Kyiv National University of Trade and Economics
Department of international economic relations

FINAL QUALIFYING PAPER
On the topic:
"ECONOMIC CLUSTERS AS A TOOL TO IMPROVE THE

COMPETITIVENESS OF THE NATIONAL ECONOMY"

(Based on the data of Ukrainian Chamber of Commerce and Industry)

Student of the 2nd year, group 2am, speciality 051 «Economy», specialization «International economy»   _____   Adelpour Ali

                                                        Dyachenko Olga

Scientific adviser
Candidate of Sciences (Economics),   _____
Associate Professor

Manager of the program
Candidate of Sciences (Economics),   _____   Kravets Kateryna
Associate Professor

Kyiv 2018

Київський національний торговельно-економічний університет
Кафедра міжнародних економічних відносин

ВИПУСКНА КВАЛІФІКАЦІЙНА РОБОТА

на тему:
«економічні кластерів як інструмент підвищення
конкурентоспроможності національної економіки»
(на матеріалах торгово-промислова палата України)

Студента 2 курсу, 2ам групи,
спеціальності 051 «Економіка»   Аделпур Алі
спеціалізації «Міжнародна економіка»

Науковий керівник
канд. екон. наук,   Дьяченко
доцент   Ольга Володимирівна

Гарант освітньої програми   Кравець
канд. екон. наук, доцент   Катерина Петрівна

Київ 2018

Final qualifying paper: 102 p., Illustrations - 8, Tables - 16, appendices – 0

References - 62

The object of investigation is the process of economic clusters as a tool to improve the national economy.

The subject of investigation the theoretical and methodological aspects and strategy of economic clusters in national economy.

Enterprise that is a basis for writing master diploma work is Ukraine Chamber of commerce

Purpose of final qualifying work is justification of ways to improve the national economy by economic clusters.

Task: Define essence and main goals of economic clusters; analyze of economic cluster in Ukrainian economy; Identify methodical tools for conducting Clusters in national economy; Define essence of clusters as points of growth of the domestic market; The content of the contradictions between the components of cluster systems; Concept of cluster efficiency; Analysis of cluster programs in developed countries; The liberal and dirigiste models of cluster policy; Modern European and European initiative initiating cluster development and the internationalization of clusters; The deterioration of the financial condition of enterprises in Ukraine; Features of the development of clusters in Ukraine; The overall assessment of the level of cluster development in the regions of Ukraine.

Methods Of Investigation: axiomatic (basing on existing general theoretical positions); analysis and synthesis (researching the methodological approaches to assess the effectiveness of the import substitution strategy); method of comparison and generalization (analysis of financial and economic activity of the clusters); methods of economic and mathematical modeling (evaluation of the effectiveness of the proposed measures); expert assessment (determining the importance of the rating criteria of suppliers).

In the introduction to the work the actuality and the practical value of the chosen topic are explained; the purpose and the urgency of its practical significance are formulated, the research object, the subject of research and its tasks are represented.

Also methodological and theoretical part of the study, methods that were used in the work are descried.

In the first part of work "Theoretical approaches to the study of economic clusters as a tool to improve the competitiveness of the national economy" the essence of economic cluster is defined. There is described the mechanism of development of clusters in national economy. The methodological approaches of economic clusters to improve the competitiveness the national economy.

In the second part of the work "Functioning of economic clusters as a tool to improve the competitiveness of the national economy" the financial and economic activity of clusters in Ukraine are analyzed, the analysis of foreign clusters are provided. The diagnoses of competitiveness of clusters are assessed.

In the third part of the work Recommendations for improving economic clusters as a tool to improve the competitiveness of the national economy". The development of models for economic clusters are justificated. Institutional support for the development of economic clusters are planned. Evaluation of the effectiveness in future including the proposed measures of economic clusters were provided.

Conclusions and proposals contains theoretical generalization and ascertain solutions to the given scientific problem, the essence of which is in the comprehensive study, assessment and effective management of economic clusters as a tool to improve the competitiveness of the national economy.

ABSTRACT

Adelpour A. Economic cluster as a tool to improve the competitiveness of the national economy

Qualifying work for obtaining a master's degree in specialty 051 "Economics", specialization "International Economics". Kyiv National University of Trade and Economics, 2018.

In the final qualification work the essence and main goals of Economic clusters are determined. The retrospective analysis of Economic clusters in national economy conducted. The methodological approaches to the clusters and their role to improve the national economy is presented.

The essence of economic cluster is defined. There is described the mechanism of development of clusters in national economy. The methodological approaches of economic clusters to improve the competitiveness the national economy.

the financial and economic activity of clusters in Ukraine are analyzed, the analysis of foreign clusters are provided. The diagnoses of competitiveness of clusters are assessed.

The development of models for economic clusters is justificated. Institutional support for the development of economic clusters is planned. Evaluation of the effectiveness in future including the proposed measures of economic clusters was provided.

Key words: Economic cluster, Clusters competitiveness, Improve the national economy, competition, competitiveness, foreign and domestic economic activity

CONTENS

INTRODUCTION

The urgency of the problem that led to the choice of research topic is among the modern phenomena of the world economy, clustering is one of the leading and effective directions of the internal socio-economic policy of the state, aimed at active economic development of regions and industries in a new, more advanced form of economic cooperation. The process of clustering industry in Ukraine is due to the need to implement sectoral, regional and national economic and public interests of economic entities of the country and the introduction of modern European forms of economic interaction and development.

The cluster approach to the formation of economic policy in the countries of the world has been used since the 1980s – 1990s. Today it is not only a powerful means of achieving the goals of the economic growth, its structural changes, modernization, but also a tool for regional and innovative development, improving the competitiveness of enterprises in the domestic and foreign markets. economical policy based on the cluster approach is classified as a cluster policy of the state and is effectively applied by the leading countries of the world. At the same time, the clustering process, in ensuring the economic security of the state, is intensified by the dangers and threats that must be identified in order to identify and apply effective mechanisms to neutralize them.

The issues of economic clusters of the state and the development of its provision mechanism have been studied in detail in numerous works of outstanding domestic and foreign scientists: V. Alkema, A. Arefieva, Y. Babanova, I. Belousova, E. Bobrova, S. Borisenko, S. Varnaliya, T. Vasiltsyva, V. Vlasyuk, V. Heeets, V. Grushko, S. Grunina, M. Denisenko, N. Yermoshenko, S. Zivko, A. Zakharova, M. Zubko, T. Ivanyuyy, A. Kiriyenko, M. Kizima, A. Kirichenko, T. Klebanov, G. Kozachenko, M. Kopitko, V. Krutova, M. Kurkina S. Lapteva, N. Litvin, Yu. Lisenko, V. Loyko, A. Lyashenko, I. Migus, V. M untlyana, A. Nikitina, I. Otenko, I. Petrova, S. Petrokopivnogo, V. rokocut, V.

Sidaka, A. Sukhorukov, V. Terekhova, V. Tokara, Yu. Kharazishvili, S. Shkarlet, L. Shemaeva and others.

The object of investigationis the process of economic clusters as a tool to improve the national economy.

The subject of investigationisthe theoretical and methodological aspects and strategy of economic clusters in national economy.

Enterprise that is a basis for writing master diploma work is Ukraine Chamber of commerce

Purpose of final qualifying work is justification of ways to improve the national economy by economic clusters.

Task: Define essence and main goals of economic clusters; analyze of economic cluster in Ukrainian economy; Identify methodical tools for conducting Clusters in national economy; Define essence of clusters as points of growth of the domestic market; The content of the contradictions between the components of cluster systems; Concept of cluster efficiency; Analysis of cluster programs in developed countries; The liberal and dirigiste models of cluster policy; Modern European and European initiative initiating cluster development and the internationalization of clusters; The deterioration of the financial condition of enterprises in Ukraine; Features of the development of clusters in Ukraine; The overall assessment of the level of cluster development in the regions of Ukraine.

Methods Of Investigation:axiomatic (basing on existing general theoretical positions); analysis and synthesis (researching the methodological approaches to assess the effectiveness of the import substitution strategy); method of comparison and generalization (analysis of financial and economic activity of the clusters); methods of economic and mathematical modeling (evaluation of the effectiveness of the proposed measures); expert assessment (determining the importance of the rating criteria of suppliers).

The final qualifying paper consists of three parts.

In the first part of work "Theoretical approaches to the study of economic clusters as a tool to improve the competitiveness of the national economy" the

essence of economic cluster is defined. There is described the mechanism of development of clusters in national economy. The methodological approaches ofeconomic clusters to improve the competitiveness the national economy.

In the second part of the work "Functioning of economic clustersas a tool to improve the competitiveness of the national economy" the financial and economic activity of clusters in Ukraine are analyzed, the analysis of foreign clusters are provided. The diagnoses of competitiveness of clusters are assessed.

In the third partof thework Recommendations for improving economic clusters as a tool to improve the competitiveness of the national economy".The development of models for economic clusters arejustificated. Institutional support for the development of economic clustersare planned. Evaluation of the effectiveness in future including the proposed measures of economic clusters were provided.

Conclusions and proposals contains theoretical generalization and ascertain solutions to the given scientific problem, the essence of which is in the comprehensive study, assessment and effective management of economic clusters as a tool to improve the competitiveness of the national economy.

PART 1
THEORETICAL APPROACHES TO THE STUDY OF ECONOMIC CLUSTERS AS A TOOL TO IMPROVE THE COMPETITIVENESS OF THE NATIONAL ECONOMY

1.1. Essential and features of Economic cluster as a tool to improve the competitiveness of the national economy

Clusters in foreign and domestic literature are devoted to a large number of studies. The reason is that clusters were formed long ago, often, naturally, and they were studied both as an economic phenomenon and as a measure of politics. Works devoted to the study of innovative clusters are both theoretical and applied. Applied research is based, as a rule, on polls of different scale and branch specialization. In this regard, taken in the dynamics, they are not quite comparable, but nevertheless provide interesting material from the point of view of changing the view of researchers and officials on the phenomenon of innovative clusters.

This information is supplemented by various case studies detailing the development and performance of certain clusters. Accordingly, there are more popular and studied clusters and examples. These include the Silicon Valley and Road 128 near Boston in the US, the German clusters of Innoregio and Bioregio, as well as the poles of competitiveness in France. The results of research available to date do not give an unambiguous answer to the question of what a "model" cluster and governmental measures of its support should be. At the same time, approaches and methods for assessing clusters and cluster initiatives can be considered as the most developed and useful for Ukraine. These monitoring and evaluation tools can be used to determine the goals, ways of development and efficiency of not only clusters but also, in part, technological platforms.

To understand essence of business clusters, it's necessary to mention M.Porter. One of the most popular definitions is Porter's theory. [6]

According to his theory, the cluster is a group of geographically neighboring interrelated companies (suppliers, manufacturers, etc.) and related organizations (educational institutions, government bodies, infrastructure companies) operating in a certain sphere and complementing each other.

Michael Porter considered the competitiveness of a country should be viewed through the prism of international competitiveness not of its individual firms, but of clusters of associations of firms from different industries, and the ability of these clusters to use internal resources effectively of fundamental importance. He also developed a system of determinants of competitive advantage of countries that called the "competitive diamond" (or "diamond").

```
          ┌─────────────────┐
          │ Firm Strategy,  │
          │ structure, and  │
          │    rivalry      │
          └─────────────────┘

┌──────────────────┐          ┌──────────────────┐
│ Factor conditions│          │ Demand conditions│
└──────────────────┘          └──────────────────┘

          ┌─────────────────┐
          │   Related and   │
          │   supporting    │
          │   industries    │
          └─────────────────┘
```
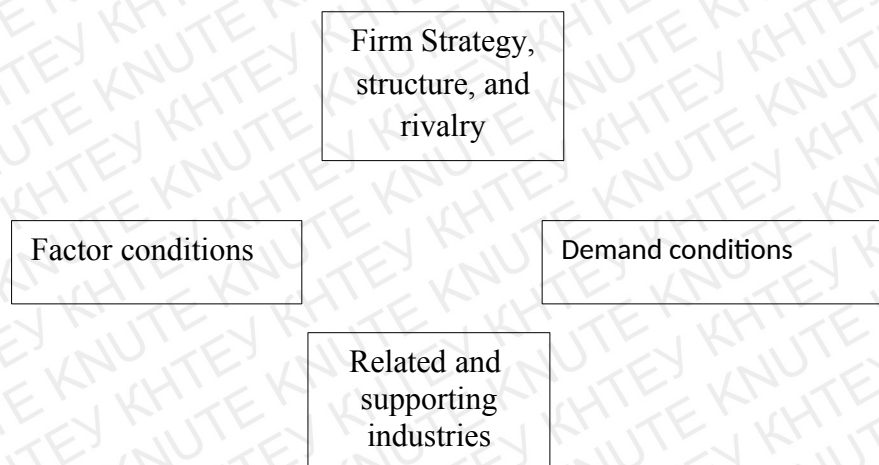
Figure 1.1 competitive diamond.

Source : [6]

In the number of major groups of such advantages. These include:

- Factor conditions: human and natural resources, scientific and information potential, capital, infrastructure, including quality of life factors;

- Conditions of internal demand (demand conditions): quality of demand, conformity to tendencies of development of demand in the world market, development of volume of demand.

- Related and supporting industries (clusters of industries): the spheres of receipt of raw materials and semi finished products, the areas of equipment supply, the use of raw materials, equipment, technologies.

- Firm Strategy, structure, and Rivalry It including goals, strategies, ways of organization, management of firms, intra-industry competition.

Perhaps, Porter's main thesis is that perspective competitive advantages are created not from outsid, but in domestic markets.

Over time, effectively operating clusters cause large investments and close attention of the government, the cluster becomes something more than a simple sum of its individual parts. The center of the cluster is often several powerful companies, while they remain competitive. This makes the cluster different from the cartel or financial group. Concentration of rivals, their customers and suppliers contributes to the growth of effective specialization of production. At the same time, the cluster gives work to many small firms and small enterprises. In addition, the cluster form of organization leads to the creation of a special form of innovation - the "total innovative product". Integration into a cluster based on vertical integration does not form a spontaneous concentration of various scientific and technological inventions, but a certain system of dissemination of new knowledge and technologies. At the same time, the most important condition for the effective transformation of inventions into innovation, and innovation in competitive advantages, is the formation of a network of stable links between all the participants in the cluster.

Thus, cooperation is becoming increasingly necessary, but it also carries a certain danger - the possibility of losing independence (the ability to develop an independent line of behavior on the market, to develop new products, new technologies, etc.).

That is why in some countries in the last decades effective "cluster strategies" that are built on the centre of business activity that have already proved their strength and competitiveness in the world market have acquired such significance. Governments focus on supporting existing clusters and creating new networks of companies that have not previously been in contact with each other. The state thus not only promotes the formation of clusters, but also itself becomes a participant in the networks. Cluster strategies are widely used in European countries.

In his research, Michael Porter analyzed the competitive capabilities of more than 100 industries in ten countries. It turned out that the most competitive multinational companies are usually not scattered haphazardly in different countries, but tend to concentrate in one country, and sometimes even in one region of the country. This is explained by the fact that one or more firms, achieving competitiveness in the world market, spreads its positive influence on the nearest environment: suppliers, consumers and competitors. And the success of the environment, in turn, has an impact on the further growth of the company's competitiveness.

For example, in Germany, since 1995, the program for the creation of biotechnological clusters Bio Regio. In the UK, the government defined areas around Edinburg, Oxford and South East England as the main regions for the location of biotechnology firms. In Norway, the government encourages cooperation between firms in the "marine economy" cluster. In Finland, a timber cluster is developed, which includes the production of wood and wood products, paper, furniture, printing and related equipment. The close interaction of the firms in this cluster in the dissemination of knowledge provides them with competitive advantages over the main trading contenders. According to experts, Finland leads in terms of both research and technological cooperation.

However, the concept of clusters is multifaceted, and depending on which set of key characteristics is chosen, their typology will depend. Like technological platforms, clusters as a measure of politics were first launched in Europe. These were called the first generation clusters. The meaning of the cluster policy was to optimize production processes within the technological chain, remove unnecessary transaction costs and to reorient the supporting infrastructure so that it most cost-effectively serviced the production itself. Clusters of the second generation are innovative clusters. The purpose of the innovation cluster is to isolate certain technological competences, which are the ability to use technology and solve a certain class of production tasks, and this allows make changes in the sectors where new competencies are transferred.

There is another essential aspect of considering clusters, depending on the nature of their origin. They can be naturally formed or created as a result of external

measures of influence, for example, certain incentives from the government. Naturally formed clusters are those that emerged as a result of market forces, in which case the state performs a soft regulatory function, which in particular, does not presuppose the establishment of priorities, examples of such countries are the United States and the Netherlands. If the cluster is formed on the initiative of the state, then priorities, goals, tasks are set, and it also establishes who will be among the main actors and stakeholders. After determining all these parameters, as a result of the dialogue between the state, science, and representatives of the business community, the development of a cluster begins, which in the future should already pass under the laws of the market with minimal state intervention.

Here wanted to add more information about the features of business cluster in USA. As already mentioned, the United States is distinguished by the fact that the most successful clusters are naturally occurring. Therefore, attention is focused on what local authorities can and should do to support and develop these naturally emerging entities. However, over time, the federal government's attitude toward the clusters has evolved, and special measures of cluster policy have been introduced.

A study of five clusters in the United States, conducted in 2001, showed that regions are not the same in terms of economic development and therefore their innovative results are also very different, in terms of wages, in terms of the number of jobs created.

At the same time, high-tech clusters constitute a small fraction of existing clusters, but their presence is of great importance. They provide economic growth, which must be accompanied by a rise in wages, as growth is characterized by rising prices. In general, it was concluded that there can't be a universal regional policy, each region must develop its own unique set of measures. Indeed, the development of cluster initiatives in the US went mainly at the level of state governments. To encourage clusters, measures such as a tax credit for research and development, research grants, low-interest loans, and free retraining of personnel are used. However, recent studies conducted in the United States call for the federal government to pay more attention to the development of innovative clusters

as mechanisms for accelerating the output of high-tech products to markets and this, according to researchers, should improve the efficiency of spending budget funds. Currently, according to the well-known economist M. Porter, US federal programs are "often fragmentary, overlapping and inefficient."

In 2012, the US National Research Council published a report where much more attention was paid to cluster policy and it was emphasized not only as a measure of regional development. The report noted that the emergence of cluster policy at the federal level in the US was a reaction to the 2008 crisis.For the first time, the concept of cluster policy was included in legislation, namely the America COMPETES Act, in 2010. In particular, the Department of Trade of the USA imposes the allocation of competitive grants for innovative regional clusters, as well as the creation of research and information programs for the development of regional innovation strategies.

At present, the programs of innovative cluster development are implemented by the Ministries of Energy, Trade, Defence, Agriculture, and Education.One of the approaches that are being developed at the moment is the unification of efforts of several agencies to form and support specific industrial clusters.For example, the Small Business Administration, the National Institute of Standards and Technologies, the Administration for Economic Development, the National Science Foundation, thecenter for the Development of Education have joined the initiative of the US Department of Energy to create "energy innovation hubs", which are regional innovation clusters in the field of solar energy, structures and nuclear power.Another similar initiative began in 2009: the Small Business Administration is working with the Ministry of Defence to launch a cluster of robotics in Michigan, Virginia and Hawaii. In turn, the National Science Foundation of the United States plans to invest 12 million Dollars. To promote the "Innovative Ecosystem of NSF", which supports regional innovation clusters that help teachers and students to commercialize their innovative developments, form alliances with industry and create start-ups. At the same time, most of the initiatives of federal agencies are so new that they are too early to evaluate.

Unlike the US, in Europe, always attached great importance to cluster policy at the federal level, and there measures to support clusters have been studied more thoroughly. European studies of clusters are diverse and sometimes very detailed, detailed consideration at the level of individual cases. In 1999, the OECD conducted a large-scale study on the development of clusters in different countries. It showed that, in the country context, the concept of a cluster is very different. They can be understood as completely different formations, from innovative systems to chains of creation of added value. The study revealed that clusters are created basically "from the bottom up", i.e. are initiatives on the ground. Their appearance is caused by market demand. An important aspect of the study was also the determination of which policies can be applied at the cluster level to respond to market failures and systemic problems.

Based on the results of the analysis, three main conclusions were drawn about what the state cluster policy should be: clusters should not be created at the will of the state, but should be the result of market forces; State policy should not be aimed at subsidizing industry or companies; State policy should avoid direct intervention and operate mainly with indirect instruments.

A later study, conducted in 2012 on the example of 13 agro-food and agro-clusters, refuted the conclusion that clusters are created proactively, "from below" and policy measures should be supportive, not proactive. It was concluded that the self-organization of companies, universities and other structures is rare, and more common practice is to initiate clusters at the state and regional levels. Moreover, the role of state cluster policy only increases.

Also, wanted to mention that two aspects should be highlighted: monitoring the results of clusters, monitoring the effectiveness of cluster development measures, including such as the IRTP and the work of development institutions. This is applicable to both clusters and TPs, and it is important to determine those measures that give the highest result.

It should be noted that cluster development of the economy is a certain tool of business. A market-oriented society forms rules for the activities of its economic entities through laws, relationships, the banking sector, support institutions, etc.

Therefore, the cluster existing within the framework of these rules is nothing more than a specially organized space that allows successful development of large companies, small enterprises, suppliers (equipment, components, specialized services), infrastructure facilities, research center, universities and other organizations. At the same time, it is important that the cluster achieves, first of all, a synergetic effect, since the participation of competing enterprises becomes mutually beneficial.

Clusters can be identified as a group of firms participating in a particular market, united on the basis of long-term contracts in order to effectively use resources and specific advantages for joint implementation of entrepreneurial projects. Using mainly horizontal connections, specialization and complementing each other, they get the opportunity to achieve higher results.

A distinctive feature of the cluster is targeted entrepreneurial activity. Within the cluster, not only production, but also innovative business, integrated product quality management, and service are combined. Combining the efforts of entrepreneurs, management bodies, investment and innovation actors in a particular area, gives significant advantages in competition, contributes to the rationalization of production and market processes, the redistribution of risks and the implementation of flexible policies necessary in a rapidly changing market environment.

The introduction of cluster technologies of business uniting promotes business activity growth, improvement of the investment climate in the country's region, development of social, economic, information and integration systems, which in turn gives an impulse for more intensive development of entrepreneurship, attraction of investments and economic growth of territories.

