the reform of local self-government and decentralization of power, the cluster approach, as one of the factors of promoting regional socio-economic development, should become an important element of public administration.

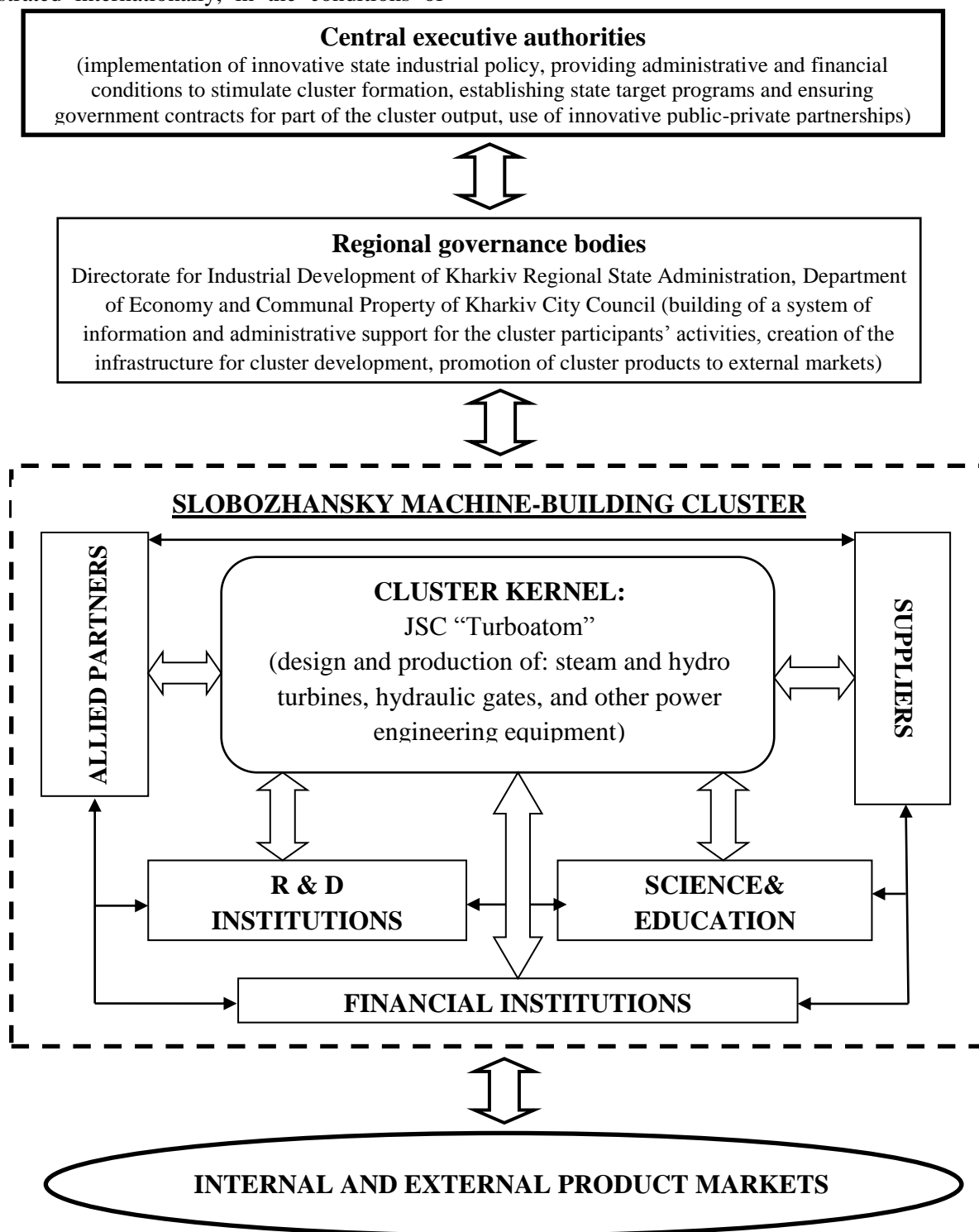


Fig. 2: The model of Slobozhansky machine-building cluster for production of power plant equipment

As part of the cluster approach, the concept of innovative public-private partnership (PPP) deserves to play a special part, since it helps shifting the focus of public administration from supporting individual projects or firms to a more systematic understanding of the innovation process, formation and strengthening of relations between its participants. Therefore, during the formation of the country's innovation environment, it is important to apply partnership approach, in particular public-private partnerships which involve representatives of both the authorities and the private sector [27]. In this case, PPP is regarded as a certain mechanism for forming an innovation system. This cooperation, in particular, can address the issue of establishing and strengthening science-production relations, especially when the links within the scientific sphere (represented in most countries by universities, research centers, and production enterprises oriented towards innovative technology) are weak [21]. Under such conditions, central and regional bodies of power can be not only indirect, but also direct cluster participants.