Finally the characteristic features of clusters can be reduced to 12 indicators: opportunities for research and development; qualification of the workforce; development of labor potential; the proximity of suppliers; availability of capital; access to specialized services; relations with equipment suppliers; associated structures; intensity of network formation; entrepreneurial energy; innovation and training; collective vision and leadership.

The most developed clusters have five principal characteristics, the first three of which can be considered as starting prerequisites for the formation of clusters:

1. The presence of competitive enterprises. As indicators of competitiveness can be considered: a relatively high level of productivity of companies and sectors included in the cluster; high level of export of products and services; high economic performance of companies (such as profitability, shareholder value).

2. The presence in the region of competitive advantages for cluster development. For example, advantageous geographical position; access to raw materials; availability of specialized human resources, suppliers of components and related services, specialized educational institutions and educational programs, specialized organizations conducting R & D, necessary infrastructure and other factors. As indicators of competitive advantages of the territory can be considered: a relatively high level of attracted foreign investment at the level of enterprises or sectors included in the cluster.

3. Geographic concentration and proximity. Key clusters are geographically close to each other and have opportunities for active interaction. The geographic scale may vary from the type and characteristics of the cluster and cover one or more regions of the state. As indicators of geographical concentration, various indicators can be considered that characterize the high level of specialization of a given region.

4. A wide range of participants and a "critical mass". Cluster can consist of companies that produce final products and services, usually exported outside the region, systems of suppliers of components, equipment, specialized services, as well as professional educational institutions, research institutes and other support organizations. Indicators that characterize the high level of employment in enterprises and sectors that make up the cluster, the number of companies and organizations belonging to the sectors that are members of the cluster, can be considered indicators.

5. The presence of connections and interaction between the participants of clusters is one of the key factors of success. These links can be of a different nature, including formalized relationships between the parent company and suppliers, between suppliers themselves, partnerships with equipment suppliers

and specialized services; communication between companies, universities and research institutes within the framework of cooperation in the implementation of joint R & D and educational programs.

For the economy of the whole state, clusters serve as points of growth of the domestic market. After the first often new clusters are formed, and the international competitiveness of the country as a whole increases, which is ensured, in particular, by the strong positions of individual clusters, while outside them even the most developed economy can only produce mediocre results.

So, the cluster, as a special form of territorial and industrial policy of the state, was developed in the European community in the 90s. Clusters consist of enterprises specialized in a particular sector of the economy and localized geographically. In the economic system, the cluster association performs the following task: strong enterprises pull up small ones.

Three characteristics are important for distinguishing a cluster: the presence of geographic localization, the commonality of the products (resources, technologies), close interrelations between firms within the cluster.

The most important feature of an industrial cluster is the combination of competition and cooperation between participating firms. Close cooperation ties between firms in the cluster lead to positive synergies, so the success of one firm in the cluster can't be separated from the overall success of the cluster.

The key to the success of the cluster is civilized competition, equalization of leaders, getting support from leaders, from the administrative resource of the region. In the period of post-industrial economy, clusters are groups of enterprises, including medium and small, located on the same territory. Clusters are the basis for effective economic development of the territory of the regions and contribute to the effectiveness of the development of the state as a whole.

Cluster is ultimately needed for enterprises to work in the market, not separately, and together - against other competitors. At the same time, clusters have to compete among themselves within the region. Without competition, there will be no technical progress.

1.2. Study of the mechanisms of functioning of economic clusters as a tool to improve the competitiveness of the national economy

The study of the mechanism for the operation of enterprise clusters is carried out using a categorical-system methodology and includes understanding the relationships and contradictions between the components of the cluster: production, provision, maintenance, consumption, research, export. With the help of the categorical method "Pentagram", the content of the direct / inverse support / constraint relationships between cluster components is disclosed, the regimes of their interaction are described on the basis of the compensation homeostat concept.

In recent years, the cluster paradigm has engulfed many countries and has become one of the most important global economic trends. Lot's of the countries have become relatively involved in clustering processes recently. At the same time, the essence of the cluster phenomenon in the economic environment remains insufficiently studied.

Clusters of enterprises are the result of spontaneous processes of clustering the economic environment and are characterized by certain general laws of development. Due to the fact that modern cluster theory does not consider clusters of enterprises as system objects, the mechanism of their functioning remains unclear. Obviously, contradictions between structural components must be reflected in it, since the emergence of contradictions, the nature of their flow and the result of resolution determine the principles of interaction of structural units, and also, in addition, determine the evolutionary potential of enterprise clusters.

To reveal the basis for the functioning of cluster structures, the categorical "Pentagram" model and the concept of compensatory homeostat are used, which makes it possible to identify and diagnose the contradictions unfolding in the inter component interactions of real clusters of enterprises. Thus, regional authorities have the opportunity to influence the flow and resolution of intra-cluster contradictions in order to ensure the desired direction of development of clusters taking into account the interests of the region.

Categorical modelling of inter component relations of clusters, as the basic relations in clusters of enterprises, which serve as the basis for the mechanism of their functioning, many researchers distinguish between the relations of competition and cooperation. However, these two phenomena do not fully reflect the nature of the relationships within the cluster formations.

First, the relationship between the components in the cluster and between the elements (business entities) in the cluster components is characterized as rivalry and cooperation. Here the struggle is embodied in a milder form than competition, and interaction is more complex in comparison with simple cooperation. Secondly, the relations of rivalry (cooperation) are realized in more subtle formats, emerging and developing as the relationship of control over the allocation of resources in the cluster system.

Such patterns of interaction are quite adequately captured by the universal categorical Pentagram method, which reflects the Chinese philosophy of Wu Xing, based on the notion that the world and its objects are the result of a mixture of primary elements (water, wood, fire, earth, metal), but in different proportions. Any object under study can be placed in a pentagram and interpreted in its terms.

The pentagram (Fig 1.2) is a five-pointed star in a pentagon. It is a cyclic construction completed by the process. The starting point for all forms of objects is water - the original formless substance. Pentagram allows you to select and interpret different types of relationships between elements, depending on their location in it relative to each other.

For this purpose, the components of clusters of enterprises that we selected are reduced to five by combining two pairs of components:

1) Production;

2) Provision / Maintenance;

3) Research;

4) Consumption / Export;

5) Training.

Figure 1.2 Pentagram method

Source: [7]

The pentagram, as indicated earlier, reflects the completed cycle, that is presupposes existence of a certain beginning and a certain end of the process that passes through the five stages. From this point of view, the cluster of enterprises appears as an evolving object. Clusters are nascent, and then in the process of their evolution they consistently go through several stages, gaining on each of them a new, more developed quality, the carrier of which is the new cluster component. The initial element here is the "Production" component.

Between the elements of the pentagram and the components of the cluster of enterprises, there are the following correspondences.

Water is the initial element, the undifferentiated state of the object. It is represented by the cluster component "Production", characterized as a component from which a cluster of enterprises can originate. It is characterized by homogeneous or slightly differentiated products, general or weakly specific factors of production, simple technologies.

The tree is the flowering of the object, the output of the process from the internal state to the external environment, the beginning of dynamic development. It corresponds to the "Provision / Maintenance" component, which allows the

cluster of enterprises to become more developed, productive and competitive by improving the supplied raw materials, components, as well as more sophisticated and productive machines, equipment, tools. The new quality of the cluster of enterprises allows it to enter a more complex environment, for example, the world market.

Fire is the most active element of the pentagram, but also the most resource-intensive. It corresponds to the "Research" component, which supports the growth of the cluster of enterprises, its productivity and competitiveness, and also enhances the quality of the cluster, such as innovation.

The earth is a balancing element. It corresponds to the "Consumption / Export" component, balancing the cluster of enterprises, which helps to find external demand for manufactured products, as well as improved raw materials, semi-finished products, components, improved machines, equipment, specialized services, commercialized research results – technologies and knowledge.

Metal - the final element. It corresponds to the component "Training", which facilitates the transfer of knowledge accumulated in the cluster and improving the quality of the human resource.

On the subject area of enterprise clusters, the categorical "pentagram" method, captures the relations of backward support, as well as reverse support.

The support relationship (the so-called mother-child relationship) is reflected by an external pentagon. In this case, each of the elements of the pentagram, having any resource, carries out either direct support (the next clockwise element) or, in the case of a resource deficit, reverse support will be provided (the preceding element), which is interpreted as a pathological link between the elements, in contrast to the normal connection of the first option.

In a cluster of enterprises, the support relationships are based on the demand of the preceding cluster elements for the products and services of the subsequent cluster. With sufficient volume of this resource, the preceding elements will support the development of subsequent (direct support) relations. If there is insufficient supply of necessary resources, an outflow of resources from the

subsequent element may occur, which, of course, will hinder its development as an element giving resources in the framework of reverse (pathological) support.

Normal direct support, obviously, is the development of a cluster of enterprises, based on universal mutual direct support of each other's cluster elements. However, it should be recognized that the relationship of backward (pathological) support may be appropriate in a limited time period in those cases where an element lags behind in development from others. In this situation, the less developed element will be both in the relationship of direct support to the previous element, and backward support - the subsequent one. After catching up the rest of the cluster elements in its development, the element lagging behind will be included in the chain of relations of normal direct support.

As mentioned earlier, in a cluster of enterprises, support relationships can be considered as based on such a resource as demand, which acts as a factor that ensures and controls the development of cluster components. The sufficient, growing demand of the preceding elements supports the development of the following: "Production" contributes to the development of the component "Assurance", "Maintenance / Support" - the "Research" component, etc. In case of insufficient, undeveloped demand, subsequent elements will not be able to receive the necessary support. At the same time, these elements may have to share some resources (for example, financial, human resources, information, knowledge) with a less developed element in order to facilitate its accelerated development, i.e., to implement the relations of backward support.

Between the elements of the cluster of enterprises, relations of another kind also take shape: restrictions (the so-called grandfather-grandson relations), reflected by the star inside the pentagon. In this case, we are talking about the limitations that are vital for the existence of an object that provide its homeostasis. Like the support relationship, the constraint relationships can be normal (they are reflected by the interaction of the star's elements in the clockwise direction) or pathological (counter clockwise).

Each of the elements of the enterprise cluster, reflected by the pentagram, creates limitations for the remaining elements. In particular the level of

development of the "Production" component acts as a limiting factor for the "Research" component, thus keeping it in some reasonable developmental limits, preventing that are not supported by the demand for their result. In its turn, the "Research" component puts limitations on the "Learning" component, which is understandable: the level and quality of education are based on already accomplished scientific discoveries and developments.

However, there may be a situation where there is not enough resource to put forward restrictions. In this case the growth of one of the elements, which is not limited by the cluster of enterprises, will lead to disproportions in the structure and rates of development of cluster components. But such growth will inevitably face constraints that have developed outside the cluster. Nevertheless, the damage to the progressive development of the cluster has already been done. The described situation reflects the relationship of the reverse (pathological) restriction. In general, it can be seen that the unrestricted, uncontrolled growth of one of the cluster elements has become a limitation on the development of other elements and the cluster.

All the previously mentioned types of relations between the components of the cluster of enterprises are, apparently, contradictory in nature. To complete the analysis of the relationship between components in enterprise clusters, it is necessary to develop the previously expressed idea of the specificity of the manifestation of the relations of rivalry and cooperation in them.

It is generally accepted that competition in clusters develops horizontally (in fact, within each cluster component between its elements - firms and enterprises), and vertically (between the elements of different components), without affecting the relations of competition (cooperation) within the components of enterprise clusters, will clarify the nature of the data relations between the components.

The categorical method of the "pentagram" clearly demonstrates that the components of the cluster of enterprises interact, simultaneously implementing both the cooperative relationship and the rivalry relationship. Cooperation is manifested in the fact that one of the components presents demand, and the other forms a proposal for specific products or services, and there is mutual support for

supply and demand generated by related components. On the other hand, it can be seen that each component has a differentiated demand, presenting it to different components. For example, the "production" element requires raw materials, semi-finished products and other resources (demand for the "Ensuring" cluster component), machines, equipment (demand for the "maintenance" component), new knowledge, research and development (demand for component, "Research"), etc. Accordingly, all the components indicated in brackets will compete with each other for the demand of the generating component - "Production".

In addition to the previously described relationships, in clusters of enterprises, relations also arise regarding the distribution of such resources as material (raw materials, semi-finished products, components, equipment) and non-material (technologies, services, knowledge) and information. In the early stages of the development of enterprise clusters, the distribution of basic resources such as raw materials, labor part (processed wood, fabrics, raw materials for the manufacture of paints, rolled metal, etc.), and the component of "Production" controls their distribution. With the development of the cluster, the basic resources are being improved and become more specific. In the case of the creation of progressive raw materials, the control over their distribution passes to the "Ensuring" component. With the development of technology, the distribution of machines, equipment, tools will be controlled by the Maintenance component. In the most developed clusters, the importance of resources such as knowledge and other results of intellectual activity increases, and the "Research" component becomes one of the cluster-forming and takes control over the distribution of these resources.

So, the study of relations between the components of a cluster of enterprises allows us to drawn the following conclusions: the basic relations in clusters, as well as in other system objects, are the direct / reverse support and forward / backward constraints arising from the distribution of such system-cluster resources as the demand and supply of products and services produced by cluster components. For supply and demand in cluster systems, there is competition between competing components, which is complemented by cooperation between cooperating components.

Homeostatic representation of inter component interactions of enterprise clusters and described relations between the components of cluster formations are the basis of the mechanism of their interaction with each other and the functioning of the cluster of enterprises as a whole.

Each of the components of a cluster of enterprises is the executor of a specific function. The complex of internal functions of the cluster ensures the realization of its main function, consisting in satisfying social needs in various goods and services, and determining its purpose in the external environment, in larger systems.

Interaction within an enterprise cluster is firstly determined by the existing components, and secondly by which of them are cluster-forming at the moment.

The approach of our study of the mechanism of the operation of enterprise clusters is based on the fact that there cannot be several equal elements in the system, it necessarily identifies the leading, system-forming ones, which determine the principles of integrating the elements into a single system object, as well as the functioning mechanism, goals and direction of development.

It is advisable to separate the core from two components as a cluster-forming one. This is due to the fact that elementary contradictions are traditionally unfolding in pairs of elements. Thus, each cluster of enterprises operates on the basis of a two-component core, in which the interaction manifests itself as a contradictory unity. Possible variants of the formation of a two-component core in enterprise clusters are presented in their typology. They are limited to a list of components. The remaining components function in the cluster in the mode of relative subordination. At the same time, the cluster's competitiveness, will be interaction with the environment. Possible directions of development are determined by the functioning of the components of the cluster core.

As a rule, the role of a cluster can pass from one pair of components to another, which is caused by a change in the medium and correction of the main function of the cluster formation, which leads to the transformation not only of the internal functions realized by the components, but also the mechanism of their interaction, the redistribution of the roles of components in the cluster.

For example, in the incipient cluster, the role of the cluster-forming nucleus at the initial stage is played by the "Production" component, then, after the emergence of the full-fledged "Provision" component, the kernel becomes a two-component. In the process of development, service enterprises, research and design organizations, industry consumers, educational institutions can be involved in the production cluster.

Over time, the complexity of the environment will lead to the fact that the competitiveness of the cluster and its adaptive abilities will depend not on production capabilities, i.e., the quality of the "Production" component, on the quality of providing the enterprises-producers of the final product and their suppliers with advanced machinery. And this will contribute to the fact that the role of one of the cluster-forming will be assumed by the "Maintenance" component. The further development and complication of the environment, the transition of the economy to post-industrial development will lead to the fact that the competitiveness of the cluster will be determined by the development.

In connection with the above, the mechanism of the operation of enterprise clusters should be supplemented by a description of the contradictions, that arise, develop and resolve within each of the possible two-component.

The study and description of the contradictions between the components of the cluster core is carried out within the framework of the methodology of such a system approach as homeostatics, specifically - on the basis of the compensation homeostat model. This model is based on the assumption that two subsystems, which are unstable individually and in contradiction with each other, provide the system with a stable state.

Variants of interaction between the two subsystems can be different. Depending on the type of cross feedback, there are four possible modes of interaction:

Each of the modes as its result has either the improvement of interaction, or its degradation, or the accumulation of potential for improvement or degradation.

The content of the contradictions between the components of cluster systems, as well as possible options for their deployment and permissions based on the above method, are interpreted as follows:

1) Contradiction of the type of "production-security":

The development of a local system from a pair of cluster components, manifested in increasing the level of system and organizational complexity; regression is interpreted as simplification of the given local system.

Here we can see represents of the development of this system without changing systemic and organizational complexity.

Possible variants of interaction of components in a cluster of enterprises:

1 -- Both components block each other's development. Local regress

2 + - Component 1 stimulates the development of component 2; component 2 blocks the development of component 1 Local

3 - + Component 1 blocks the development of component 2; component 2 stimulates the development of component 1 Local

4 + + Both components stimulate each other's development Local progress

Mode 1 - this type of interaction is the least favorable. The weak development of both components hinders the realization of not only the progressive branch of development, but even the realization of the isogressive stage. Such a situation is possible when both "production" and "provision" are aimed only at the realization of their own interests, the interaction between them is not developed, it hinders the transition to sustainable progressive development. If the interaction continues in this mode, the cluster of enterprises will demonstrate a regressive direction of development;

Mode 2 - this situation is formed at the time of the formation of a full-fledged security component. Being aware of the production component, the need for active interaction with the supporting companies leads to the fact that producers start supporting suppliers, including financing, transfer of knowledge, experience, information. However, at this stage, "provision", while not yet fully formed component, to stimulate the development of production is not yet able. Moreover, the diversion of resources in itself is a factor limiting the development of the production component. At this stage, the cluster of enterprises will implement an innovative direction of development. However, it should be borne in mind that this stage cannot be unnecessarily long, otherwise there is a threat of transition to regression;

Mode 3 - it is impossible to exclude the possibility of a situation where suppliers are more developed than producers. This possibility is reflected in the developed typology of clusters and is caused by the birth of clusters of enterprises from a group of suppliers. The economic interest of suppliers in this situation is obvious: the more developed the producers, the more profitable is the providing activity. Therefore, suppliers can begin to stimulate the development of the production component in order to ensure a mutually stable progressive development.

This situation reflects an isogressive stage in the development of a cluster of enterprises. As in the previous version, a timely transition to progress is required, otherwise the threat of a regressive development scenario is great;

Mode 4 - a similar situation, as seen, is most favorable, both components form a positive cross feedback, provide support to each other. Sufficiently developed production needs qualitative basic factors, which stimulates the improvement of processing of raw materials, the production of necessary materials, semi-finished products and components. In turn, the providing component, which has the potential to improve its products, will stimulate the further development of the production component. At this stage, the cluster of enterprises will implement a progressive branch of development;

2) Contradiction of the type of "production-service":

The resolution of this contradiction in the cluster of enterprises will proceed according to the previous scenario, which makes it possible to omit its detailed description;

3) Contradiction of the type of "production-consumption":

Mode 1 - the underdeveloped components "Production" and "Consumption" can't ensure the formation of any positive cross-feedback. The cluster will implement a regressive direction of development;

Mode 2 - the "Production" component, offering a better and better product, will contribute to the development of demand from the "Consumption" component, but it will take some time before positive cross-feedback occurs. During this

period, the "Consumption" component will constrain the development of the "Production" component;

Mode 3 - the opposite situation is also possible, when the "Consumption" is more developed in the pair of components. Consumers can begin to stimulate the development of the production component, but for a while the cluster will be in an isogressive branch of development;

Mode 4- the situation with two positive cross feedbacks in the interaction of production and consumption is most favorable from the point of view of cluster development of enterprises. The developed production stimulates the growth of requirements in the corresponding cluster component, the demand becomes more demanding and differentiated. This has a stimulating effect on the development of the production component, supports its growth;

4) Contradiction of the type of "production-research":

Mode 1 - when the cluster is born on the basis of the components "Production" and "Research", as well as in the situation of the cluster development crisis, both components are unable to provide at least one positive cross-feedback. If this situation is preserved, the cluster will either be broken or the crisis will not be resolved and the cluster will remain within the regressive branch of development;

Mode 2 - in the early stages of the development of the production cluster with the research component "Production" will support research institutions, until they acquire the conditions necessary for the progressive development of the cluster.

Mode 3 - in a modern economy, clusters can be formed on the basis of a research component. However, the nature of economic clusters will require the formation of other components too. Therefore, from the theoretical point of view, a situation is possible when research institutions are more developed, and a weak production component hinders their further development and needs support. Strengthening producers in the cluster will allow him to move to progressive development under the regime 4 scenario;

Mode 4 - the same as in the previous types of contradictions, a strong, dynamically developing production component will form the demand for research

and development, stimulating the development of the relevant component. In turn, a well-developed research base will be able to successfully meet the demand of producers for research results, which will support the progressive development of the production component;

5) Contradiction of the type of "production-export":

Mode 1- the situation reflects the insufficient development of both components. It takes time to gain strength by at least one of them, otherwise the cluster will not be able to move to either the isogressive or the progressive branch of development;

Mode 2-advanced production stimulates the formation and development of a separate export component, when domestic demand is stable or declining. Some resource support is required to form a large-scale export component. The cluster is in an isogressive branch of development that can move into either of the three other regimes or to one of the two branches of development - progress or regression;

Mode 3- the export direction can be quite developed in the region, but the cluster still does it on its own when implementing foreign economic transactions or does not have any exports at all. In this case, the export component can be involved in the cluster and begin to stimulate the development of the production component. For some time, the cluster will be in the branch of the isograd with the prospect of transition to progressive development. Although we can't exclude the possibility of switching to regimes 2 or 1;

Mode 4- is the most favorable variant of interaction within a given cluster core. Strong foreign trade intermediaries are needed for advanced production. The export component, in turn, supports dynamically developing producers that are able to effectively meet external demand and increase the profitability of foreign trade activity;

6) Contradiction of the type of "production-training":

Mode 1 - weak production cannot support the development of the educational sphere.

Mode 2- developed production component is in need of improving the quality of human resources and supports the educational institutions. This stage of is ogress is a transition to progressive development, which, however, may not take place;

Mode 3 - as in the case with the research component, the situation may arise of the cluster on the basis of a developed educational sphere, which can begin to stimulate the development of the production component in order to generate adequate demand for various educational programs. If successful, the cluster can move on to the branch of progressive development;

Mode 4 - mutual support of the two components - the most favorable of all modes.

A strong production sphere supports the educational component, constantly upgrading the skills of people employed at enterprises. The educational component involved in active cooperation stimulates the dynamic development of the production component, taking into account its needs and requirements for the formation and implementation of both academic and professional higher education, postgraduate and additional education programs.

The contradictions that arise and unfold between the remaining cluster components can be investigated and described in a similar way.

Thus, the most favorable mode for unfolding contradictions within the cluster core is the mutual-stimulating interaction of the two components. However, it should be noted that progress in development, as a rule, is short-term due to the fact that it is impossible to maintain the same rate of development of any two components in the long term. One of the components will inevitably outrun the other, and the development of a contradiction between them will unfold in regimes 2 or 3. Over time, the contradiction may return to regime 4. However, if the oppressive effect of the component retarded in its development turns out to be strong, it can lead to the disappearance of a positive cross-feedback also from the supporting component and the cluster will go into the mode 1 of unfolding the contradiction in the kernel.

Thus, in the mechanism of the operation of enterprise clusters, a significant aspect is the presence of a contradiction between a pair of components that are a cluster-forming core that can unfold in different regimes that specify one of the directions of cluster development-progress, isogress or regress. The study of this aspect allows us to take into account this feature of the functioning of cluster structures when managing their development.

The purposeful formation and development of cluster structures in the Ukrainian regions requires a theoretical understanding of their nature and functioning characteristics. We believe that the identification of the nature of the relations and contradictions between the cluster components will allow the selection of management measures that promote the productive development of both relations and intra-cluster contradictions, ensure the improvement of the mechanism of functioning of cluster structures and obtain the desired positive effects by the territory of their basing, including economic growth, improvement of the reproductive structure and innovation system, improvement and development of the resource base, acceleration scientific and technical progress, increasing the well-being of the population.

The described model of functioning of enterprise clusters allows not only to understand the nature of relations and interrelations between structural parts of clusters, but also to reflect aspects of their development that assume the formation of new components and, accordingly, new inter component relations and contradictions.

1.3. Methical approaches to assessing the effectiveness of the functioning of economic clusters as a tool to improve the competitiveness of the national economy

Changing social and market conditions, the problem of survival or sustainable development economics of different countries, regions, industries and separate companies place in the forefront of territorial economic development of cluster business patterns. Important transformations occur on the industrial markets and in the corporation relations. New industrial structures and markets are forming and there is the redistribution of roles and companies quantity and other market entities. It is very important to see and take into account that cluster approach gives some benefits, at the first, for the region control authorities, at the second for the region business, and at the last, the cluster participants. In this article was proposed estimation method of cluster functioning effectiveness for all cluster participants.

In the formation and development of the cluster it is advisable to estimate the contribution and to take into account interest of each cluster participant. On the way of region economic clustering should increase the availability the recourses that occurred as a result of cluster policy is carried out competently.

The practical application and monitoring of the suggested indicators for accessing effects of clustering in the region allow indicating positive and negative dynamics of clusters function and using in these clusters of recourses aimed at improving the socio-economic situation of the region. It gives opportunity to the opportunity to develop the necessary solutions for the adjustment of regional clusters in case they are not effective operation.

Changing social and market conditions, the problem of survival or sustainable development of economies of different countries, regions, industries and individual companies puts cluster forms of management on the forefront of economic development of territories. Significant transformations take place in industry markets and in corporate relations. New industry structures and markets are being formed, there is a redistribution of roles and the number of companies and other market entities.

The founder of the cluster approach, M. Porter drew attention to the fact that the most internationally competitive firms of one industry are usually concentrated in one region. This is due to the wave nature of innovations spread around the most competitive companies and affecting suppliers, consumers and competitors of these companies. Thus, in the region there is a cluster - a community of geographically concentrated firms of closely related industries mutually contributing to the growth of each competitor.

On the territory of the regions there may be significant natural resources and major assets belonging to large corporations, but this does not increase the influence of regions deprived of modern clusters on global exchanges of people, technologies, information, and finances. However, there are a number of problems associated with the formation and development of clusters in different countries. Including:

1. Weak development of cooperation ties. As a rule, existing clusters are mono-profiled, and the effect is achieved due to concentration of resources and promotion of the cluster brand. Therefore, any market fluctuations make the cluster vulnerable enough.

2. Active participation in the formation of a cluster of officials (this is the way the cluster policy is implemented), most often far from understanding the market situation, not so well perceiving the market as entrepreneurs and, as a rule, inefficiently using resources.

3. A serious problem in the development of the cluster is the lack of transparency of many large enterprises, the inability to work with new partners, who are hard at mastering new technologies and products. The gap between science and business also affects.

4. Large territories have a bad connection with world centers, and the territorial location of clusters does not allow us to orient ourselves to a global level. It also creates problems of uncoordinatedly and lack of horizontal links, cooperation of participants.

5. There are significant differences in both the formation conditions and in the tools for cluster development and qualitative characteristics of the results. A small share of medium and small business in clusters does not contribute to the development of internal competition in clusters. Funded primarily innovation infrastructure, while virtually not supporting joint projects of R&D and cooperation.

6. There is still a problem of closed territories and cities. Practically, the potential accumulated in these territorial entities is not used.

Summarizing the above problems, it can be noted that the existence of such a large number of subsidized clusters is ineffective in such a critical economic situation, given the low potential of commercialization of science and innovation potential. In these conditions, the problem of evaluating the effectiveness of the cluster policy for all its participants, taking into account state priorities and social tasks, becomes especially important and urgent.

The concept of "cluster efficiency" characterizes, first of all, the expediency of the cluster's activity to extract benefits on the basis of initiative, responsibility and innovative entrepreneurial idea.

With respect to each specific region, there is a peculiar potential for clustering, special prerequisites, in connection with which specific cluster formation (construction) will take place, as well as a distinctive synergetic effect.

To assess the efficiency of entering the cluster, it is proposed to use a set of indicators that are grouped into three groups: efficiency for cluster administrative structures and efficiency for entrepreneurs within the cluster, as well as efficiency for cluster participants. The choice and justification of the indicators were carried out on the basis of such requirements as the quantitative value; calculation of the indicator on the basis of statistical reporting (information accessibility); visibility and presence of semantic content; simplicity of calculation formulas, etc..

As a result of formation and development of the cluster, there are corresponding social and economic effects: additional jobs from the creation of innovative industries, increased tax revenues, infrastructure development. The overall effect of the operation of clusters operating in the E region is defined as the sum of the gains from the functioning of the clusters in this region (V), taking into account the availability and utility of entry of entrepreneurs into clusters existing on their territory, and should strive for maximum:

$$E_\partial = \sum_{i=1}^{n} E_i \to max \qquad (1.1)$$

n - the number of the i-th active clusters on the territory of the region, units;

E - the effect of the functioning of first acting clusters in the region, cost and etc.

Considering clusters from the point of view of increasing the efficiency of functioning of regional systems and territories, it is expected to increase the income from the operation of the respective clusters, reduce costs for the

entrepreneurs included in the cluster, as well as the risks that affect the process of obtaining economic benefits from the functioning of existing and newly created clusters. In order to obtain a positive effect on the functioning of existing clusters, it is necessary that the overall benefits exceed the total costs and cost losses as a result of the associated risks.

Effects of administrative structures of clusters

So, for the structures of regional cluster management such an assumption will look like this:

$$V_{ij} = \sum_{i=1}^{n} F_i - \sum_{i=1}^{n} L_i - \sum_{i=1}^{n} S_i > 0 \quad (1.2)$$

where V.- benefit from the functioning of the i-th types of clusters;

$F_i \in (f_1 + f_2 + ... + f_n)$ - Income from the functioning of the i-th types of clusters, stand, etc.

$L_i \in (l_1 + l_2 + ... + l_n)$ - Costs of organization and functioning of the i-th types of clusters, costs and so on.

$S_i \in (S_1 + S_2 + ... + S_n)$ - cost losses as a result of risks arising from the organization and implementation of the i-th types of clusters, costs, etc.

In addition, as a result of regional management of different types of clusters, positive dynamics of the following indicators should be traced:

- An increase in the number of taxpayers and the tax base (since the centers for managing small and medium-sized businesses tend to be on the same territory as the business itself, as opposed to vertical corporations);

- Increase in the number of working places;

- The emergence of a convenient tool for interacting with business;

- The emergence of conditions for further structural restructuring of the region's economy;

- Growth of investment attractiveness of the region;

- Increase of the political importance of the region.

Moreover, the benefits of regional cluster management in the subsequent stages of their operation during the period (D +) should increase as a result of the multiplier effect (the expansion of the number of entrepreneurial structures due to the economic expediency of finding in the cluster and the use of innovative technologies) in industries where different types of clusters, which should affect the increase in GDP, increase the competitiveness and security of the country's economy:

$$V_{i+1} = \sum_{i=1}^{n} F_{i+1} - \sum_{i=1}^{n} L_{i+1} - \sum_{i=1}^{n} S_{i+1} \to max \qquad (1.3)$$

If $V_{i+1} > V_i$,

Where, V_{i+1} - benefit from the functioning of the i-th types of clusters in the period t, stand. etc;

$F_{i+1} \in (f_1 + f_2 + ... + f_n)$ - a set of indicators of income from the functioning of the i-th types of clusters in the t period.

$L_{i+1} \in (l_1 + l_2 + ... + l_n)$ - a set of indicators of the costs of organization and functioning of the i-th types of clusters in the t period.

$S_{i+1} \in (s_1 + s_2 + ... + s_n)$ - a set of indicators that characterizes the cost losses due to the occurrence of risks associated with the organization and implementation of the i-th types of clusters in the t period.

In order to estimate the increase in the total benefit from the operation of cluster types in the period t, it is necessary to find the ratio of the benefit difference from the functioning of all types of clusters in the region between the subsequent stage of their functioning and the previous one to the benefits of the operation of all types of clusters in the previous stage:

$$K_v = \frac{\sum_{i=1}^{n} V_{i+1} - \sum_{i=1}^{n} V_i}{\sum_{i=1}^{n} V_i} \to max, \, If \, K_v > 1 \qquad (1.4)$$

Accordingly, if the given conditions are not fulfilled when the clusters function, then the question arises of the correctness of the goals and tasks for the development of the region, the professionalism of specialists dealing with the management of existing clusters, and the expediency of the existence of such clusters.

For successful functioning of the cluster, it is necessary that business structures are interested in joining the cluster. As a result of the functioning of the cluster for entrepreneurial structures, there should be a positive effect that increases the competitiveness of products, reduces its price, improves quality and accessibility for users.

Thus, the model for assessing the benefits of business entities from being in a cluster resulting from the application of cluster policy instruments can be represented as follows:

$$R_{ij} = \sum_{j=1}^{m} \sum_{i=1}^{n} Q_{ij} - \sum_{j=1}^{m} \sum_{i=1}^{n} Z_{ij} - \sum_{j=1}^{m} \sum_{i=1}^{n} E_{ij} \to max, \text{If } R_{ij} > 0 \quad (1.5)$$

Where R_{ij} - benefit of j-th business entities from being in the i-th types of operating clusters, units;

m - Number of business entities, resources used as a result of being in a cluster, units;

$Q_{ij} \in (d_1 + d_2 + ... + d_n)$ - The level of economic benefit of j-th business entities from the use of resources obtained as a result of being in the i-th cluster, cost units;

$Z_{ij} \in (Z_1 + Z_2 + ... + Z_n)$ - Level of costs of j-th business entities associated with the location in the i-th cluster, cost units;

$E_{ij} \in (s_1 + s_2 + ... + s_n)$ - Value losses from the onset of possible risks of j-th business entities associated with obtaining resources arising from the location of the cluster, cost.

To assess the possible increase in the benefits of j-th business entities from being in the i-th cluster (K_R), it is necessary to find the ratio of the difference in the

benefits of business entities from being in the i-th types of operating clusters in the subsequent period t and the previous period to the sum of benefits of j-th subjects entrepreneurship from being in the i-th types of operating clusters in the previous period:

$$K_R = \frac{\sum_{j=1}^{m} \sum_{i=1}^{n} R_{ij+1} - \sum_{j=1}^{m} \sum_{i=1}^{n} R_{ij}}{\sum_{j=1}^{m} \sum_{i=1}^{n} R_{ij}} \to max, if \ K_R > 0 (1.6)$$

The indicator of the benefits of business entities from being in the i-th clusters should be supplemented with an indicator - the volume of sales arising from the use of innovative technologies, per one business entity (R_∂), which should grow with a correctly conducted cluster policy

$$R_\partial = \frac{\sum_{j=1}^{m} \sum_{i=1}^{n} C_{ij}}{N_{n/n}} \qquad (1.7)$$

Where: M is the number of business entities, the resources used as a result of being in a cluster

$N_{n/n}$ is the total number of business entities in the i-th cluster

N is number of i-th active clusters in the territory of the region

C_{ij} is the volume of sales resulting from the application of innovative technologies in i-th clusters by j-th enterprises

With the continuous monitoring of this indicator (R_∂) over time, its value should grow, which will positively characterize the clustering process with the introduction of innovative technologies. Decrease in this indicator will indicate a decrease in the innovative focus of the cluster.

Thus, in the way of clustering the economy of the region, the availability of resources arising from the cluster policy should increase, and the effectiveness of their application in business activities should be increased.

CONCLUSIONS TO PART 1

According to Michael Porter theory, the cluster is a group of geographically neighbouring interrelated companies (suppliers, manufacturers, etc.) and related organizations (educational institutions, government bodies, infrastructure companies) operating in a certain sphere and complementing each other.

Michael Porter considered the competitiveness of a country should be viewed through the prism of international competitiveness not of its individual firms, but of clusters of associations of firms from different industries, and the ability of these clusters to use internal resources effectively of fundamental importance.

To reveal the basis for the functioning of cluster structures, the categorical "Pentagram" model and the concept of compensatory are used, which makes it possible to identify and diagnose the contradictions unfolding in the inter component interactions of real clusters of enterprises. Thus, regional authorities have the opportunity to influence the flow and resolution of intra-cluster contradictions in order to ensure the desired direction of development of clusters taking into account the interests of the region.

The pentagram is a five-pointed star in a pentagon. It is a cyclic construction completed by the process. The starting point for all forms of objects is water - the original formless substance. Pentagram allows us to select and interpret different types of relationships between elements, depending on their location in it relative to each other.

The purposeful formation and development of cluster structures in the Ukrainian regions requires a theoretical understanding of their nature and functioning characteristics. We believe that the identification of the nature of the relations and contradictions between the cluster components will allow the selection of management measures that promote the productive development of both relations and intra-cluster contradictions, ensure the improvement of the mechanism of functioning of cluster structures and obtain the desired positive effects by the territory of their basing, including economic growth, improvement of

the reproductive structure and innovation system, improvement and development of the resource base, acceleration scientific and technical progress, increasing the well-being of the population.

PART 2
FUNCTIONING OF ECONOMIC CLUSTERS AS
A TOOL TO IMPROVETHE COMPETITIVENESS
OF THE NATIONAL ECONOMY

2.1. International experience in the implementation of the cluster form of organization

In the developed countries of the world, the realization of the advantages of clustering industry occurred in the middle of the 20th century. This is due in particular to the fact that in economically developed societies and corporate associations with developed ethical norms and principles of economic ethics, market competition and economic solidarity of economic entities mutually complement each other, helping to eliminate most of the contradictions not only of market, economic, but also social contradictions. , causing a decrease in social tensions, optimization and regulation of market competition.

One of the first and most famous clusters in the world is Silicon Valley, which was formed in the US state of California on the basis of the Stanford University founded in 1951 Technopark during the 1960s and 1970s. Silicon Valley Cluster has concentrated representatives of the business sector (more than 7 thousand large and medium-sized companies, including Intel, Apple, Google, Yahoo, eBay, etc.), educational and scientific spheres (Stanford, California universities and Berkeley), which became prerequisite for the formation of a unique human, innovation and production potential.

The synergistic effect of the activities of the Silicon Valley cluster enterprises has made it the most technological center of the United States, which is the country's absolute leader in terms of attracted venture capital, number of patents received, wages and other economic indicators. It should be noted that despite the lack of state participation in the formation and development of a network of companies in Silicon Valley, one of the most important prerequisites for the creation of this cluster was the favorable legislation of the state of California - only in this US state did the Civil Code guarantee workers the right to leave work without hindrance competing companies or setting up their own competing firms, while in all other states many employees (especially high-tech ones) hire were forced to sign the e slander non-compete and non-disclosure. This gave impetus to the formation of numerous startups in Silicon Valley, increased competition between electronics companies and a corresponding increase in their innovative activity.

The success of the Silicon Valley Cluster inspired the developed countries of Europe to create in the 1970s and 1980s state programs to support the business and scientific sector networks in selected regions of Germany, Italy and Austria, since the second half of the 1990s. In a number of European countries, national cluster development programs have gradually been formed. In the late 2000s National cluster development programs have already been implemented in 26 EU member states.

At present, the level of clusterization of the economy in Europe, Japan and India is 65-70%, with about 70% of cluster structures operating in the industrial sector. In the US, more than half of enterprises operate within clusters, and the share of GDP created by them exceeds 60% fully embraced by the clustering economy of the Scandinavian countries - Denmark, Finland, Norway and Sweden. The clustering process is actively underway in Southeast Asia and China. So, in China today there are more than 60 clusters, in which about 30 thousand companies are concentrated out of more than 3,500,000 employees and the level of sales amounting to about 200 billion dollars annually.

In the EU today there are about 2 thousand. Officially registered clusters, in which 38% of employees in all EU countries work. 150 of the existing clusters are recognized as world-class clusters in terms of employment, cluster size and specialization. Recent studies indicate that during 2010-2017. 33.3% of firms that are members of clusters, showed employment growth of more than 10%, while behind clusters - only 18.2% of firms.

Analysis of cluster programs of developed countries indicates their overwhelming focus on the formation and development of innovative sectors of the economy. The experience of many countries shows that the formation of new high-tech and creative industries in the economy is due to systemic government support. The active role of the state and supra-state entities (for example, the EU) in the formation of cluster networks at the present stage of cluster development is explained by the need to attract qualified personnel and organizations specializing in an important activity for a region or state, as well as the dependence of innovative activities of enterprises on the state of fundamental science development, which is a sphere of state responsibility - the share of the public sector in the costs of research and development Work in the developed countries of Europe is about 40%. Therefore, in most countries, clustering is supported at the state level by implementing cluster policy, which refers to the promotion of cluster formation and development through the identification and elimination of specific "market failures", which, in particular, include:

1. General "market failures", non-specific for the functioning of clusters, related to the conduct of entrepreneurial and innovative activities: lack of funding for new companies, lack of infrastructure for research, innovation and personnel training. Government policy provides an individual approach to timely response to such problems arising in a particular cluster.

2. Lack of information from companies about the location of an existing or potential cluster, participation in which would contribute to increasing the productivity of their activities. The role of the state is to inform private companies in a timely and

complete manner about the advantages of locating a business in a particular area and concentrating certain types of activities in the most favorable place for them.

3. The weakness of interaction between participants of an existing or potential cluster, due to the fact that none of its participants can count on reimbursement of expenses for establishing and maintaining interaction between all participants. In addition, an inadequate level of trust between the participants can be a significant barrier to establishing cooperation. Therefore, the public sector acts as an intermediary between the cluster companies and the guarantor of their cooperative behavior.

4. The existence of barriers to the mobility of companies and workers associated with the need for significant costs for moving companies to the cluster location, the high cost of renting land, housing for workers and other costs. Therefore, in most cases, the government creates the conditions for reducing these costs by introducing certain benefits and providing the necessary physical infrastructure to house the cluster companies in a certain area.

5. Excessive specialization of developed clusters and the emergence of the "gauge effect", which can lead to rigidity and isolation of the cluster from the environment and its gradual degradation. The role of the state in this case is to ensure the access of cluster members to new knowledge and technologies, facilitating the attraction of foreign investment and the development of new partnerships.

Summarizing the accumulated foreign experience in implementing cluster policy, we can distinguish two of its main models, the liberal and dirigiste, in which two general cluster models, Anglo-Saxon and Continental, developed, with specific features inherent in clusters in particular regions of location.

The liberal and dirigiste models of cluster policy have a number of significant differences. First, the liberal cluster policy is aimed at "growing" clusters that were formed by the market. On the other hand, conductors at the state level choose industry and regional priorities and purposefully support the formation of the respective clusters.

The second difference is that the conductors create the infrastructure for priority clusters - branches of universities, research institutes, roads, airports, and the like. Liberal governments, by contrast, rarely participate in creating infrastructure for clusters.

The third fundamental difference lies in the role of the regions where the cluster is created. Conductors independently choose the region to create a cluster, and also determine the amount of its funding. Liberals, on the other hand, create incentives for regional authorities and assume full responsibility for the created cluster.

The Anglo-Saxon cluster model, which was formed as a result of the application of the liberal cluster policy model, prevails in countries such as the USA, Canada, the United Kingdom and Australia. But in all countries of Europe, post-Soviet countries (Russia, Ukraine, Kazakhstan), countries of Asia (Japan, South Korea, Singapore, China, India) the dirigible model of cluster policy and, accordingly, the continental model of clusters prevail.

For Ukraine, the experience of the implementation of the cluster policy of EU countries can be most useful, for two reasons. First, it is the EU countries that have the greatest experience of successful implementation of cluster policy in industry, are leaders in the world in the number of cluster programs and have developed clustering mechanisms at all levels - supranational, state and regional. Secondly, Ukraine's policy of European integration presupposes, first of all, integration into the EU's economic space, Ukraine's involvement in European-wide value-added chains, which today operate mainly in the form of industrial clusters.

The study of industry clustering experience accumulated by the EU countries over the past decades allows us to highlight a number of important common features inherent in their cluster policy, which have become prerequisites for the successful implementation of the cluster model and the level of economic security of countries:

1. Using the software approach for the development of clusters.

Studies of European experts in the field of clustering found that more than 40% of cluster initiatives in 50 of the most developed countries of the world

(mainly OECD) were started thanks to the participation of companies and organizations in various state cluster development programs. The priority sectors and the development potential of clusters are determined on the basis of a detailed analysis of the available production, financial, research, innovation and organizational resources of the economy, which leads to the implementation of cluster studies and the construction of a state cluster program. For example, a typical European state cluster program provides financial and organizational support to 12-20 clusters, whose members are from 600 to 5000 enterprises and organizations, has an annual budget of about 5 to 10 million Euros and is designed for a period of 3 to 10 years.