Public authorities' creation of the environment, required for cluster formation and development, should also provide for the planning of regional socio-economic development using the cluster approach, application of the target approach, ensuring state contracts for the supply of cluster products, organizing the infrastructure for cluster development (special economic zones, technoparks, business incubators, venture companies, development banks, etc.).

## 5 Conclusions

1. It has been established that in modern conditions the restoration of high-tech industries, which traditionally functioned in Ukraine and had a broad geography of their product marketing, becomes one of the main factors in building a powerful self-sufficient economy. The industrial restoration will contribute to solving many social problems facing the country, namely: unemployment, impoverishment of a large share of the population, lack of funds to finance public goods (primarily education, science, health care). It is shown that clustering of industry, which is possible due to effective governance by public authorities, should become one of industrial policy instruments. The efficiency of governance can be provided by implementing a systemic transition from the libertarianism, which is the ideological platform of the present Ukrainian authorities, to the standing of

a reasonable protectionism. It is under these conditions that public administration begins prioritizing public interests, a component of which is the protection of the interests of domestic commodity producers, and simultaneously addressing the problems of inequality in the distribution of income, attainment of social justice and worthy conditions for human development.

2. The conducted research shows that the use of the cluster approach to implementation of industrial policy not only allows effecting the structural changes in the country's economy, promoting innovative and investment-led development of production, improving the efficiency of cluster enterprises, but also accelerates the socio-economic development of the regions.

3. We regard the cluster to be a dynamic network of compactly localized enterprises that ensure the achievement of the set goals for both the focal enterprise (cluster kernel) and a number of related enterprises (allied partners, suppliers), financial institutions, educational and scientific establishments, etc. With that, there may be a fairly large number of industrial clusters in the region that are at different stages of development, have different structure, composition of components and scope of activity. However, these clusters will be closely interconnected, when, for example, enterprises which make up the kernel of one cluster act as suppliers of products for enterprises of other clusters.

4. The model of the formation of Slobozhansky machine-building cluster is proposed, the main catalyst of which is public authorities. Their role is to create the necessary conditions for an accelerated cluster formation and introduction of measures for its continuous development (modernization of cluster enterprises, enhancement of the role of scientific and technological factors, ensuring productive interaction of cluster stakeholders with financial institutions).

5. The clustering of the economy should become an integral part of the implementation of state target programs and national projects, through which the state provides the normative and legal, organizational, financial, and technological support for all cluster stakeholders. A combination of such programs and projects determines the basic points of the country's socio-economic development. In particular, implementation of the program for providing the country's business complex with domestic products will allow, due to the synergy of actions intended to increase the efficiency of the sectors of the economy and the growth of industrial production, increasing the self-sufficiency of the

Ukrainian economy and strengthening its production potential.