2. Creation of special cluster organizations responsible for the development of the cluster, ensuring communication between the cluster members and its relationship with the external environment. The study of cluster initiatives TheClusterInitiative Greenbook 2.0, which summarized the information provided by 356 cluster organizations from 50 countries of the world (mainly OECD countries), shows that the bodies of cluster organizations that are elected by the cluster members, consist of 61% of the private sector, 16% representatives of the scientific community, 14% of the public sector, 7% of non-profit organizations and 2% of financial institutions. Despite the low share of the public sector, the data indicate its significant participation in financing cluster organizations - they receive close to 54% of the funding from the public sector (23% from regional authorities, 18% from government, 13% from supranational bodies), 26% from contributions participants 8% from the sale of services and 12% from other sources.

Cluster organizations perform two main functions: provision of services (creation of basic infrastructure for cluster activities, maintenance of the office, maintenance of the cluster site, implementation of information dump, organization of periodic meetings of cluster members, provision of consulting services, implementation of market research, etc.) and implementation of projects with the participation of individual cluster members (developing new products, creating working groups to promote the export of cluster products, etc.).

3. Application of a competitive approach to the selection of cluster members. Cluster initiatives are often implemented through e-government mechanisms. When creating clusters, most countries apply a competitive approach - enterprises, scientific organizations, universities send their projects in electronic form to government organizations, which are responsible for the formation and implementation of cluster policy, after which the most promising projects and participants of future clusters are selected in priority state directions, receive financial and organizational support of the state.

Such programs are high level of competition between enterprises for participation in government programs. For example, in Germany, the share of rejected applications of enterprises is about 95%. European cluster programs provide for a fairly long period of preparation of applications, and the competitive selection takes place in several stages. Often, governments use two-stage selection system- after preliminary selection, participants invited to detail competitive bids for financial and advisory support from the state. After that, in the second stage, winning projects are selected, which receive full-format government support.

4. Systematic cluster policy due to implementation at the supranational (EU), national (individual EU states), regional and local levels. It should be noted that in many EU countries, cluster policy began to form at the regional level earlier than at the national level. Thus, in Germany, lands such as Baden-Württemberg, Bavaria, and North Rhine-Westphalia began cluster programs in the 1980s. On the other hand, the federal government initiated the first programs in the mid-90s. In the early 2000s, the first large-scale wave of cluster policy implementation at the level of individual states and regions began in the EU, and cluster policy was considered only as a separate component of existing programs to support small and medium-sized enterprises. At the same time, the EC made the first attempts to promote cluster policy in selected countries of Central and Eastern Europe, which were candidates for EU membership, through the RNAEC program.

The national clustering program today has the vast majority of EU countries. Usually they provide for the provision of significant financial support for the

development of clusters in accordance with national strategic priorities (key technologies, priority sectors of the economy, etc.), which is mainly aimed at supporting cluster management, R & D and innovation projects. But the advantage of regional and local clustering programs is the ability to take into account the individual specific features of cluster activities when building a program through the development of direct dialogue with the participants.

The distribution of the main areas of cluster support by the levels of its provision (supranational (EU), national, regional) is presented in Table. 2.1.

Table 2.1 Distribution of areas of state support for clusters in the EU

Tasks	direction of support	Support level
networking	Financial support for the start of clusters	National / Regional
	institutionalization of clusters	National / Regional
	Providing labor and other types of resources	Regional
introduction innovative technology	Providing tax credits for R & D	National
	Funding for basic and applied research	National / Regional
	Development of technology transfer schemes	National / Regional
	Creation of a specialized research base	National / Regional
	Supporting the development of research networks	EU / national / regional
	Development of connections between enterprises, research organizations and other participants	EU / national / regional
Human capital development	Support for cooperation between universities and enterprises in the field of staff training and employment of graduates	Regional
	Creating vocational training programs	Regional
	Creation of new specialties in universities, taking into account the staffing needs of cluster companies	Regional
Development of physical infrastructure	Creation of business incubators	National / Regional
	creation of technology parks	Regional
	Creation of business parks	Regional
	development of communications	Regional
Providing access to markets	Creation of regional development funds in the regions where clusters are located	Regional
	Creation of innovation funds	National / Regional
	Support for companies in accessing state and EU funding programs and projects	National / Regional
	Creating networks "business angels"	Regional
	Conducting trainings for companies to ensure that they meet the criteria for obtaining funding from state and EU funds	Regional
	Support for internationalization of companies	Regional
	Supports co-branding and marketing of cluster companies	Regional
	Marketing research	Regional
General	Ensuring company access to business services	Regional

support	Creating a supportive regulatory environment	Regional
	Improving the quality of life	Regional

Source: made by author

5. Integration of cluster policy into other types of economic policy. Cluster policy in the EU countries has a close relationship with other types of economic policy, which ensures high efficiency and consistency in its implementation. Very often, when implementing cluster policy, tools of other types of economic policy are used, combining and using them in a new way to get the best results.

In the new EU-2020 economic development strategy, clustering is recognized as one of the main tools for achieving competitiveness of the economy. The use of the cluster approach is proposed for the implementation of two of the seven key economic policy initiatives:

- "industrial policy of the era of globalization" (the goal is to improve the business climate, especially for small and medium-sized enterprises, to support the development of a strong industrial base capable of competition at the world level)

- "resource efficient Europe" (the goal is to make the transition to a low-carbon green economy, support the development of new sources of energy, modernize the transport sector, etc.).

Despite the fact that the overwhelming majority of EU countries have sufficient experience in the development of clusters, the new approach to the innovative development of European regions based on "smart specialization" is based on the active use of cluster policy methods and tools, including privately identifying priority areas for cluster development, organization the process of selecting companies and organizations, establishing an effective dialogue between the participants by creating cluster organizations, etc.

The cluster model is actively used in the development policy of SMEs through the implementation in the EU during 2014-2020. COSME program, the total budget of which is 23000000 Euros. One of the most important tasks of the program is to stimulate the development of world-class clusters with the

participation of SMEs, with an emphasis on the development of intersectoral cooperation in new industries with the active use of ICT.

6. Internationalization of clusters and stimulation of cluster interaction. European clusters often do not reach the critical mass necessary for their effective functioning and competitiveness outside the region of location. Therefore, in the context of global competition, the development of inter-cluster interaction becomes an unallocated process and is actively supported at the EU level.

One of the most important modern trends in the coordination of cluster development at the international level is the formation of cluster networks. Despite the fact that competitive clusters usually have developed links with similar clusters in other regions and countries, stimulating the development of cooperative relations between them, the development and implementation of joint development and cooperation programs is an important priority of European policy.

Modern European and European initiative initiating cluster development and the internationalization of clusters, in particular, include:

• The European Cluster Collaboration Platform is a platform for the development of cluster interaction, which allows cluster organizations to find potential partners for international cooperation and provides cluster access to international markets. Today, the platform brings together 950 cluster organizations from all over Europe;

• The European Strategic Cluster Partnerships initiative, which aims to promote the development and implementation of joint cluster-wide strategies to conquer the markets of other countries in the new knowledge-intensive industries, with particular emphasis on the participation of SMEs in international competition in innovative sectors of the economy. In fact, this initiative is a continuation of the project to create European cluster consortia. In 2013, the initiative selected, on a competitive basis, 13 partner cluster unions, which are supported by the European Cluster Cooperation Platform.

The internationalization of clusters is also an important strategic priority for most national and regional cluster programs of EU countries. In particular, the

following measures aimed at the internationalization of clusters are planned or are being implemented in regional and national cluster programs:

- Organization of on-site training seminars for cluster members

- Organization of trainings for cluster managers and employees of cluster organizations;

- Approximation and complementarity of policy instruments to support exports and support SME access to international markets;

- Attraction of cluster organizations in trade and investment policy at the regional and state levels;

- Providing clusters with information on opportunities to participate in international projects (conferences, expert and scientific platforms, etc.);

- Providing opportunities for the participation of clusters in various EU programs and the development of international cooperation through the institutions of permanent business missions, trade attaches, and the like;

- Creation of new structures for transnational cooperation in the field of research and development;

- Development and signing of agreements, memorandums of understanding and other documents between clusters in sectors that have the greatest potential for access to foreign markets.

7. The focus of cluster policy on the development of SMEs. In general, the policy of supporting and developing SMEs is traditionally a priority for the EU, which is determined by the determining role of SMEs in the economy - their share in the total number of enterprises in the EU-28 real sector is 99.8% (of which 92.4% of EU-28 enterprises are micro-enterprises) The added value created by them reaches 28% of the EU28's GDP, they employ 66.8% of the total employed population.

In turn, SMEs are also interested in participating in pan-European projects and initiatives, because the limited size of the overwhelming majority of them make it difficult to independently implement large-scale innovative projects, implement R & D and access to highly competitive international markets. This

leads to a significant interest of SMEs in the creation of cluster associations - European experience indicates that SMEs are the main beneficiaries of cluster programs. Overall, the share of SMEs in European clusters is 76%. In a survey of representatives of 100 clusters of SMEs from 11 EU countries, conducted under the EU CO-DESNET project (Collaborative Demand And SupplyNetworks), it was found that 46% of the surveyed clusters showed a steady positive effect from the merger, another 51% showed a moderate growth.

Thus, in the EU countries, considerable experience has been accumulated in the formation and implementation of cluster policy at supranational, national and regional levels, which makes it possible to form a coordinated integrated approach to the formation of a system of economic security for both member countries and the EU as a whole. Considering the scale of clustering of the real sector and, in particular, the industry of European countries at the present stage, one can argue about the significant impact of cluster organization of production on economic security indicators. The sustainability of the EU countries' economy in the current crisis trends in the world economic system, which manifested itself in at least weak growth against the background of the general fall of the global economy in recent years, the persistence of high indicators of innovation activity and the status of one of the world leaders in high-tech products indicates high cluster efficiency politicians.

2.2. Impact of cluster activities on the country's competitiveness

Analysis of clusters' activities on the country's competitiveness and its individual components should be carried out taking into account the most pressing threats to economic security, which will determine the role of clustering in neutralizing these threats and in ensuring the effective functioning of the national economic system.

The emergence of threats can be caused by both internal and external factors. It should be noted that during almost the entire period of Ukraine's

independence, most of the threats to the economic security of the state were caused by factors related to significant structural distortions in the economy and the lack of market mechanisms of management. But in the years 2014-2017an unprecedented exacerbation of threats caused by external, independent of Ukraine, factors related to the Russian aggression in eastern Ukraine and the annexation of the Autonomous Republic of Crimea has occurred. As a result, new and deepening existing socio-economic problems have emerged, significantly affecting the key indicators of the EDB.

As of the end of 2017, calculations according to the methodology of the Ministry of Economic Development and Trade indicate that the integral indicator of economic security has dropped to an unprecedented low level for the entire period of Ukraine's independence - 44% (Table 2.2)

Table 2.2 The level of economic security of Ukraine in terms of components, 2009-2017,%

Component	2009	2010	2011	2012	2013	2014	2015	2016	2017
Production	61	56	52	54	57	53	53	52	46
Demographic	41	44	46	45	52	45	46	46	49
Energetic	32	34	31	34	32	34	39	45	41
Foreign economic	40	36	38	39	35	30	32	35	38
Investment Innovation	41	41	34	36	36	37	35	30	30
Macroeconomic	48	38	44	38	47	38	40	33	29
Food	85	83	84	90	92	93	86	94	94
Social	53	55	57	56	59	62	64	57	52
Financial	65	49	44	47	48	46	50	36	36
integral index	**52**	**48**	**47**	**48**	**50**	**48**	**49**	**45**	**44**

Critical zone 0 – 19   *Satisfactory area 60 - 79*
Danger zone 20 - 39   *The optimal zone 80 - 100*
Unsatisfactory area 40 – 59
        Source: made by author

The only component that has remained in the optimal zone for many years is food security. But in the danger zone (20-39%) are foreign economic, investment and innovation, macroeconomic and financial security. Four components of economic security are in an unsatisfactory zone (40-59%): production, demographic, energy, and

social. At the same time, the industrial, investment and innovation, macroeconomic and financial components suffered the greatest decline in recent years.

It is obvious that the introduction of the cluster model has the greatest impact on the industrial safety of Ukraine, affecting the main indicators of the industry. It is precisely the industrial safety of Ukraine in recent years that has suffered a crushing effect of exogenous and endogenous factors, and its level has experienced a fall from 61% to 46%. The most relevant at the present stage of development of threats to industrial safety of Ukraine include:

1. The decline in industrial production due to the exacerbation of systemic problems in the manufacturing sector and the deepening crisis trends in the economy, caused by the deployment of military operations on the territory of Ukraine, which led to the destruction of strategically important production facilities and the weakening of production potential. In 2015-2016 The fall in industrial production was 10.1% and 13.0%, respectively (Table 2.3), with all the main aggregated types of industrial activity showing a negative trend. This trend was largely due to a drop in production in the Donetsk and Lugansk regions. At the end of 2017, there was a weak production growth of 2.8% in industry, which was mainly due to the low base of comparison.

Table 2.3 Indices of industrial production in Ukraine, 2011-2017, % to the previous year

Type of industrial activity	2011	2012	2013	2014	2015	2016	2017
Industry, total	112,2	108	99,3	95,7	89,9	87,0	102,8
Mining and quarrying	105,0	106,7	101,5	100,8	86,3	85,8	99,8
processing industry	116,3	109,7	98	92,7	90,7	87,4	104,3
Supply of electricity, gas and air conditioning	109,7	103,1	100,9	98,9	93,4	88,0	102,5

Source: made by author

2. Deep structural deformations in the industrial sector due to excessive orientation to the development of basic (mainly raw materials) industries, which leads to a high dependence of the functioning of the economy on external conditions and low ability to respond quickly to market needs.

World experience shows that the highest rates of economic growth can ensure the development of high-tech sectors of the sector. In Ukraine, in the volume of products sold, only an insignificant share belongs to products with a high added value.

3. Disintegration of industrial production - a low degree of cooperation between enterprises in value-added chains, the lack of closed production cycles of products of higher technological structures.

4. The lack of a systemic vision of the development of the industrial complex and the uncertainty of the strategic foundations of the state industrial policy. Today in Ukraine there is no central executive body, the main functions of which would be the development and implementation of the state industrial policy. After the reorganization of the Ministry of Industrial Policy by joining the Ministry of Economic Development and Trade, these functions are assigned to individual departments of the Ministry of Economic Development and Trade, which significantly reduces tasks and disperses powers and responsibilities in the development and implementation of state industrial policy, thereby reducing its effectiveness.

In Ukraine, the complex state strategy for the development of industry has not yet been developed, where the directions of state support would be determined in the general balance of state, sectoral, corporate and regional interests and resources.

5. A high level of monopolization, consolidation of the monopoly-oligarchic model in the economy. In fact, in every region, market power and most of the production resources are concentrated in the hands of several large companies, creating economic dependence on the policies of monopolistic companies and suppressing the development of small business.

Losses from cartel collusion in Ukraine are estimated at between 10 and 22% of GDP. Today, only 47% of the markets in Ukraine, goods are sold in a competitive environment. But about 11% of the markets are markets with a natural monopoly, and the remaining 42% are markets in which there is a monopoly or oligopoly position. Over the past 10 years, the share of markets where goods are sold under competitive conditions in Ukraine has fallen by 12%.

6. Uneven distribution of productive forces in the regions of Ukraine, which leads to deep regional disproportions of economic development and the emergence of depressed, crisis and backward regions. Analysis of data on the structure of the GDP and GDP of Ukraine per person suggests that a significant gap in the production potential of the regions remains - the shares of certain eastern regions of Ukraine in GRP were several times larger than the shares of many western and central regions, and the GDP per capita - two times more (Table 2.4).

Table 2.4. GDP per capitain the regions of Ukraine and the structure of GDP, 2012-2017

Region	GDP per 1 person., Th. UAH						Share in GDP,%					
	2012	2013	2014	2015	2016	2017	2012	2013	2014	2015	2016	2017
Ukraine	23,6	28,5	32,0	33,5	36,9	46,4	100	100	100	100	100	100
Vinnitska	14,3	17,8	20,3	22,3	27,2	37,3	2,2	2,2	2,3	2,4	2,8	3,0
Volynska	13,9	17,0	19,2	19,8	23,2	30,4	1,3	1,4	1,4	1,4	1,5	1,6
Dnipropetrivska	34,7	42,1	44,7	46,3	53,7	65,9	10,7	10,8	10,1	10,0	11,1	10,8
Zhytomyrska	14,6	17,2	19,6	20,3	23,7	30,7	1,7	1,7	1,7	1,7	1,9	1,9
Zakarpattia	12,3	14,5	17,1	17,0	19,2	23,0	1,4	1,4	1,5	1,4	1,5	1,5
Zaporizhska	23,7	27,6	30,7	30,5	37,3	50,6	3,9	3,8	3,8	3,6	4,2	4,5
Ivano-Frankivska	14,8	19,4	23,4	24,0	27,2	33,2	1,9	2,1	2,2	2,2	2,4	2,3
Kyivska	26,1	34,4	40,5	40,0	46,1	60,1	4,2	4,5	4,8	4,5	5,0	5,2
Kirovogradska	15,5	19,9	22,1	25,5	29,2	39,4	1,5	1,5	1,5	1,7	1,8	1,9
Lvivska	16,4	20,5	24,4	24,9	28,7	37,3	3,8	4,0	4,3	4,2	4,6	4,8
Nikolaevska	20,3	23,4	24,8	27,4	30,4	41,5	2,2	2,1	2,0	2,1	2,2	2,4
Odeska	22,5	25,7	27,1	29,1	31,3	41,7	5,0	4,7	4,4	4,6	4,7	5,0
Poltavska	29,7	35,2	38,4	40,0	48,0	66,4	4,1	4,0	3,9	3,8	4,4	4,8
Rivnenska	13,8	16,7	18,7	19,0	24,8	30,4	1,5	1,5	1,5	1,4	1,8	1,8
Sumska	15,7	19,8	21,7	23,5	26,9	37,2	1,7	1,8	1,7	1,8	1,9	2,1
Ternopiskal	11,7	15,1	16,6	16,8	20,2	25,0	1,2	1,2	1,2	1,2	1,4	1,3
Kharkivska	23,6	28,0	30,0	31,1	35,3	45,8	6,0	5,9	5,6	5,6	6,1	6,3
Khersonska	14,3	17,0	17,9	19,3	21,7	30,2	1,4	1,4	1,3	1,4	1,5	1,6
Khmelnitska	13,6	17,3	19,9	20,2	24,7	31,7	1,7	1,8	1,8	1,7	2,0	2,1
Cherkaska	17,3	21,1	25,0	26,2	30,6	40,8	2,1	2,1	2,1	2,2	2,4	2,6
Chernivetska	10,9	13,2	14,5	15,2	16,6	20,3	0,9	0,9	0,9	0,9	0,9	0,9
Chernihivska	15,4	19,4	22,1	22,6	26,5	35,2	1,6	1,6	1,6	1,6	1,8	1,9
Kyiv City	70,4	79,7	97,4	109,4	124,2	155,9	18,2	17,2	18,9	20,5	22,5	22,7

Source: made by author

The deterioration of the financial condition of enterprises in Ukraine, the instability of the socio-political situation and the aggravation of global competition

in the market of investment resources causes a deepening investment crisis in Ukraine. The following threats should be recognized as actual threats to the state's economy in the investment sphere at the present stage of development:

1. A significant drop in the volume of investment, which leads to the acceleration of physical and moral obsolescence of production equipment, a critical level of depreciation of fixed assets, increasing Ukraine's technological lag behind developed countries.

In 2014-2017 there was a constant decline in foreign direct investment (FDI) in the industry - the deepest drop of 29.8% was recorded in 2015, after which the rate of decline somewhat decreased to 20.3 and 3.5% in 2016-2017 (Fig. 2.1). Capital investment, after a decrease of 25.7 and 19.9% during 2015-2016. (Which was largely due to the exclusion of the ARC and the ATO zone according to calculations), in 2017, growth resumed at 18.7%.
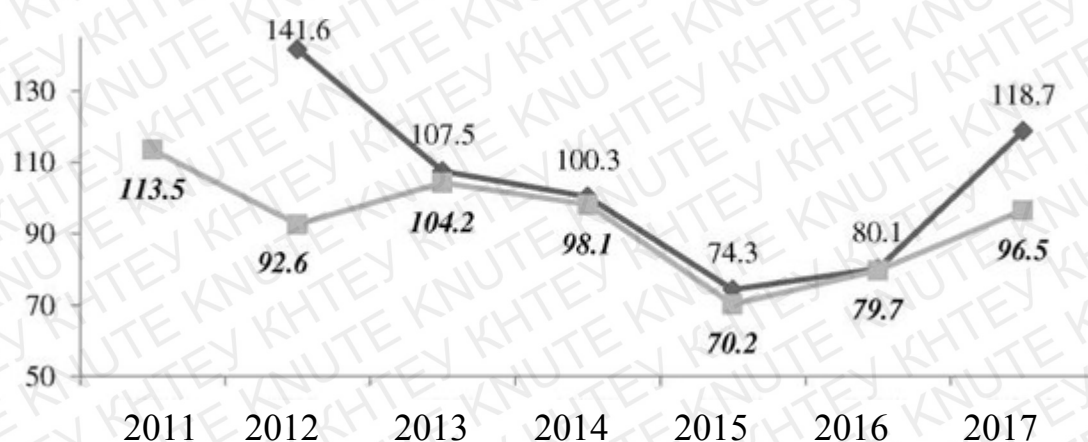
Fig. 2.1 Capital investment indices and growth rates (decrease) in the volume of FDI (equity capital) in the industry of Ukraine,%

Source: made by author

2. The inefficiency of the investment structure of the industry for the implementation of the strategic priorities of economic development with the primary direction of investment in the production of lower technological structures (mining, metallurgy, food industry), which leads to the consolidation of the raw materials orientation of production and export.

On the other hand, the attraction of capital investments in industries with high potential for the production of high-tech and high-tech products remains at an extremely low level.

3. The unfavorable investment climate in Ukraine, the reasons for which are the unsatisfactory protection of the rights of owners and investors, the lack of investment insurance mechanisms, high volumes of the shadow economy, high inflation, numerous shortcomings in investment legislation, added to military threats, macroeconomic instability, a sharp loss purchasing power by both the public and the corporate sector.

In recent years, threats to the state's innovative security have escalated, deepening the technological gap between Ukraine and the developed countries of the world, consolidating the raw material model in the economy. The most urgent threats to the state's innovative security include, first of all, the following:

Table 2.5 Structure of capital investment and foreign direct investment (Share capital) by type of industrial activity, OKVED-2010

Types of activities	Capital investment million UAH /%			Foreign direct investment, million USD /%		
	2015	2016	2017	01.01. 2015	01.01. 2016	01.01. 2017
Industry	86242.0 100	87656,0 100	108635,2 100	14472,5 100	9 893,6 100	9 550,2 100
Extractive	20010.6 23,2	18466,3 21,1	21740,0 20,0	1418,2 9,8	1 868,7 18,9	1 524,5 16,0
processing, including:	42474.4 49,3	46219,1 52,7	55002,2 50,6	12264,0 84,7	7 531,9 76,1	7 594,3 79,5
food industry	13486.7 15,6	13548,5 15,5	16938,5 15,6	2706,4 18,7	2 419,0 24,5	2 550,9 26,7
light industry	623,0 0,7	987,0 1,1	1695,3 1,6	127,2 0,9	116,9 1,2	113,8 1,2
wood products manufacturing, paper making and printing	2011,8 2,3	4031,1 4,6	3581,1 3,3	458,4 3,2	400,7 4,1	408,3 4,3
production of coke and refined petroleum products	534,2 0,6	579,6 0,7	734,9 0,7	129,2 0,9	188,7 1,9	176,6 1,8
production of chemicals and chemical products	2174,6 2,5	1679,7 1,9	1655,5 1,5	913,1 6,3	679,5 6,9	644,2 6,7
pharmaceutical industry	1413,2 1,6	1622,8 1,9	1669,3 1,5	49,5 0,3	45,5 0,5	50,9 0,5
manufacture of rubber and plastic products, other non-	3989,0 4,6	3817,7 4,4	5857,0 5,4	1179,2 8,1	1 079,8 10,9	1 035,2 10,8

metallic mineral products						
Metallurgy	11833,6 13,7	12470,0 14,2	14341,4 13,2	5551,6 38,4	1 533,1 15,5	1 497,9 15,7
mechanical engineering	5474,7 6,3	6283,1 7,2	7166,0 6,6	894,4 6,2	781,6 7,9	828,5 8,7
other industries	933,6 1,1	1199,6 1,4	1363,2 1,3	254,9 1,8	287,2 2,9	288,1 3,0
supply of electricity, gas and conditioned air	22895,0 26,5	21347,2 24,4	29885,7 27,5	707,2 4,9	438,0 4,4	378,6 4,0
water supply; sewage, waste management	862,0 1,0	1623,4 1,9	2007,3 1,8	83,2 0,6	55,1 0,6	52,8 0,6

Source: made by author

1. Inconsistency and fragmentation of state policy in the scientific, technical and innovation spheres, non-compliance with legislatively defined goals and priorities of innovative development. In developed countries, science, technology, and innovation policies are deeply integrated into all other types of national policies, and the state assumes a significant portion of the costs of science and technology to avoid promising innovative projects and responsibility for their practical implementation in industry.

2. Insufficient financing of scientific and technical works and related derivative threats - loss of scientific personnel and intellectual property; irrational structure of scientific and technical potential; decrease in innovation activity.

3. The gap between the links between science and production, the isolation of basic research from the needs of the market. Despite the fact that domestic research institutes annually create a significant amount of new developments, their introduction into production is constrained by low demand from the private sector, which is primarily due to the lack of financial resources from enterprises, as well as the underdevelopment of technology transfer systems in Ukraine.

The main threats to the economic security of the state in the foreign economic sphere include the following:

1. Deformation of the export structure with a predominance of the share of raw materials and a low share of high value-added products, deepens the imbalances in the development of the mining and processing industries.

2. Growth of import dependence of the national economy. Weak competitiveness of domestic producers, focus on the production of lower technological structures and raw materials increase the country's dependence on imports of end-use products and high-tech products, which, in turn, displaces domestic producers from the domestic market, reducing their share in the domestic economy. In 2011-2017 the needs of the domestic market were met by strengthening the position of imported products against the background of the redirection of domestic production to foreign markets (Table 2.6).

Table 2.6 Dynamics of domestic consumption of industrial products in Ukraine, 2011-2017

Index	2011	2012	2013	2014	2015	2016	2017
Total domestic consumption, UAH billion	1119,3	1412,3	1490,6	1430,5	1435,1	1763,3	1840,7
Domestic products, billion UAH	640,7	767,2	826,3	824,6	789,6	943,9	839,9
% Domestic products summarize the volume of domestic consumption	57,2	54,3	55,4	57,6	55,0	53,5	45,6
Imported products, billion UAH	478,6	645,1	664,3	605,9	645,5	819,4	1000,8
% Import in total domestic consumption	42,8	45,7	44,6	42,4	45,0	46,5	54,4

Source: made by author

3. The slow introduction of international standards of production and product quality, the inadequacy of the national technical regulation system with international and European standards, which hinders the introduction of new technologies into production, creates technical barriers in foreign trade, limiting the access of Ukrainian products to European markets.

4. Weak geographic diversification of Ukraine's foreign trade, which results in Ukraine's critical dependence on the economic policies of key foreign trade partners.

In the conditions of an unprecedented aggravation of internal and external factors influencing the financial system of Ukraine in recent years, threats to the financial security of the state in all its subsystems have increased significantly. However, for the purpose of the study, we will consider only those threats that can at least partially be neutralized due to the positive impact of the use of cluster systems in the manufacturing sector. These include the following:

1. The unsatisfactory financial condition of enterprises threatens to reduce their investment potential and tax revenues to the budget of Ukraine (Table 2.7).

Table 2.7 Financial results of Ukrainian enterprises, 2013-2017

Indexes	2013	2014	2015	2016	2017
Financial results before tax	21353,4	13698,3	-166414,0	-181360,9	4696,2
Net profit (loss)	2592,4	-4181,1	-178730,9	-188267,9	-11855,9
Profitability of operating activities	3,4	3,0	1,6	0,9	5,5

*2013-2017 - excluding the temporarily occupied territory of the ARC, Sevastopol and part of the zone of the antiterrorist operation

Source: made by author

2. The insufficient role of the non-banking financial sector of Ukraine in financing the real sector of the economy, low diversification of the national financial market, significantly limits the ability of industrial enterprises to attract the necessary financial resources for modernization, technical re-equipment and the development of innovative areas in industrial production. Analysis of the data of the National Commission, which carries out state regulation in the sphere of financial services markets, suggests that despite a significant increase in the total value of financial leasing and factoring contracts, only a small part of financial resources is attracted to the industry (Table 2.8).

Table 2.8 Performance indicators of individual institutions of the non-banking financial sector of Ukraine, 2015-2017, million UAH

Index	2015	2016	2017
Legal entities-lessors and financial companies providing financial leasing services			
The cost of financial leasing contracts concluded for the period, including:	41544,9	67127,8	58572,6
industry:	1979,0	2506,2	2593,7
mining industry	1051,8	1520,6	992,3
Light industry	70,3	134,1	129,3
Engineering	210,7	219,9	273,4
Metallurgy	132,4	43,6	220,0
Food industry	430,0	517,3	906,6
Chemical industry	83,8	70,7	72,1
Factoring			
The cost of factoring contracts concluded for the period, including:	11702,8	10039,5	23525,7
industry:	586,7	117,5	133,3
mining industry	0	0	0,1
Light industry	11,1	0	0
Engineering	253	0,3	0
Metallurgy	26,8	0	0
Food industry	295,8	115,1	133,2

Chemical industry	0	2,1	0

Source: made by author

Increased risks and threats in the sphere of production, investment, foreign trade, finance and innovation cause deeper macroeconomic imbalances in the economy of Ukraine, the most important of which is the fall in real GDP caused by a general decline in economic activity in Ukraine; high level of shadow economy.

In the face of increasing socio-economic instability, threats to the social security of the state are growing, the most relevant of which are:

1. Deepening the property differentiation of the population and increasing the level of poverty as a result of stopping enterprises and increasing unemployment, increasing imbalances in the socio-economic development of regions with the formation of depressed regions, creates social and criminal tensions, increases protest attitudes in society.

2. Low demand of laborforce and lack of jobs, due to the deterioration of the financial and economic condition of enterprises, the reduction of a large number of workers and staff, as well as the existence of systemic problems in the educational sphere caused by the inconsistency of state policy in the field of secondary and higher education with modern requirements labor market, lack of dialogue and cooperation between the educational and industrial sectors in training specialists in demand in the labor market, increasing employee qualifications and the like.

The solution of these deep socio-economic problems requires systemic solutions capable of ensuring the growth of key indicators for many development vectors at once — the creation of new jobs, the modernization of industry, the development of new promising industries, the increase in the innovation, investment and foreign economic potential of the Ukrainian economy and the like.

The introduction of the cluster model in industry helps to neutralize the threats described above to the state's economy and has a positive effect on the main functional components of economic security, provided by the positive effects of cluster activities presented in Table 2.10.

The presence of such an influence of cluster activity on the economic indicators of the development of their participants and, accordingly, on the indicators of economic development at it will be susceptible to further European experts. Thus, the OECD experts published a Cluster Scoreboard study: Measuring Performance of Local Business Clusters in the Knowledge Economy, in which the performance of 80 of the most efficient global clusters specializing in the production of high-tech products was evaluated.

Table 2.10.Impact of cluster activities on the country's competitiveness

Processes that accompany the development (formation) of clusters	Result
Development of a competitive environment, Improving conditions for SME development, development of outsourcing, subcontracting	Demonopolization
Creation of new productions, increase output volumes, ensuring uninterrupted supply	Building productive capacity
Involvement of state authorities asActive members of the cluster policy	Creating a system of state Supporting industry according to development priorities
OZ upgrade, technical upgrading Industrial enterprises	Increase in the economy
Building formal and informal connections of all sectors of the economy	Creation of closed production chains
Creation of growth points in regions and Distribution of innovative impulses	reduction of regional developmental imbalances
Release of investment resources enterprises by reducing costs, integrating enterprises into global value added chains	The growth of investment in industry, increasing the level of capitalization of the economy
Creating a complete production cycle industrial products	investment overflow Resources from primary sectors to processing industries
Creation of stable integration formations With strong economic ties	Increased investor confidence in business associations
Involvement of the state in the development and implementation of innovative cluster projects	Efficiency increase Government investment in R & D and innovation
Creating "overflow effect" -Distribution of new knowledge, technologies, innovative methods of organization	growth innovation Industrial activities, accelerating commercialize at innovation
Development of processing industries with The emphasis is on the production of products with high added value	Growth of expensive export components
Creating missing links in chains production	The development of import substitution in industry
Creation of cross-border clusters, Development of benchmarking and implementation "Best practices" of production	Accelerated implementation International production standards
Setting up production Higher redistributions	The conquest of new markets
Creation of new enterprises Improvement of financial performance of enterprises and organizations	Expanding the tax base, increasing tax revenues
Development of venture financing, factoring, leasing services	Strengthening the non-banking financial sector
Creation and development of specialized Cluster organizations	Development of business infrastructure
Creation of scientific, advisory centers, equipment sharing centers, etc.	Development of innovation infrastructure
Creating growth points outside urban areas	capacity development in depressed regions
Creation of new jobs Favorable environment for professional growth	The growth of employment, the creation of specialized "pools" of labor
Development of production of higher redistribution	Growth of the share of products with high airborne vehicles in GDP
Introduction of transparent reference schemes of business	Reducing the level of economy shadowing

The best results were observed in terms of employment and sales volumes. At the same time, the correlation coefficient between these two indicators in both time periods was 0.78, which indicated that the increase in sales volumes resulted in the creation of jobs. A significantly greater decline in sales volumes than employment rates during a recession indicates a faster negative impact of the crisis on trade.

The growth in financial performance of enterprises was less noticeable, but they all remained mostly positive against the background of a significant deterioration in the financial condition of enterprises in developed countries.

Studies conducted within the EU analytical report Cluster'sFacilitating Innovation Europe confirm a higher level of innovation activity of enterprises participating in clusters compared to innovatively active enterprises operating outside clusters, is shown in Fig. 2.2.
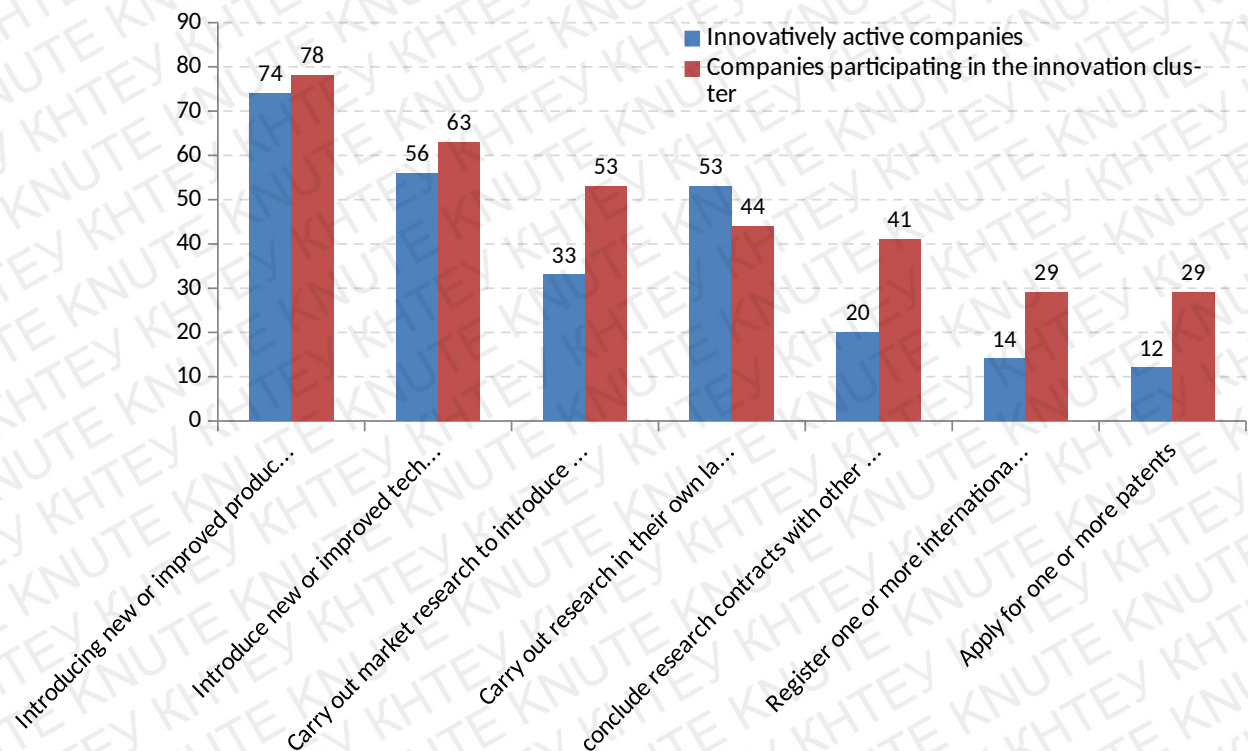

Fig. 2.2 Comparison of indicators of innovation activity of companies that are and are not members of clusters

Source: made by author

Figures 2.3 indicate that the companies participating in clusters are ahead of other innovatively active companies in the overwhelming majority of indicators of innovation activity. Considering that the development of cooperation with other companies is one of the fundamental principles of cluster activity, their lag behind other innovatively active companies in carrying out research in their own laboratories is quite natural and is due to their active use of subcontracting and outsourcing mechanisms.
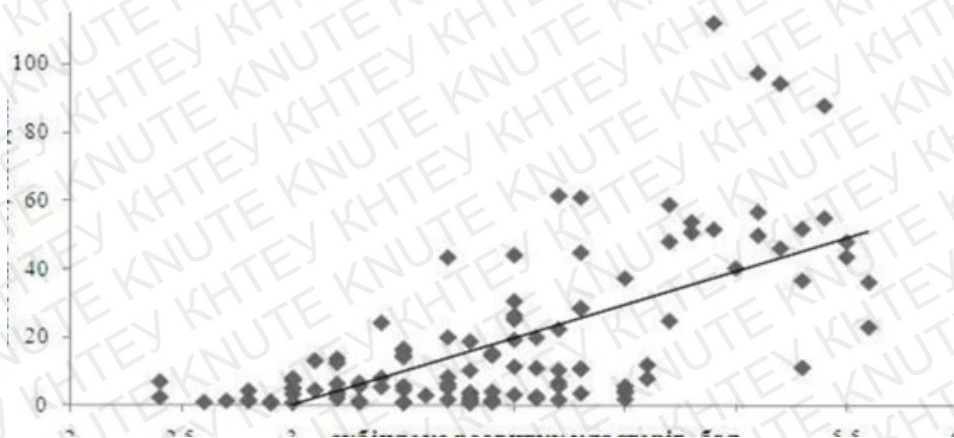

Fig 2.3 The level of clustering of the economy on the production of GDP and the macroeconomic security of countries

A definite resultant indicator of the influence of clustering on the development of a country's economy can be considered the growth of GDP production.

The significant impact of the level of clustering of the economy on the production of GDP and the macroeconomic security of countries is evidenced by the results of the correlation analysis (Fig. 2.3), which revealed a fairly high direct correlation between the sub-index "Cluster development level" of the WEF global competitiveness index and the indicator of 1 person per 115 countries of the world.

The results of the correlation analysis of the demonstration of the fact that countries with a high level of clusterization of the economy mainly have significantly higher rates of GDP production than countries with a low level of development of clusters.

2.3. Analysis of the development of economic clusters in the economy of Ukraine

The rapid growth of the popularity of the cluster development model in the economies of European countries and dynamically growing Asian countries, as well as the significant accumulated experience of successful implementation of cluster policies at the state level in these countries, have heightened the interest of Ukrainian scientific and business communities in the concept of industrial clusters and the spread of European clustering experience in Ukraine in the 1990s - early 2000s.

Spreading the world experience of creating clusters in Ukraine takes place with active international support - in particular, the EU project "Support for Sustainable Regional Development", the OSCE Project Coordinator in Ukraine, the US Agency for International Development (SAGO), the Ukrainian-German project "Promoting Economic Development and Employment" with the participation of the German Society for Technical Cooperation in Ukraine, the Representative Office and UNDP projects, which provide information support for the development of clusters, are Terni research and support at the stage of cluster initiatives, etc.

The first cluster initiatives in Ukraine were founded thanks to the cooperation of leading Ukrainian scientists with representatives of the progressive business community of small and medium enterprises. For the first time, the idea of clustering the economy of Ukraine at the regional level began to be implemented in the Khmelnitsky region from 1998. At the initiative of the famous American economist Wolfgang Price and scientists of the Khmelnitsky National University called "Podolye I". The implementation of the Program in the region resulted in the construction of the first three clusters - sewing, construction and food, and in 2002 the first Ukrainian tourist cluster "Obereg" was founded, designed as a public organization, which included more than 50 agricultural enterprises, farmers, fishermen and craftsmen. In the Zaporozhye region, the machine-building cluster LLC AgroBUM successfully operates, which unites more than 20 enterprises and develops cooperation on the principles of subcontracting. In Ivano-Frankivsk region acts known Tismenitsky fur cluster on the basis of "HutrofirmaTysmenytsia" in Rivne - wood cluster "Polesie Rokitnovschiny", created in 2003. The clusters are

developing in Volyn (agricultural, transport, automotive, feed, wood), Mykolaiv (Shipbuilding , electronics, marine), Kherson (transport and logistics), Odessa (metal service, engineering, transport and logistics) and other areas.

Today, cluster initiatives cover almost all regions of Ukraine, which indicates the interest of companies in creating business networks and provides a reliable platform for the formation of a cluster policy at the state level. The overwhelming majority of Ukrainian clusters are in their infancy (protoclusters or monocentric clusters with a small number of participants, weak connections within the cluster and a lack of network representation of all institutional sectors of the economy). The immaturity of most industrial clusters in Ukraine is also evidenced by the lack of stable interregional cluster associations and the overwhelming concentration of industrial clusters within individual regions or regions.

A feature of the development of clusters in Ukraine is the orientation of most promising clusters to traditional industries, while the priority of European countries is the development of high-tech innovation clusters in high-tech engineering, biopharmaceuticals and electronics, ensuring the creation of maximum value added with minimal transaction costs.

A promising direction for Ukraine is also the creation of cross-border clusters. Despite the fact that 19 of the 25 regions of Ukraine are border, Ukraine has significant potential for cooperation with foreign companies within cross-border clusters. An example of such cooperation is the Ukrainian-Romanian "First Agrarian Cluster", created in 2009. In the Chernivtsi region. In 2007, a Ukrainian-Russian-Belarusian construction cluster was established with the participation of the Kharkiv State Technical University of Construction and Architecture, the Belgorod State Technological University. Shukhov, Belgorod Regional Fund for Small Business Support and Kharkiv Regional Fund for Entrepreneurship Support.

Let us dwell in more detail on individual successful examples of the implementation of cluster initiatives in the industrial sector of Ukraine. One of the oldest clusters in Ukraine was created in 2000. Khmelnitsky construction cluster, consisting of 32 companies, including 21 enterprises engaged in the construction,

production and sale of building materials, 2 banks, 2 universities, 3 architectural design institutes, 3 client companies and 1 audit firm. The initiator of the creation of the cluster was the Association "Podolia First". The core of the cluster, which included several construction companies, was formed in the second half of 1999, starting in 2000. Non-governmental organization of the construction cluster - Khmelnitsky Regional Public Organization.

Prerequisites for creating a construction cluster in Khmelnitsky steel:

- the presence in the region of minerals used in the construction industry;

- availability of scientific, industrial and personnel potential;

- the presence of a large-scale wholesale and retail market in the region;

- the presence of significant foreign exchange earnings from citizens working abroad, which are used to invest in production;

- high level of interest and organizational support from local authorities.