#### References:

- [1] Analytical Center Industry4Ukraine, Clusters are like drivers for development and anti-crisis events, <https://www.industry4ukraine.net/digest-5/#form> [in Ukrainian].
- [2] Barsukov D.P., *Formation of an industrial cluster: theoretical and methodological aspects* : monografi`ya. SPb.: SPbGUKiT, 2014 [in Ukrainian].
- [3] Brown R., *Clusters, Supply Chains and Local Embeddedness in Fyrstad*, European Urban and Regional Studies, 2006
- [4] Deineko L.V., *Industry Development for Growth and Renewal of the Ukrainian Economy: Scientific and Analytical Report*, Kyiv, 2018.
- [5] Dejneko L.V., *Promotion of promises for securing growth and development of the Ukrainian economy: naukovu-anali`tichna dopovi`d`, K*, 2018 [in Ukrainian].
- [6] Engineering industry in Ukraine: potential and opportunities for export expansion until 2021 (analytical report), [in Ukrainian].
- [7] Enright M. J. *Survey on the Characterization of Regional Clusters: Initial Results*, Working Paper, Institute of Economic Policy and Business Strategy: Competitiveness Program, University of Hong Kong, 2000.
- [8] European Cluster Observatory. Emerging Industries mapping. <http://www.emergingindustries.eu/maps/europe/all/e-co.aspx>. [2021.04.29].
- [9] European Cluster Organisation Directory, <http://www.clusterobservatory.eu/index.html>
- [10] Guidelines for Cluster Development A Handbook for Practitioners <https://www.enterprise-development.org/wp-content/uploads/GuidelinesforClusterDevelopment.pdf>
- [11] Istomina L., 2014. *Clusters: Lessons from the German Experience*, <https://clusterland.by/2019/11/13/klastery-uroki-nemeczkogo-opyta/> [in Russian].
- [12] Ketels Ch., Lindqvist G., Sölvell Ö. *Strengthening Clusters and Competitiveness in Europe. The Role of Cluster Organizations*, 2012.
- [13] Kizim M.O., *Industrial policy and clustering of Ukraine's economy: monografi`ya*. Kh.: VD «I`NZhEK», 2011
- [14] Kuznetsov, A., Kavun, S., Smirnov, O., Babenko, V., Nakisko, O., Kuznetsova, K. (2019). Malware Correlation Monitoring in Computer Networks of Promising Smart Grids. 2019 IEEE 6th International Conference on Energy Smart Systems, ESS 2019 – Proceedings, No. 8764228, pp. 347-352. <https://doi.org/10.1109/UKRCON.2019.8879793>
- [15] Mamonova V.V, Kucz Yu. O., Makarenko O. M., *Formation of territorial clusters as a tool of regional development: nauk. Rozrobka. K.*: NADU, 2013 [in Ukrainian].
- [16] Marshall A. *Principles of economic science* M.: Progress, 1993 [in Russian].
- [17] Nykyforuk O.I., Gusev Yu.V., and Chmyrionova L.Yu. *Public-private partnership: an institutional environment for developing and modernizing of Ukraine's infrastructure*. Economics and Forecasting, 2018.
- [18] Porter M., *Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition*, ISC White Paper, 2007.
- [19] Ramazanov, S., Babenko, V., Honcharenko, O., Moisieieva, N., Dykan, V. Integrated intelligent information and analytical system of management of a life cycle of products of transport companies. *Journal of Information Technology Management*, 2020, 12(3), 26-33. <https://doi.org/10.22059/jitm.2020.76291>
- [20] Rudneva P. S.. *Experience in creating structural clusters in developed countries*, Ekonomika regiona. vol 18. Ch. 2 (desember) 2007, <http://journal.vlsu.ru>. [in Russian].
- [21] Scherrer W. *The role of public private partnerships at the regional level of government and regional innovation policy in particular*, 2011. [http://hum.ttu.ee/failid/HKAC%202011/HKAC\\_Scherrer.pdf](http://hum.ttu.ee/failid/HKAC%202011/HKAC_Scherrer.pdf)
- [22] Sölvell Ö., *Clusters – Balancing Evolutionary and Constructive Forces*, second edition, Ivory Tower Publishers, Ödeshög. 2009.
- [23] Sölvell Ö., Lindqvist G., Ketels Ch., *The Cluster Initiative Greenbook*, Ivory Tower, Stockholm, 2003.
- [24] State Statistics Service of Ukraine [http://www.ukrstat.gov.ua/express/expres\\_u.html](http://www.ukrstat.gov.ua/express/expres_u.html)
- [25] The Unido Approach to Cluster Development. Key Principles and Project Experiences for Inclusive Growth <https://www.unido.org/sites/default/files/2014>



-

01/UNIDOS\_CLUSTER\_APPROACH\_0.PD  
F

- [26] Tishhenko A.N., *Theory and Practice of Cluster Organization: Foreign Experience*, Problemy ekonomiky, № 2, 2010, pp 9–15 [in Russian].
- [27] Todorova O. L., Cluster approach as a public tool for implementing state policy of regional development [Tekst] : avtoref. dys. kand. nauk z derzh. upr. Nats. akad. derzh. upr. pry Prezidentovi Ukrainy, Odes. rehion. in-t derzh. upr. - Odesa 2016 [in Ukrainian].
- [28] Wickham M. 'Regional economic development: exploring the 'Role of Government' in Porter's Industrial Cluster Theory', paper presented at the Beyond clusters: current practices & future strategies: CRIC Cluster Conference, June 30 - July 1, 2005, <https://eprints.utas.edu.au/9541/>
- [29] World Bank, Cluster for Competitiveness A Practical Guide & Policy Implications for Developing Cluster Initiatives, 2009.

#### **Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)**

Kateryna Khodiakova has created models of forming Slobozhansky machine-building cluster. Mykola Kovalenko has designed the methodology.

Natalia Ryzhikova Olha Korneva hamy carried out the applying a cluster approach and implemented its to solving regional socio-economic problems.

Nadiia Myrna and Sergiy Kalinichenko have been responsible for the statistics and analitics.

#### **Creative Commons Attribution License 4.0 (Attribution 4.0 International, CC BY 4.0)**

This article is published under the terms of the Creative Commons Attribution License 4.0

[https://creativecommons.org/licenses/by/4.0/deed.en\\_US](https://creativecommons.org/licenses/by/4.0/deed.en_US)