Thanks to the joint efforts of the cluster members, a number of initiatives have been implemented, which have led to a significant increase in the productivity and competitiveness of all its companies. The most important initiatives include:

- the creation by the cluster companies of a common plant for the production of dry building mixes, which allowed all cluster members to use high-quality local-made mixtures for the construction at a price well below imported counterparts. In particular, a new technology has been introduced for the production of a mixture of the "Ceresite" type from local raw materials, which is twice as cheap as the Polish counterpart;

- founding the cluster of a joint service company Budclust, Ltd. by the companies, which combined the whole range of services from the construction of houses and high-rise buildings to the decoration and decoration of the premises, making them significantly cheaper for the cluster clients.

Thus, already after 4 years from the start of the cluster initiative of the construction cluster, it was possible to achieve significant economic results - to manufacture more than 10 new types of building materials and components, to

form a common information and production infrastructure, to organize the sale of its products throughout Ukraine and abroad participation in national and international exhibitions, significantly improve the quality of construction work and shorten the construction cycle .

Another example of successful application of the cluster model of production organization is the Eastern Food Technologies plus agro-industrial cluster created in 2012 in the Kherson region, which, on the principles of developing a closed production chain, united the efforts of companies and organizations involved in growing, collecting, storing, pre-sale preparation, processing and marketing fruit and vegetable products by supporting commercial offers from the best players in this market into a single agreed commercial package.

The cluster is registered in the form of an association and unites more than 20 private companies with an aggregate number of employees of more than 2 thousand people and an annual turnover of about $ 100 million. It is conditionally divided into 4 groups: collegial (representatives of state authorities, non-profit organizations, international organizations, TIP, universities, etc.), stem (product manufacturers), auxiliary (companies that accompany the stem group activities - banking, insurance, consulting, engineering, logistics, security companies, etc.) and target (companies-consumers of goods and services of the stem group - farms, canneries, alcoholic beverage enterprises, traders, etc.).

Thanks to the active organizational activity of the founders, the cluster already today unites representatives of three regions of Ukraine - Odessa, Nikolaev and Kherson. In addition, its collegial group included representatives of the Lithuanian cluster "SMART IR CLUSTER", specializing in the development of integrated IT solutions for agricultural, energy and banking companies; Representatives of the Swedish Embassy in Ukraine (Honorary Consul of the Kingdom of Sweden in Ukraine is one of the founders of the Chumak company in Kakhivka), which expanded the boundaries of the cluster not only to the interregional, but also to the international level.

The interaction of companies within the cluster allowed developing new technologies for the production of food products and putting into operation unique types of equipment that were not previously produced in Ukraine, in particular, equipment for drip irrigation and remote phytonomonitoring and new types of equipment for processing fruit and vegetable products.

The lobbying of interests of the cluster and agribusiness participants in the south of Ukraine as a whole at the national level will be greatly facilitated by the inclusion of its representatives in the public council of the Ministry of Economic Development and Trade of Ukraine. In addition, the cluster is actively developing cooperation with the International Trade Center, the UN and WTO technical cooperation agency in the field of export promotion in countries with economies in transition, which will result in the development and implementation of an export strategy for the fruit and vegetable sector in the south of Ukraine.

Despite significant prospects for the development of clusters in traditional industries, increasing the economic competitiveness of the regions of Ukraine is impossible without ensuring the priority development of high-tech industries of the fifth and sixth technological structures. Ukraine has all the prerequisites for the development of clusters in high-tech industries based on existing technology parks and industrial parks - biotechnologies, special and dual-use systems based on the Kiev Polytechnic technology park; nuclear technologies based on the Pyatikhatkytechnopolis in Kharkiv. electronics industry based on the industrial park in with. Rosovka (Zakarpattia), mechanical engineering on the basis of the industrial park "Solomonovo" (Zakarpattia region), etc.

Thus, the science park "Kyiv Polytechnic" has all the prerequisites for creating a powerful high-tech innovation cluster - an extensive infrastructure for research and development activities based on the laboratories and specialized centers of NTUU "KPI" and a significant pool of highly qualified workforce taking into account the needs of the cluster; LLC "Technopark" Kiev Polytechnic "is registered, the functioning of which is already now based on the principle of the triple helix and whose participants during 2005-2010. More than 150 new products and technologies

have been introduced to the market. In particular, among the developments of the technopark is a complex of computer equipment that provides the user from collateral electromagnetic radiation; technologies of strategic planning and system management of the sustainable development of Ukraine's megalopolises; energy efficient eco-house with the complex use of renewable and alternative energy sources; production technology of new dietary foods of health and preventive action; microsatellite; technologies of low-cost production of titanium.

There are prospects for the creation in Ukraine of a full technological cycle of production of immunoprophylactic drugs using substances developed by domestic scientists. Ukraine has a historically established scientific school of microbiology and virology, represented by the Institute of Epidemiology and Infectious Diseases. L.V.Gromashevsky, Institute of Microbiology and Immunology. I. Mechnikov, Institute of Microbiology and Virology. D.K.Zabolotnogo NAS of Ukraine and others.

In Ukraine, there is also a powerful research base for creating new types of substances and preparations - numerous developments in this area should be the Institute of Bioorganic Chemistry and Petrochemistry of the National Academy of Sciences of Ukraine, which, in particular, developed new methods for the synthesis of materials that can be used for medical diagnostics and treatment as well as the Institute of Pharmacology and Toxicology by us of Ukraine, which is the leading scientific institution of Ukraine in the field of creation and implementation in the production of medicines a full cycle - from synthesis to the production of finished products.

Back in 2010, the specialists of the Institute for Problems of Materials Science. I. Frantsevich in the framework of the scientific project of the National Academy of Sciences of Ukraine investigated the possibilities of organizing the production in Ukraine of polyacrylonitrile (PAN) carbon fibers. Considered the possibility of creating production in the territory of JSC "Chernihiv chemical fiber" and SE "Design Bureau" Yuzhnoye ". However, the concept was not approved, production is not established.

At present, the state does not create proper conditions for the development of innovatively active networks, attracting private and public investments in them, and

providing participants with opportunities to participate in international events and programs, significantly hinders the development of high-tech products in Ukraine. On the other hand, international experience convincingly shows that without state support for the formation of innovative clusters it is almost impossible even with relative economic stability, because the creation of a new product is a high-risk and costly process and is usually characterized by a significant time lag from the moment of investing in product commercialization and making a profit, often an insurmountable barrier to the participation of many private enterprises (primarily SMEs) in the development of innovative industries.

The underdevelopment of innovation networks in Ukraine is evidenced by the indicators of innovation activities conducted by the State Statistics Service of Ukraine in the Ukrainian economy, the results of which showed that Ukraine maintains a large gap between production, science and education and low efficiency of technological exchange. The survey showed that the main partners of innovative enterprises were suppliers of equipment, materials, components or software, 17.1% of enterprises supported close ties, as well as customers or consumers (9.9%), while cooperation with state research institutes and educational institutions remained undeveloped - only 4.7% and 3.4% of enterprises maintained close ties with them, respectively. In 2015-2017, 19.6% of innovatively active enterprises collaborated with suppliers of equipment, materials, components or software; with customers and consumers of the business sector - 7.5% of enterprises. On the other hand, the number of acquisitions that collaborated with educational institutions decreased to 2.6%, with research institutes remained at the level of 4.7%. 3.0% of enterprises cooperated with consultants and commercial laboratories, 3.8% with competitors. In general, 18.1% of enterprises with technological innovations collaborated with other enterprises and organizations, including universities, research institutes.

For a general assessment of cluster development in Ukraine, data from the global economic competitiveness report of the World Economic Forum (WEF) can be used. Although M. Porter, the founder of the modern cluster concept, is one of the

developers of the global competitiveness index calculation methodology, the integral indicator of the index includes a significant number of indicators that allow assessing the state and development potential of clusters in the economy of a given country.

First of all, this concerns the sub-indices of the "Business Development Level" component, which were developed by M. Porter, taking into account all four components of the "Porter's diamond" - assessing the availability of common and specialized production factors, stimulating conditions of local demand, proximity to related and supporting industries, as well as favorable economic policies and intense competition from other firms.

In tab. 2.11 the individual components of the global competitiveness index are presented, which in our opinion most fully characterizes the state of development of industrial clusters and the environment necessary for their development. Considering that the number of countries in the ranking varies from year to year, the table shows Ukraine's scores from 1 to 7 (1 is the worst indicator, 7 is the best indicator).

According to the data of table 2.11, the level of development of clusters in Ukraine remains extremely low - during 2010-2012. It steadily declined and, despite some improvement in the indicator in 2013-2017, as of 2017, it remains lower than in 2009. This, among other things, is explained by the deterioration of conditions for the formation and development of clusters in the economy, as evidenced by:

- Low quality indicators of local suppliers with relatively high rates of their quantity;

- The lack of control by domestic companies over the sales networks in export markets and the establishment of control by foreign companies over the distribution of Ukrainian products abroad, despite the improvement in the value chain, the level of development of production processes and marketing, indicates a certain progress of domestic companies in promoting their products to the markets, logistics development and in the development of new products;

Table 2.11 Indicators of the global competitiveness index of the WEF, characterizing the state of cluster development and the potential of clustering in Ukraine, 2009-2017

Index	2009	2010	2011	2012	2013	2014	2015	2016	2017
The level of business development, incl:	**3.9**	**3.6**	**3.5**	**3.5**	**3.7**	**3.7**	**3.7**	**3.7**	**3.6**
Cluster Development Level	**3.3**	**3.1**	**2.9**	**2.7**	**2.9**	**2.9**	**3.0**	**3.0**	**3.0**
Number of local suppliers	4.7	4.4	4.5	4.4	4.6	4.6	4.5	4.6	4.5
Quality local suppliers	4.3	4.0	4.0	3.9	4.4	4.4	4.2	4.1	4.2
The nature of competitive advantage	3.1	2.8	2.9	2.9	2.9	3.0	3.0	3.1	2.9
Value Chain Length	3.2	3.2	3.4	3.5	3.7	3.6	3.7	3.8	3.5
International distribution control	4.5	3.9	3.6	3.6	4.1	4.1	3.9	3.6	3.3
state of the art	3.9	3.5	3.4	3.5	3.5	3.4	3.5	3.8	3.8
marketing level	4.0	3.8	3.7	3.9	4.2	4.1	4.1	4.2	4.3
Willingness to transfer authority	3.4	3.2	3.0	3.0	3.1	3.1	3.2	3.2	3.2
Product Market Efficiency, incl:	**3.9**	**3.7**	**3.5**	**3.6**	**3.8**	**3.8**	**4.0**	**4.0**	4.0
Intensity of competition in the domestic market	4.4	4.2	4.1	4.0	4.3	4.5	4.7	4.7	4.6
Degree of monopolization of the market	3.6	3.3	2.9	2.9	3.2	3.0	3.0	3.4	3.4
Degree of customer focus	4.9	4.4	4.2	4.2	4.6	4.5	4.5	4.5	4.5
customer demand	3.4	3.5	3.2	3.2	3.4	3.3	3.4	3.4	3.1
Market size, incl:	**4.6**	**4.7**	**4.5**	**4.5**	**4.6**	**4.6**	**4.6**	**4.5**	**4.4**
Domestic Market Size Index	4.4	4.4	4.3	4.3	4.4	4.4	4.4	4.3	4.1
Foreign Market Index	5.0	5.3	5.2	5.2	5.2	5.3	5.2	5.3	5.2
Technological readiness, incl:	**3.4**	**3.4**	**3.4**	**3.5**	**3.6**	**3.3**	**3.5**	**3.4**	**3.6**
Availability of new technology	4.2	4.3	4.5	4.6	4.8	4.3	4.1	4.3	4.3
Introduction of technology at company level	4.5	4.4	4.4	4.6	4.8	4.3	4.2	4.2	4.4
Innovations, incl:	3.4	3.2	3.1	3.1	3.2	3.0	3.2	3.4	3.4
Ability to innovate	3.8	3.7	3.5	3.4	3.3	3.2	3.6	4.2	4.4
Expenditures of companies for R & D	3.3	3.0	3.0	3.0	2.7	2.7	3.1	3.4	3.3
Collaboration between universities and business UNDKR	3.6	3.5	3.5	3.6	3.6	3.4	3.5	3.5	3.5
Infrastructure, incl:	3.1	3.4	3.8	3.9	4.1	4.1	4.2	4.1	3.9
Overall quality of infrastructure	3.1	3.5	4.1	4.2	4.6	4.4	4.1	3.8	3.6
The level of development of the financial market	4.0	3.6	3.3	3.4	3.5	3.5	3.5	3.2	3.0
Availability of financial services	3.6	3.4	3.8	3.7	3.8	3.8	3.9	3.9	3.0
Global Competitiveness Index	4.1	4.0	3.9	4.0	4.1	4.1	4.1	4.0	4.0

Source: made by author

- Maintaining high rates of monopolization of markets and the prevalence of an authoritarian management style (low willingness to transfer authority) in companies due to the dominance of a limited number of business groups in the markets;

- Building competitive advantages of companies mainly in the export of products with a low degree of processing, as evidenced by high indicators of the size of the external market while maintaining low indicators of the nature of competitive advantages, which indicates their construction on the use of cheap natural resources and labor;

- Underdevelopment of the domestic market and growth of import dependence of the economy, as evidenced by the decrease in the size index of the domestic market, against the background of weak orientation of companies to customer needs and low customer demands caused by deterioration in their purchasing power;

- Significant deterioration in the quality indicators of the general infrastructure and infrastructure of the financial market with a significant deterioration in the rate of access to financial services.

All these factors explain the low position of Ukraine in the global competitiveness rating in terms of cluster development - in 2017 Ukraine ranked 125th among 138 countries of the world, losing in terms of cluster development not only to developed countries, but also to many CIS and post-socialist countries.

The overall assessment of the level of cluster development in the regions of Ukraine is presented in the reports on the competitiveness of the regions of Ukraine that were compiled by the Foundation for Effective Governance according to the methodology for calculating the global competitiveness index of the WEF. Indicators of the sub-index "cluster development level" are presented in Table 2.12.

Unlike most European countries and Asian countries, they are developing rapidly, and Ukraine has not formed a national cluster development strategy integrated into other types of state economic policy. There is no regulatory and institutional framework for the implementation of the cluster development model. At present, drafts of regulatory legal acts on the formation of the basis of state policy in the sphere of clusterization have been developed unapproved.

Table 2.12.Cluster development indicators in the regions of Ukraine, 2014-2017

Region	2014		2015		2016		2017	
	Score (1-7)	Rank	Score (1-7)	Rank	Score (1-7)	Rank	Score (1-7)	Rank
Vinnitska	2.2	19	3.59	14	3.52	19	3.71	16
Volynska	2.6	17	3.12	23	3.06	26	3.26	25
Dnipropetrivska	3.9	1	4.91	2	4.84	2	4.85	1
Zhytomyrska	2.6	16	3.5	17	3.27	23	3.23	26
Zakarpattia	3.0	10	3.63	12	3.72	12	3.8	14
Zaporizhska	3.4	6	4.6	3	4.57	3	4.34	3
Ivano-Frankivska	3.1	9	3.96	9	4.23	7	4.4	4
Kyivska	-	-	2.96	26	3.24	24	3.43	24
Kirovogradska	-	-	3.62	13	3.7	13	3.66	18
Lvivska	2.5	18	3.7	10	3.92	10	4.23	5
Nikolaevska	-	-	3.14	22	3.33	22	3.71	15
Odeska	3.1	8	4.08	8	4.05	8	4.12	7
Poltavska	2.9	12	4.14	7	4.05	9	3.68	17
Rivnenska	2.6	15	3.53	16	3.6	16	3.63	19
Sumska	2.0	20	3.55	15	3.52	18	3.52	22
Ternopiskal	-	-	3.39	19	3.41	21	3.58	20
Kharkivska	3.5	5	3.67	11	3.91	11	4.16	2
Khersonska	2.8	14	2.97	25	3.55	17	4.34	13
Khmelnitska	2.9	13	2.93	27	3.23	25	3.53	21
Cherkaska	3.0	11	3.48	18	3.7	14	3.84	6
Chernivetska	-	-	3.23	21	3.44	20	3.43	23
Chernihivska	-	-	3.09	24	2.93	27	3.03	27
Kyiv City	3.2	7	3.38	20	3.66	15	4.01	8

Source: made by author based on [11]

However, in recent years, clustering has become one of the priorities of regional economic policy in Ukraine - the creation and development of clusters has been recognized as one of the most important areas in the development strategies of many regions.

Thus, today in most regional development strategies in Ukraine, a cluster approach to organizing economic activities is applied, which indicates that clustering is recognized as an effective mechanism for regional development. At the same time, the analysis of strategies shows that the vast majority of regions of Ukraine consider the cluster model as a tool for implementing two main tasks - ensuring the effective development of the agro-industrial sector and developing an innovative model in industry, defined by the objectives of applying the cluster approach in 9 and 7 areas, respectively.

The other areas of the cluster model specified in the strategies are the development of the tourism sector (including Green Tourism), the development of cross-border cooperation, the strengthening of the potential of SMEs and the development of its infrastructure, leveling regional development and solving problems in depressed regions, the development of the alternative energy industry. The summarized data on the directions of application of the cluster approach in regional development strategies are presented in Table. 2.13.

Table 2.13 Application of the cluster model in the development strategies of the regions of Ukraine

Purpose	Region	Number of regions
Increasing the efficiency of agro-industrial production and realizing the potential of the agro-industrial complex	Vinnitsa, Zhytomyr, Zakarpattia, Ivano-Frankivsk, Kirovograd, Poltava, Ternopil, Chernivtsi, Chernihiv	9
Implementation of an innovative development model in industry	Vinnitsa, Zhytomyr, Zakarpattia, Kirovograd, Ternopil, Chernivtsi	6
Strengthening the capacity of SMEs and the development of its infrastructure	Volyn, Poltava, Chernivtsi, Lviv, Kherson	5
Ensuring the development of recreational potential and tourism industry	Ternopil, Kherson, Chernivtsi, Chernigov	4
Encouraging cross-border cooperation and border areas	Vinnitsa, Transcarpathian, Lviv	3
Reducing developmental imbalances in the region	Kiev, Nikolaev	2
Ensuring the development of the alternative energy sector	Ivano-Frankivsk, Chernivtsi	2

Source: made by author based on [42]

The definition of clustering priorities in many regional strategies does not take into account the specifics of the industrial development of the region, ignoring the industries with the greatest clustering potential and inter-sectoral cooperative relations were formed. But in many strategies there is a simple literal copying of the goals and strategic priorities of regional development from the strategies of other regions, including priority areas and sectors for the creation and development of clusters (primarily for the creation of clusters in the agro-industrial complex and for the development of the business environment).

So, Ukraine has significant potential for creating industrial clusters both in basic traditional industries and in high-tech knowledge-intensive industrial sectors, as evidenced by numerous cluster initiatives of the business sector and successful examples of cluster development in most regions of Ukraine. However, the realization of this potential is hampered by a weak awareness of the essence of the cluster approach and cluster policy both at the level of business communities and at the state level, and therefore the lack of understanding of the advantages of using the cluster approach in industry, the mechanisms for its implementation and the sequence of their application.

CONCLUSIONS TO PART 2

Analysis of cluster programs of developed countries indicates their overwhelming focus on the formation and development of innovative sectors of the economy. The experience of many countries shows that the formation of new high-tech and creative industries in the economy is due to systemic government support. The active role of the state and supra-state entities (for example, the EU) in the formation of cluster networks at the present stage of cluster development is explained by the need to attract qualified personnel and organizations specializing in an important activity for a region or state, as well as the dependence of innovative activities of enterprises on the state of fundamental science development, which is a sphere of state responsibility - the share of the public sector in the costs of research and development Work in the developed countries of Europe is about 40%.

For Ukraine, the experience of the implementation of the cluster policy of EU countries can be most useful. First, it is the EU countries that have the greatest experience of successful implementation of cluster policy in industry and they are leaders in the world in the number of cluster programs and have developed clustering mechanisms at all levels - supranational, state and regional. Secondly, Ukraine's policy of European integration presupposes, integration into the EU's economic space, Ukraine's involvement in European-wide value-added chains, which today operate mainly in the form of industrial clusters.

One of the most important modern trends in the coordination of cluster development at the international level is the formation of cluster networks. Despite the fact that competitive clusters usually have developed links with similar clusters in other regions and countries, stimulating the development of cooperative relations between them, the development and implementation of joint development and cooperation programs is an important priority of European and Ukrainian policy.

PART 3

RECOMMENDATIONS FOR IMPROVING ECONOMIC CLUSTERS AS A TOOL TO IMPROVE THE COMPETITIVENESS OF THE NATIONAL ECONOMY

3.1. The development of models for economic clusters as a tool to improve the competitiveness of the national economy

Economic development and improvement of production and innovation activity of industrial enterprises is possible subject to the introduction of new organizational and management mechanisms aimed at stimulating the productive activities of domestic enterprises, developing and introducing innovations, high-tech industries, developing cooperation and economic cooperation, creating closed production chains with a high level of efficiency.

The cluster approach is one of the most effective means of organizing industrial production; it is able to combine and optimize resources, innovations, technologies and capabilities of individual enterprises into a powerful production and innovation complex that is strategic for the country both in the domestic and foreign markets.

The modelling of approaches to assessing the competitiveness of clusters in national economy is carried out on the basis of studying and adapting the leading scientific models and methods of studying the clustering process of the industry itself and leading methods of studying the economic of the country, adapting these methods to the subject of this study and forming on their basis became to a new model that allowed assess the competitiveness of clusters in national economy, determine the main components and indicators of the economic, the safety of the clustering process and their level.

Research studies on the formation and functioning of industrial clusters are explored in the works of leading world scientists who started the basis, reveals the essence of the cluster concept and the process of clustering the economy as the

driving force of its industrial, regional and innovative development and determine the directions of further research based on certain prerequisites, factors and vectors development.

So in the works of A. Marshall, first identified the cluster as an economic phenomenon and as a process of concentration of industrial enterprises in certain industrial regions of the country, three main advantages for enterprises belonging to the cluster are identified: effective exchange of experience and innovation, specialization of suppliers and the formation of an effective labor market with a significant number of workers and employers. M. Porter, studying the concept of a cluster in its modern sense, defined clusters as geographically concentrated groups of interrelated companies in their respective industries and defined the conceptual foundations of an industrial-innovation cluster. The diamond competitive model created by M. Porter determines the main determinant factors, is the driving force of the cluster and the microeconomic level. According to this model, the competitive advantages of clusters are based on the availability and availability of a significant number of factors of production; in the process of interrelated relations and interaction is the driving force of the cluster. According to the model of competitive advantages of M. Porter, its main components are factorial conditions - available resources, qualified labor, research and innovation potential, capital and other factors that are the basis of enterprise development; conditions of demand - the definition of demand in the domestic market, its development; The third factor is the presence of - related and service industries that are able to develop and maintain competitive advantages, namely, research centers and educational institutions, logistics companies, etc .; and such components as strategy, structure and management of the enterprise. In addition to the main, there are two additional components: case, uncontrolled events, and government policy.

In 2002 G. Etzkovich developed a model of competitive advantages of the company, called the "triple helix". This model combines such basic components as: companies, industries and their combinations; local and regional authorities as a member of the cluster, which is responsible for its formation and development of

regional development programs; research, development in the field of education - as the basis for the development of innovative technologies necessary for the formation of a cluster. According to this model, a prerequisite for the effective functioning of a cluster is the presence of three specific determinants and effective cooperation between them.

The model of the components and indicators of the industrial clustering process is built using the conceptual foundations of the competitive advantage models of G. Etzkovich and M. Porter.The purpose of developing a model of the components of the economic process of clustering industry is to form a conceptual framework for diagnosing hazards and threats to the clustering process of the country's industry and calculating the integral economic competitivenessindex of the clustering process. The model for determining the economic competitivenessof the industry clustering process is presented in Figure 3.1.

	Industrial, technological component of economic competitiveness	
Institutional component of economic competitiveness	**Economic clustering process**	Innovative component of economic competitiveness
	Integration and coordination component of economic competitiveness	

Fig3.1. Model for calculating the economic competitiveness of the industry clustering process

Source: made by author based on [60]

The main basic components of the model for determining the level of economic competitiveness of the economical and industrial clustering process are such warehouses as institutional, industrial-technological, innovative and integration-coordinating components of economic competitiveness.

The institutional component of the economic competitiveness of the clustering process is the impact of the state and the state industrial and cluster policy

on the formation and operation of clusters and the economic security of the clustering process and determines the impact of macroeconomic and institutional factors, factors of state regulatory policy on the development of industry in general and the clustering process of the domestic economy particular. The production and technological component of economic competitiveness is an indicator of the development of the domestic technical and technological potential of industrial enterprises, the state of their technical production base — fixed assets, technology and technological processes; and their willingness to work together with other actors of the clustering process under the cluster formation. The main indicators that form the production technological component include: the level of material and technical base, the level of technological potential, the efficiency and workload of production capacities, the use of modern forms and methods of organizing production, the level of energy supply, the level of cooperation with suppliers of raw materials, components, and suppliers, the level of development of industrial cooperation, the level of cooperation with the marketing organizations for the realization of products in the domestic and foreign markets, the establishment of permanent communication of financial and economic relations with other business entities within the region, the industry, the level of staffing, the level of financial security.

The innovative component of the economic competitiveness of the industry clustering process determines the state and level of innovative development of enterprises and innovative technologies used by cluster associations in the clustering process to ensure the revitalization of the cluster.This is primarily the development and implementation of innovative projects and development programs, the development and implementation of radical product and innovation processes, significantly change production and technology and are able to ensure the competitiveness of industrial cluster products both in the domestic and foreign markets. The innovativeness of the process of clustering industry and the competitiveness of products are integral components of the process of formation and development of innovative industrial clusters.

Indicators of the innovation component of the clustering process are such indicators as: the level of technical and technological development of industrial enterprises, the development and implementation of innovative projects, programs, participation in fundamental, applied research and research and development, active relations with research institutes, laboratories, the presence of industry-specific research institutions, the level of financing innovation in the region, the level of high-tech production, l application of the latest computer technology and technology, the priority of high-tech production, the level of expenditure on research and development, the availability of specialists to carry out scientific and technical work, the proportion of enterprises introducing innovations in the total number of industrial enterprises in the region, the proportion of enterprises introducing innovations in the total number of industrial enterprises in the region, etc.

The integration and coordination component is determined by the following indicators: the level of development of interactions between an industrial enterprise and research institutes, innovative structures, interaction between industrial enterprises and organizations that develop innovations, infrastructure development, the state and level of information and analytical support for the clustering process, the willingness of subjects management of all types in the process of clustering, the presence of a single body - the management company, readiness to form a single cluster management body, the availability of management personnel and specialists necessary for coordination activities within the cluster, readiness for joint participation in the development and implementation of innovative projects and industrial production innovative products, the level of cooperation with local authorities, the level of use of external knowledge, technology, the level of support of clustering by local authorities, the level of support for the process of Classification by society and society, the level of communication, technology and software, active participation in the development and implementation of joint marketing companies to promote products in the domestic and foreign markets.

The algorithm of formation and implementation of the model for determining the level of economic competitivenessof the process of clustering the country's industry is shown in Figure 3.2.

Fig. 3.2 Algorithm of formation and implementation of the model for determining the level of economic competitiveness of the state economic clustering process

Source: made by author based on [39]

3.2. Improving institutional support for the development of economicclusters, as a tool to improve the competitiveness of the national economy

Achieving an appropriate level of EBD due to the introduction of a cluster form of organization of production requires creating the necessary institutional legal environment - defining and adhering to principles, fulfilling priority tasks, ensuring mechanisms to protect the interests of security subjects from the effects of internal and external threats. Institutional and legal support primarily includes a set of legal acts, other mandatory documents or documents adopted by official bodies, as well as the institutions that create, accept, distribute, correct, control execution and establish punitive sanctions.

The multilevel cluster policy and the cooperative nature of clusters provide for the involvement in the creation and implementation of cluster policy of a number of subjects, including from the sectors of science, education, industry, public organizations, professional associations and the like. However, we believe that at the first stage, it is the public administration sector that should take on the role of initiator, sponsor and coordinator of cluster policy, deign to rally other sectors and give impetus to cluster initiatives in the field.

At the level of central executive bodies, the subject of state cluster policy, to ensure the formation of state policy in the relevant field, can be either a specially created structure (for example, an agency), or a separate unit in the structure of one of the relevant ministries. At the present stage of development of Ukraine, given the significant budgetary constraints, the creation of a separate structure responsible for the implementation of cluster policy in Ukraine seems inappropriate. The best, in our opinion, would be the creation of a separate department within the Ministry of Economic Development and Trade.

The reform of public administration in the direction of decentralization, which began in Ukraine, greatly enhances the role of regions in the formation and implementation of state policy, especially cluster policy, which in most developed

countries was initiated and implemented precisely in regional rivals. The subjects of state cluster policy should be local state administrations, regional councils, as well as rural and township and city councils of territorial communities.

Strengthening the coordination of activities of all subjects of the cluster flights implementation is an attraction of involvement in these processes created in 2017. Regional Development Council and regional development councils in the areas to be created in pursuance of the Decree of the President of Ukraine by regional state administrations. The key tasks of the Council include the promotion of the effective interaction of state bodies, in particular, local executive authorities, with local governments in developing new approaches in the field of regional development, which include the introduction of a cluster model of economic activity. It is also advisable to create in subordination of the regional councils of regional development of specialized regional centers of cluster development, which will coordinate the implementation of projects by regional clusters.

Significant potential for the development of industrial clusters in the regions of Ukraine has the use for this purpose of the funds of the State Regional Development Fund, due to which investment programs and regional development projects are implemented. Today in Ukraine there is the problem of inefficient use of this powerful resource - regional development projects that come from the regions to the Ministry of Regional Development, Construction and Housing of Ukraine, mostly of low quality, sent with a significant delay or not sent at all, and do not correspond to certain in the state strategy for regional development priorities. From 3 billion UAH provided for the implementation of regional projects by the state budget, in 2017. Regions could not use on time 520 million UAH due to the lack of high-quality projects.

According to the provisions of Article 24 of the Budget Code of Ukraine, the funds of the State Regional Development Fund should be directed to the development of regions, the creation of infrastructure of industrial and innovative parks. Using this resource for industrial cluster development projects could

significantly contribute to the task of clustering, respectively, the systemic development of Ukrainian regions.

An important task in the field of institutional support for clustering in industry is to establish an effective dialogue between all institutional sectors in the development of cluster policies.

The introduction in Ukraine of the cluster form of organization of production, in our opinion, is most hampered by its insufficient legal and regulatory support. The lack of a favorable regulatory field makes it difficult to create clusters, increasing the transaction costs of participants in this process and reducing their overall performance. In Ukraine, attempts have been made repeatedly to introduce the notion of a "cluster" into official documents regulating state economic policy, but no practical steps have been taken along this path yet.

The analysis of the normative legal acts listed in the application indicates that since 2003. Ukrainian governments have periodically attempted to introduce a cluster approach to solve problems in the industrial, innovation, investment, foreign economic, social sectors and in the field of SME support. However, in our opinion, one of the important reasons for the lack of real changes in the implementation of the cluster model in the Ukrainian economy during all these years is the lack of consistency in the position of political and public circles regarding the content of the "cluster" concept, the principles and priorities of cluster policy, and the lack of methodological bases for the implementation of the cluster model of development in the economy.

In particular, in separate documents of strategic importance (the Law of Ukraine of 08/09/2011 No. 3715-VI "On Priority Areas of Innovation Activity in Ukraine", Resolution of the Cabinet of Ministers of 02.02.2011 No. 389 "On Approval of the Program for the Development of Investment and Innovative Activity in Ukraine") clusters are erroneously attributed to the objects of innovation infrastructure next to business incubators, industrial parks, free economic zones and so on. Infrastructure facilities must ensure the functioning of a certain system, but the purpose of the cluster's operation is not limited to ensuring

the development of innovation activities — its mission is much broader, encompassing production, investment, social, and foreign economic areas. So, unlike the industrial park and the FEZ, the cluster is not a territory within which the participants carry out economic activities. In contrast to technology parks, which, according to Ukrainian legislation, can also be a group of legal entities acting in accordance with a joint venture agreement without creating a legal entity and without pooling deposits and aimed primarily at stimulating new innovative projects, the clusters' activity is primarily associated with the implementation of existing entities in a certain territory. Techno parks are focused on stimulating innovation in the region, while clusters focus on increasing the competitiveness of companies operating in the region. The cluster is a production system, the functioning of which should be provided by such property complexes and infrastructure, such as industrial parks, technology parks, free economic zones, centers for the collective use of equipment, business incubators, etc.

We believe that the strategic bases for the implementation of the cluster model in the economy of Ukraine should be defined in specially designed NLAs that will serve as the foundation for the formation of a national cluster development strategy and the implementation of an effective cluster policy and it will helps their roll into national economy of Ukraine.

At the same time, we consider it necessary to finalize and adopt the "Concept for the creation of clusters in Ukraine", developed in 2008. The Ministry of Economy of Ukraine in pursuance of the Order of the Cabinet of Ministers of 09.07.2008 No. 947-p "On approval of the Concept Project of the National Target Economic Program for Industrial Development for the Period up to 2018", which envisaged the development of regulatory legal acts on the creation and implementation of a cluster industry organization model.

It should be noted that despite the formal availability in the structure of this project of all the elements mandatory for this type of documents, its content requires substantial improvement. Therefore, we consider it expedient to improve the concept in the following areas:

- In the section "Problems the Concept is aimed to solve", we propose to formulate the problems as follows: a fall in the volume of industrial production; the deepening of structural deformations in the economy; the disintegration of industrial production and the absence of closed value-added chains; low level of commercialization of research; high level of monopolization of the economy; uneven distribution of productive forces in the regions; low innovation activity of enterprises; insufficient investment in the economy; low demand in the labor market and lack of jobs.

- In the section "Analysis of the causes of the problem and the rationale for the need to solve it" there is no list of the causes of the problems. In the section, it is necessary to determine the main causes of the problems described above, which are as follows: the lack of a coherent and consistent state policy aimed at the comprehensive development of the economic potential of Ukraine; the inertia of the authorities in the introduction of new organizational approaches to the development of economic activity; the inaccessibility of internal and external sources of investment for enterprises for the low profitability of production and the high cost of credit; isolation of basic research from market needs.

- In the section "Ways to solve the problem", which in the draft Concept is devoted to the description of the theoretical foundations of clustering, the list of mechanisms and tools for implementing cluster policy should be significantly expanded. Despite the fact that the specifics of the cluster policy toolkit is to prioritize the use of organizational measures for the development of communications, the exchange of experience, the expansion of networking, it is necessary to significantly expand the list of measures to stimulate interaction between the participants of cluster processes, as well as include measures aimed at creating institutional support for clusters.

- Requires the revision of the cluster classification approach proposed in the project, according to which production, innovation and technology (which can also be production), tourism and transport and logistics are highlighted. We believe that it would be more appropriate to apply the classification by economic activity with

the allocation of industrial clusters, clusters in the scope of services (financial, tourism, transport and logistics, educational, medical, trade, etc.), agricultural and construction clusters.

In world practice, considerable practical experience has been gained in the implementation of cluster initiatives, which is based on using a wider range of financial instruments of state support. In Ukraine, in modern conditions, the practical implementation of the cluster model in industry will inevitably face the problem of limited financial resources for the implementation of cluster initiatives, and can completely paralyze clustering processes. Therefore, it is important for Ukraine to refer to the experience of developed countries where clustering processes are actively supported thanks to the already existing tools and measures of state policy in other areas that will potentially benefit most from the implementation of the cluster model. Effective coordination of instruments and measures of state policy in investment, innovation, in support of SMEs, regional, industrial and other types of government policy, taking into account the priorities of clusterization, contribute to creating a significant synergistic effect on the economy. This should be achieved through the full integration of cluster policy into the general strategic course of the state and coherence with the directions and priorities of other types of state policy.

Ukraine's priorities for reform and development are formulated in the "Sustainable Development Strategy","Ukraine-2020 ", approved by Decree of the President of Ukraine dated January 12, 2015 No. 5/2015. The analysis of certain priorities of development and reform allows to identify among them those whose tasks overlap with the priorities of cluster policy and can be successfully implemented through the use of the cluster approach:

- In regional policy: "Reform of regional policy", "Decentralization and public administration reform". The success of the development of the cluster network directly depends on the realization and expansion of the rights of local self-government by the territorial community, since it is the territorial community that contributes to the concentration of the territory's territory, organizational and

financial resources for performing local tasks; regulation and rationalization of the use of territorial resources and maximizing the efficiency of the use of the potential of the territory.

- In foreign economic policy: "Program for participation in trans-European networks", "Program for the development of Ukrainian exports", "Program for promoting Ukraine in the world and promoting Ukraine's interests in the global information space", "Program for creating the brand" Ukraine ". Forming a positive image of Ukraine as an integrated European global value-added value chain with a favorable business climate and a unique place in the global division of worker requires at the first stage the creation of powerful industrial clusters in the most promising areas for Ukraine in terms of future integration into the European economic space and trans-European networks. These clusters should ensure the creation of well-known Ukrainian brands that are actively promoted by the state on the world market. In addition, when shaping the state policy of supporting Ukrainian exports, one of the main focuses should be the production of Ukrainian clusters, to stimulate the processes of their internationalization;

- In investment policy: "The program of Attraction of Investments". At the present stage of development, Ukraine faces the task of not only increasing investment volumes, but also changing their structure with the redistribution of investments from primary sectors into sectors with high value-added products. In this context, clusters as developed value-added chains are one of the most promising objects for attracting investments, which, in accordance with the experience of other states, cause greater trust among investors than individual enterprises. In addition, the developed clusters in the future are not only consumers, but also powerful generators of new investment resources.

- In innovation policy: "Innovation Development Program". Creating a holistic national innovation system implies a high level of integration of all its components, which can be realized through the introduction of a cluster approach. Innovative impulses in the industry to increase due to the spread in clusters, the "overflow effect" is the dissemination of new knowledge, technologies, innovative

methods of organizing production activities, reducing R & D costs due to the development of a joint innovation infrastructure. The development of links between the scientific and industrial sectors in clusters will accelerate the commercialization of innovations;

- Science and technology policy: "Reform of state policy in the field of science and research." In addition to creating favorable institutional conditions for the development of science and research, an important area of state science and technology policy should be to ensure organizational and financial support for targeted R & D projects, to promote priority development not only theoretical, but applied research that will have high practical value and profitability. R & D support, which will be carried out within the framework of clusters, will expand the circle of participants (including small and medium enterprises) of such projects and will increase the synergy effect from their implementation.

Of course, the aforementioned directions of state policy are not exhaustive about the possibilities of implementing cluster policy, but they determine the immediate real prospects for the implementation of the cluster approach when it is legitimized at the state level.

3.3. The forecast of development and improvement of economic clusters in Ukraine

One of the most important steps in the process of developing a distribution policy improvement is the prediction of the results of the implementation of improvements. Forecasting should be under a theoretical substantiation, and practical understanding of the characteristics of the company.

In this part, we analyzed some of the most important factors and indicators that influence on economic clusters and their role to improvement the competitiveness of the national economy of Ukraine.

For making better predictions and to do more precise forecasts of our indicators and components in this part, has been used tables form the second part of this diploma and also database of Ukrainian Chamber of commerce and industries.

Making predictions is a vital part of any scientific work, specially in economical work because just throw them we can clearly see what we will have and where we will be in the next few years and if we need, from today try to make changes and make better situations.

In order to assess the impact of improvements in the distribution policy of an economic cluster on its economic indicators, it is necessary to predict the values of economic indicators for future periods and then adjust it to reflect the impact of the recommended changes in distribution policy.

For the beginning, according to table 2.2 and based on the database of Ukrainian Chamber of commerce and industries, in the table 3.1 we have the forecast of the level of economic security of Ukraine in terms of components.

How we see in table 3.1, the only component that has remained in the optimal zone for many years is food security and in our forecast we see that at least in the next three years also this component will be in optimal zone by the highest points in our table.

In the danger zone (20-39%) for the last few years were foreign economic, investment and innovation, macroeconomic and financial security, that in the forecast we see that we will have some improvement in foreign economic and financial security, but we need to have improvement in investment and innovation, macroeconomic component, because in the forecast, even in 2021 they will be still in the danger zone and it's a bad news for national economy and Its competitiveness. Actually these two components need lots of improvement and more support from government and require more investment to improve.

Table 3.1.Forecast of the level of economic security of Ukraine in terms of components, 2019-2021

Component	2019	2020	2021
Production	48	53	53
Demographic	49	49	52
Energetic	45	44	46
Foreign economic	39	40	40
Investment Innovation	30	30	35
Macroeconomic	31	32	32
Food	94	93	94
Social	55	57	57
Financial	38	40	40
Critical zone 0 – 19 *Danger zone 20 - 39* *Unsatisfactory area 40 – 59*		*Satisfactory area 60 – 79* *The optimal zone 80 – 100*	

Source: made by author

In the last few years, four components of economic security were in an unsatisfactory zone (40-59%): production, demographic, energy, and social. How we see, in our forecast, there are six components in the unsatisfactory zone, and in our prediction, we don't have enough improvement for these components.
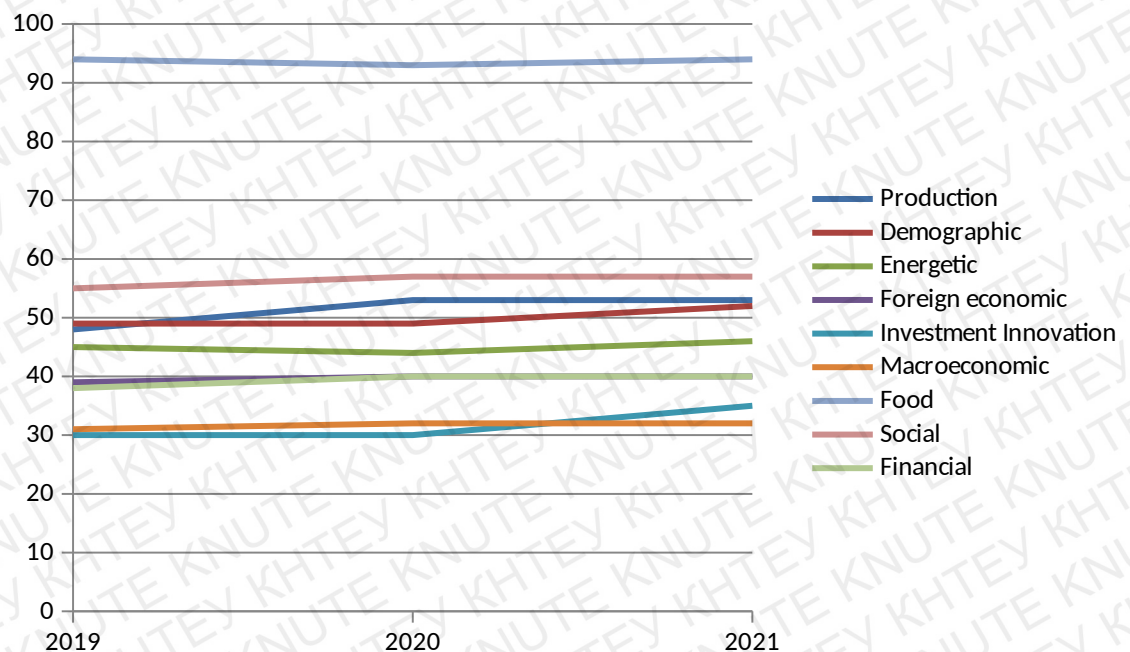

Figure 3.3 Forecast of the level of economic security of Ukraine in terms of components.

Source: made by author

Above, we have figure 3.3 and it can help us to have a better and clear look at the forecast of these components in next three years.

In production, from 2019 to 2021 integral indicator has 5 points improvement. Demographic component has 3 points and energetic also shows improvement in 3 points. Foreign economics shows just 1 point improvement that is for sure not enough and need more attention because it's very important component. Investment innovation has 5 points improvement and Macroeconomic component just 1 point. Food component remain unchanged and social shows just 2 points improvement. Financial as the last component in our calculation shows 2 points improvement.

Production and investment innovation both with 5 points improvement located in the first place and then financial and social components with 2 points and energetic, foreign economic and macroeconomic components with 1 point improvement. But all of these components still need a lot of improvement because they are still far from the optimal zone.

As a result we should know that if we want to have a better future, we need a lot of more improvements in economic security and as we mentioned it is an obvious that the introduction of the cluster model has the greatest impact on the industrial safety of the country, affecting the main indicators of the industry. It is precisely the industrial safety of Ukraine and in the next few years have to do a lot to make an improvement in this sector.

One of the most important factors and indicators that has a lot of influence on economic clusters in national economy, are Capital investment and foreign direct investment of country in different types of activities.

According to table the table 2.5(Structure of capital investment and foreign direct investment (Share capital) by type of industrial activity) and based on the database of Ukrainian Chamber of commerce and industries, in the table 3.2 we have forecast for next three years.

According to our forecast, capital investment to 2020 in industry, extractive, food industry, light industry, wood products manufacturing, paper making and printing,

manufacture of rubber and plastic products, other non-metallic mineral products, metallurgy, mechanical engineering, water supply; sewerage and waste management, will increase. At the same time, capital investment in production of coke and refined petroleum products, production of chemicals and chemical products, pharmaceutical industry, supply of electricity, gas and conditioned air will be decreased.

Table 3.2 Forecast of capital investment and foreign direct investment

Types of activities	Capital investment million UAH			Foreign direct investment, million USD		
	2019	2020	2021	2019	2020	2021
Industry	115562.0	120915,0	124093,2	9391,8	9 997,6	10 410,0
Extractive	22840.0	22910.5	23251.7	1630.7	1765.8	1780.0
processing, including:	59541.2	61219,1	67122,2	8298.1	8759.5	9493.1
food industry	16860.3	18910.6	20740.6	2710,4	2 849,0	3 050,0
light industry	1820,0	1931,0	1973,3	118,2	117,9	118,8
wood products manufacturing, paper making and printing	3754,8	4031,1	3945.7	410,4	412,7	411,3
production of coke and refined petroleum products	642,2	700,6	720,9	169,2	175,7	182,6
production of chemicals and chemical products	1667,6	1677,7	1631,5	610,1	623,5	608,2
pharmaceutical industry	1704,2	1634,8	1611,3	50,5	48,4	49,8
manufacture of rubber and plastic products, other non-metallic mineral products	6710,0	6201,7	6127,0	1036,2	1 055,7	996,4
Metallurgy	17040,6	18910,0	19600,4	1764,6	1833,1	1894,9
mechanical engineering	7347,7	7283,1	7566,0	864,4	881,6	878,5
other industries	1423,6	1499,6	1373,2	297,1	287,2	266,0
supply of electricity, gas and conditioned air	29640,0	29946,4	29785,7	340,2	310,1	301,6
water supply; sewage, waste management	2080,3	2161,9	2140,1	49,2	50,1	55,8

Source: made by author

Also according to our forecast Foreign direct investment until 2020 in Ukraine will be increased in industry, extractive, food industry, light industry, wood products manufacturing, paper making and printing, manufacture of rubber and plastic products,

other non-metallic mineral products, metallurgy, mechanical engineering, water supply; sewerage and waste management. At the same time, it will be decreased in production of coke and refined petroleum products, production of chemicals and chemical products, pharmaceutical industry, supply of electricity, gas and conditioned air.

Obviously and without any doubt Ukraine is located in some economical situation that to have more foreign investment is a must for him and how we can see, in most of the economic activities, in next three years will have more investment that it could be a good news for us.

Also with more investment, we could have more budget for innovation and it could helps us to make a better goods and product that have higher quality and in the result can have more competitive and they will have a better competitive advantages and more chance to win the domestic and foreign market.

If we talk about capital investments indices in industry of Ukraine and look at the last 6 years, form 141.6 in 2012 falls down to 74.3 in 2014, but according to table the Fig 2.1(Capital investment indices and growth rates (decrease) in the volume of FDI (equity capital) in the industry of Ukraine) and based on the database of Ukrainian Chamber of commerce and industries, in 2019 it will grow up to 130.4 that is still less than 141.6 in 2012 but it shows a good improvement from 2014 and shows 43% increase.

Also at the same figure (Fig 2.1) we have 113.5 for foreign direct investment in 2010 shows decrease to 2014 with 70.2 and have -37%. But from 2014 we show improvement in this very important economic indicator and according to table the Fig 2.1 and based on the database of Ukrainian Chamber of commerce and industries, for next year, it will grow up to 115.7 that is good news for us and actually it's 2% higher than 2010 and 38% higher than 2014.

Another important index to make forecast about the future of economic clusters and their role in national economy of Ukraine is growth of import dependence of the national economy. We mentioned that weak competitiveness of domestic producers, focus on the production of lower technological structures and raw materials increase the country's dependence on imports of end-use products

and high-tech products, which in turn, displaces domestic producers from the domestic market, reducing their share in the domestic economy.

According to table the table 2.6(Dynamics of domestic consumption of industrial products in Ukraine) and based on the database of Ukrainian Chamber of commerce and industries, in the table 3.3 we have forecast for next three years.

Table 3.3 Forecast of dynamics of domestic consumption of industrial products in Ukraine, 2019-2021

Index	2019	2020	2021
Total domestic consumption, UAH billion	1880.2	1894.4	1967.1
Domestic products, billion UAH	910.0	941.5	970.3
% Domestic products summarize the volume of domestic consumption	43.4	41.8	44.9
Imported products, billion UAH	1080.2	1123.0	1179.7
% Import in total domestic consumption	50.1	52.4	53.9

Source: made by author

In table 3.3 has predicted the needs of the domestic market were met by strengthening the position of imported products against the background of the redirection of domestic production to foreign markets, 2019 to 2021.

As we see, our forecast show that Total domestic consumption, Domestic products and Imported products will increase in the next three years but Domestic products summarize the volume of domestic consumption and Import in total domestic consumption will be decreased.

Total domestic consumption form 2019 to 2021 shows 86.9 billion UAH increase and domestic products shows 60.3 billion UAH increase. Also Import products shows 99.5 billion UAH increase. And about domestic products summarize the volume of domestic consumption, it shows 1.5% improvement and Import in total domestic consumption shows 3.8% improvement.

According to table 3.3 in all of these indicators we have improvement that could be good news for national economy, but we have to mention that to have a better position, we still need to do more.

CONCLUSIONS TO PART 3

The main basic components of the model for determining the level of economic competitiveness of the economical and industrial clustering process are such warehouses as institutional, industrial-technological, innovative and integration-coordinating components of economic competitiveness.

The institutional component of the economic competitiveness of the clustering process is the impact of the state industrial and cluster policy on the formation and operation of clusters and the economic security of the clustering process and determines the impact of macroeconomic and institutional factors, factors of the state regulatory policy on the development of industry in general and the clustering process of the domestic economy.

An important task in the field of institutional support for clustering in industry is to establish an effective dialogue between all institutional sectors in the development of cluster policies.

The introduction in Ukraine of the cluster form of organization of production, in our opinion, is most hampered by its insufficient legal and regulatory support. The lack of a favorable regulatory field makes it difficult to create clusters, increasing the transaction costs of participants in this process and reducing their overall performance. In Ukraine, attempts have been made repeatedly to introduce the notion of a "cluster" into official documents regulating state economic policy, but no practical steps have been taken along this path yet.

CONCLUSIONS AND PROPOSALS

According to Michael Porter theory, the cluster is a group of geographically neighboring interrelated companies (suppliers, manufacturers, etc.) and related organizations (educational institutions, government bodies, infrastructure companies) operating in a certain sphere and complementing each other.

Michael Porter considered the competitiveness of a country should be viewed through the prism of international competitiveness not of its individual firms, but of clusters of associations of firms from different industries, and the ability of these clusters to use internal resources effectively of fundamental importance.

To reveal the basis for the functioning of cluster structures, the categorical "Pentagram" model and the concept of compensatory are used, which makes it possible to identify and diagnose the contradictions unfolding in the inter component interactions of real clusters of enterprises. Thus, regional authorities have the opportunity to influence the flow and resolution of intra-cluster contradictions in order to ensure the desired direction of development of clusters taking into account the interests of the region.

The pentagram is a five-pointed star in a pentagon. It is a cyclic construction completed by the process. The starting point for all forms of objects is water - the original formless substance. Pentagram allows us to select and interpret different types of relationships between elements, depending on their location in it relative to each other.

The purposeful formation and development of cluster structures in the Ukrainian regions requires a theoretical understanding of their nature and functioning characteristics. We believe that the identification of the nature of the relations and contradictions between the cluster components will allow the selection of management measures that promote the productive development of both relations and intra-cluster contradictions, ensure the improvement of the mechanism of functioning of cluster structures and obtain the desired positive effects by the territory of their basing, including economic growth, improvement of the reproductive structure and innovation system, improvement and development of the resource base, acceleration scientific and technical progress, increasing the well-being of the population.

Analysis of cluster programs of developed countries indicates their overwhelming focus on the formation and development of innovative sectors of the

economy. The experience of many countries shows that the formation of new high-tech and creative industries in the economy is due to systemic government support. The active role of the state and supra-state entities (for example, the EU) in the formation of cluster networks at the present stage of cluster development is explained by the need to attract qualified personnel and organizations specializing in an important activity for a region or state, as well as the dependence of innovative activities of enterprises on the state of fundamental science development, which is a sphere of state responsibility - the share of the public sector in the costs of research and development Work in the developed countries of Europe is about 40%.

For Ukraine, the experience of the implementation of the cluster policy of EU countries can be most useful. First, it is the EU countries that have the greatest experience of successful implementation of cluster policy in industry and they are leaders in the world in the number of cluster programs and have developed clustering mechanisms at all levels - supranational, state and regional. Secondly, Ukraine's policy of European integration presupposes, integration into the EU's economic space, Ukraine's involvement in European-wide value-added chains, which today operate mainly in the form of industrial clusters.

One of the most important modern trends in the coordination of cluster development at the international level is the formation of cluster networks. Despite the fact that competitive clusters usually have developed links with similar clusters in other regions and countries, stimulating the development of cooperative relations between them, the development and implementation of joint development and cooperation programs is an important priority of European and Ukrainian policy.

The main basic components of the model for determining the level of economic competitiveness of the economical and industrial clustering process are such warehouses as institutional, industrial-technological, innovative and integration-coordinating components of economic competitiveness.

The institutional component of the economic competitiveness of the clustering process is the impact of the state industrial and cluster policy on the

formation and operation of clusters and the economic security of the clustering process and determines the impact of macroeconomic and institutional factors, factors of the state regulatory policy on the development of industry in general and the clustering process of the domestic economy.

An important task in the field of institutional support for clustering in industry is to establish an effective dialogue between all institutional sectors in the development of cluster policies.

The introduction in Ukraine of the cluster form of organization of production, in our opinion, is most hampered by its insufficient legal and regulatory support. The lack of a favorable regulatory field makes it difficult to create clusters, increasing the transaction costs of participants in this process and reducing their overall performance. In Ukraine, attempts have been made repeatedly to introduce the notion of a "cluster" into official documents regulating state economic policy, but no practical steps have been taken along this path yet.

REFERENCES

1.Smith KA. Laws, leaders, and legends of the modern National Library of Medicine. J Med

2. Dmitrieva, N.V., Zaitseva, N.A., Kulyamina, O.S., Larionova, A.A., Surova, S.A. (2015), scientific and theoretical aspects of the staff recruitment organization within the concept oftalent management. Asian Social Science, 11(3), 358-365.

3. Dranev, Y.N. (2016), Practice of Economic Development of Trajectories: The Experience ofthe EU and Russia. Moscow: Scanrus.

4. Yu.I. Yefimychev, I.V. Zakharov, INDUSTRIAL CLUSTERS AND ECONOMIC GROWTH - Internet resource:http://www.unn.ru/pages/vestniki_journals/99990193_West_econ_finans_2005_1(7)/4.pdf

5. Swords, Jon (2015) Michael Porter's Cluster Theory as a local and regional developmenttool – the rise and fall of cluster policy in the UK. LocalEconomy, 28 (4).pp. 367-381.ISSN 0269-0942

6. Портер М. Международная конкуренция. - М., Международные отношения, 2017.

7. Tzikhan, T.V. (2015), Cluster theory of economic development. Theory and Practice ofManagement, 5, 40-51.

8.Философскийсловарь / Подред. В. И. Шинкарука. - 2 изд, перерабидоп. Киев, 2016. - 800 с.

9.Goncharov Yu. V., Marchenko T.I. The rationale for building a cluster model to increase the investment and innovation potential of enterprises of light industry in Ukraine // Light industry. 2014. No. 4. P. 21-24.

10.Heyets V.M., Seminozhenko V.P. Innovative Perspectives of Ukraine Kharkov Constanta, 2016. 272 p.

11. Z.V. Gerasimchuk Economic security of the region: diagnostics and support mechanism: (monograph) / Z.V. Gerasimchuk, N.S. Vavdiuk. Lutsk: Nastya, 2017. 244 p.

12.Boronenkov V. Study of the role of clusters in improving the competitiveness of the region // The Economist. 2018. № 10. P. 50-51.

13. E. Buchwald. Enlargement of Regions: A Perspective or a Substitute for Reforming Federative Relations // Federalism. 2015. №4. Pp. 135-152.

14. Vasiltsiv T. Economic Security of Ukrainian Entrepreneurship: Strategy and Strengthening Mechanisms: Monograph. Lvov: Aral, 2018. 384c.

15. Blank I.A. Financial risk management. Q.: Nick Center, 2015. 600 p.

16. Big Economic Dictionary / Ed. A.N. Azriliyana. Fifth ed., Extras.andpererabat. Moscow: Institute of New Economics, 2014. 1280 p.

17. Bondarenko V. Small Enterprises in the Cluster System [Electronic Resource] // Business for All. 2015. № 33. Access mode:Http://www.businesspress.ru.

18.Bendikov M. A. Economic security of an industrial enterprise in the conditions of crisis development // Management in Russia and abroad. 2014. № 2. S. 17-30.

19. Рибчинська Л. Кластерним технологіям об'єднання підприємств в Україні - 10 років // Економіст. 2018. № 4. C. 64-65.

20. Рибчинська Л. Концептуальні підходи до формування кластерів на Хмельниччині // Економіст. 2018. № 10. C. 44-46

21. Розвиток інформаційного суспільства: Колективна монографія у 10-ти томах / Том 6. Фінансова політика держави на макрорівні / В.І. Грушко, С.М. Лаптєв, О.І. Пилипченко, В.С. Сідак, І.І. Румик та ін.; За ред. проф. Грушка В.І. К.: ВНЗ «Університет економіки та права «Крок», 2014. 296 c. (C. 43-58, C. 94-104)],

22. Рокоча В.В. Економічна безпека суб'єктів господарської діяльності в умовах глобальної фінансової кризи. Монографія. За ред.. проф. О.А. Кириченка, проф. М.П. Денисенка, проф. В.С. Сідака .К.: ІМБ Університету«КРОК», 2014.

23. Романова Е. Региональные кластеры и конкурентная экономика (на примере Германии) // Современная Европа. 2018. № 2. C. 90-104.

24. Саблук П. Т., Кропивко М.Ф. Кластеризація як механізм підвищення конкурентоспроможності та соціальної спрямованості аграрної економіки // Економіка АПК. 2014. № 1. С. 3-12.

25. Сандулова Т. Международная конференция по кластерам - в Севастополе // Економіст. 2018. № 10. С. 68-69.

26. Сафонов Ю. М. Кластерна політика регулювання сировинного комплексу текстильної промисловості України // Легка промисловість. 2017.№ 1. С. 35-36.

27. Паліга Н.Б. Шляхи запобігання зовнішнім та внутрішнім загрозам економічній безпеці промислового підприємства [Електронний ресурс] / Н.Б. Палі- га, Ю.В. Світлична // Економіка промисловості. 2017. № 1. С. 197-202. Режим доступу: http://nbuv.gov.ua/j-pdf/econpr_2017_1_32.pdf

28. Панкова М. О. Кластерна політика як інструмент стратегічного менеджменту // Вісник Дніпропетровського університету. Серія «Економіка», 2017. Вип. 6(2). С. 38-44

29. Пастернак О. І., Горблюк Р.В. Оцінка готовності Львівської області до формування кластерів у системі охорони здоров'я // Регіональна економіка. 2016. № 4. С. 184-190.

30. Патон Б. Е. Инновационный кластер „Бархатный путь" и научно-технический прорыв Украины на мировой рынок строительства скоростных железных дорог / Б. Е. Патон, М. Д. Костюк, С. И. Кучук-Яценко [и др.] // Наука та інновації. 2014. № 2. С. 69-86.

31. Педько А. Б. Власність, контроль і конфлікт інтересів в акціонерних товариствах. К.: Вид. дім Києво-Могилянська академія, 2018. 325 с.

32. Питерс Т., Уотермен Р. В поисках эффективного управления: Опыт лучших компаний . М.: Прогресс, 2016. 423с.

33. Ленчук Е. Б., Власкин Г.А. Кластерный подход в стратегии инновационного развития зарубежных стран // Проблемы прогнозирования. 2016. №5. С. 38-51.

34. Ліпкан В.А. Національна та міжнародна бепека у визначеннях та поняттях / В.А. Ліпкан, О.С. Ліпкан, О.О. Яковенко; под общ. ред. І.М. Рижкова. – К.: Текст, 2016. – 256 с.

35. Лоханова Н. О. Система управління станом економічної безпеки підприємства: проблемні питання, концепція розвитку // Економіст. 2015. № 2. С. 52-56.

36. Лысенко Ю. Г. Механизмы управления экономической безопасностью / Ю. Г. Лысенко, Лопатовський В. Г. Поняття, класифікація ризиків та методи боротьби з ними. Вісник Технологічного університету Поділля. 2014. -№4 .Т. 1. С. 177-180.

37. Мак-Мак В. П. Служба безопасности предприятия. Организационно-управленческие и правовые аспекты деятельности. - М. : Мир безопасности, 2014. 160 с.

38. Малий М. Якщо зацікавлених людей об'єднує спільна мета, то можна подолати будь-які перешкоди // Економіст. 2018. № 10. С. 14-15.

39. Мартиняк І. О. Формування кластерної політики як механізму вдосконалення інфраструктури функціонування малого і середнього інноваційного бізнесу в регіоні // Регіональна економіка. 2018. № 4. С. 54-62.

40. Матеріали Міжнародного дослідницького агентства «Євромонітор» . - [Електронний ресурс] – режим доступу: http://www.euromonitor.com/

41. Кудрявець Є. В. Засади європейської політики створення інноваційних кластерів та поглибленої взаємодії з Україною // Інвестиції: практика та досвід, 2016. № 5. С. 64-72

42. Корецький Б. М., Клиновський А.Б. Домінантні напрямки управління конкурентоспроможністю регіону на основі кластеризації його економіки // Формування ринкових відносин. 2018. № 9. С. 124-127.

43. Косач І. А. Функціонування кластерів в умовах сучасних економічних відносин // Формування ринкових відносин в Україні. 2016. № 1. С. 125-128.

44. Кракос Ю. Б., Серик Н.И. Подход к оценке уровня финансовой составляющей экономической безопасности предприятия // Економіка. Фінанси. Право. 2016. № 12. С. 7.

45. Крисанов Д., Удова Л. Кластеризація економічної діяльності та обслуговування як інструмент сталого розвитку сільських територій // Економіка України. 2017. № 10. С. 69-75.

46. Алькема В.Г. Система економічної безпеки логістичних утворень// Монографія. К.: Університет економіки та права «КРОК», 2017. 378с.

47. Алькема В.Г. Управління економічною безпекою транспортного підприємства// Вісник національного університету водного господарства та природокористування. Збірник наукових праць. Економіка. 2017. Випуск 3 (59). с.5-10.

48. Аналіз даних у дослідженнях соціально-економічних систем: Монографія / В. С. Пономаренко, Л. М. Малярець. 2018. 432 с.

49. Андрощук Г. А. Экономическая безопасность предприятия: защита коммерческой тайны : [монография] / Г. А. Андрощук, П. П. Крайнев. - К.: ИД "Ин Юре", 2014. 400 с.

50. Андрюшкін Б.М. Економічна та майнова безпека підприємства і підприємництва. Антирейдерство/ Б.М. Андрюшкін, Ю.Я. Вовк, П.Д. Дудкін, та ін.. Тернопіль. 2018. 424 с.

51. Анненкова О. В. Механізм державної підтримки інноваційних кластерів // Актуальні проблеми розвитку економіки регіону : наук. зб. Вип. VI, т. 2. / за ред. І. Г. Ткачук. Івано-Франківськ, 2017. С. 108-112.

52. Анненкова О. В. Формування промислових кластерів як інструмент структурної перебудови економіки України / О. В. Анненкова, Є. В. Пономаренко // Актуальні проблеми розвитку економіки регіону : наук. зб. Вип. V, т. 1. / за ред. І. Г. Ткачук. Івано-Франківськ, 2017. С. 108-112.

53. Аналітична доповідь до Щорічного Послання Президента України до Верховної Ради України «Про внутрішнє та зовнішнє становище України в 2015 році». Київ : НІСД, 2015. 684 с.

54. Ареф'єва О. В. Планування економічної безпеки підприємств / О. В. Ареф'єва, Т. Б. Кузенко. К.: Видавництво Європейського ун-ту, 2016. 169 с.

55. Ареф'єва О. В., Шнипко О.С.Суперечності розвитку як основне джерело загрози безпеці рівноваги економічних систем // Актуальні проблеми економіки. 2016. № 3 (57). С. 57-63.

56. Асаул А. Кластер - это способ самоорганизации сообщества для выживания в условиях бескомпромиссной международной конкуренции // Економіст. 2018. № 10. С. 60-61.

57. Базилюк А. В. Тіньова економіка в Україні / А. В. Базилюк, С. О. Коваленко. К. : КФ ДП НДЕІ Мінекономіки, 2017. 206 с.

58. Бакум В. В. Методологія розробки агропромислових кластерних утворень регіону // Економіка АПК. 2017. № 4. С. 38-44.

59. Бакум В.В. Самоорганізація в агропромислових регіональних кластерах // Економіка АПК : міжнародний науково-виробничий журнал. 2018. Вип.1. С. 21-27.

60. Hill E. A methodology for Identifying the Drivers of Industrial Clusters: The Foundation of Regional Competitive Advantage / E. Hill, J. Brennan // Economic Development Quarterly. 2014. Vol. 14, υ 1. P. 65-96.

61. Innovation Acceleration (Europe INNOVA) [Елект-ронний ресурс]. — Режим доступу до ресурсу: http:// www.europe-innova.eu/c/document_library/ folderId=- 132990&name=DLFE-10371.pdf

62. Innovation clusters — Definition [Електронний ресурс]. Режим доступу: http://www.innoviscop.- com/en/definitions/innovation-clusters