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Cluster structurization as basis for circular economy state policy implementation: regional level

The article substantiates the expediency of cluster structurization application while forming and realization of the concept of circular economy both at the national level and taking into consideration regional peculiarities. The authors determine the approaches to the methodical supply of cluster structurization process for the state administration system based on SWOT-analysis of Zhytomyr region in terms of discovering strong and weak points, possibilities and threats of the region, SO, WO, ST, WT matrix construction, developing the actions of state business motivation concerning the activity implementation in a circular format that will make it possible to use the innovative potential of the region, build a modern service infrastructure for supporting the risky branches of economy and intensification of the foreign economic activity.
Keywords: circular economy; cluster structurization; cluster; SWOT-analysis.

Introduction. The transition from the administrative command economic system to the market one had to strengthen the national economy potentially, however, the practice shows that Ukraine turned to be in crisis, which is getting deeper because of imbalance in the development of particular Ukrainian regions. At present, the provision of economic development of the country's regions as the component of the national economic system is becoming an actual target for the bodies of state administration. More and more attention is being paid to the regional concepts of development aimed at the realization of effective and alternative forms of economy organization at the territorial level and provision of realization of strategies able to increase the competitiveness of the country's regions. The cluster structurization is a relatively new approach for providing the growth of the regions; the main goal of the structurization is the building interconnection between economic entities and their integration in separate clusters on the basis of branch peculiarities. On the one hand, such an approach allows to minimize resource expenses, to increase labour productivity and the efficiency of conducting economic activity, on the other hand, it allows to ensure economic and social development of a particular territory. If the cluster is built according to the modern ecological demands, the country will get a number of economical, ecological and social advantages. The synergetic effect of the integration allows to motivate innovations, and investments through setting up the interconnection between business entities, authority and science.

Current conditions are characterized with the imperfection in state administration to provide the cluster concept realization because it is the relatively new approach in ensuring the economic growth of regions. The cluster structurization is also one of the ways to implement the regulations of the circular economy and, on the one hand, it allows to increase the economic importance of a region, on the other hand, it provides a stable country's development.

The issues of clusters as the instrument for regional development were examined by O.V. Bezyhliy [2], O.Yu. Bobrovska [3], N.V. Vasylyeva [5], I.A. Chykarenko [12] and others. In spite of the issue actuality and the researches performed, the building of clusters as the way of implementation of regulations for the circular economy in terms of searching the mechanisms of state administration by the present processes has not been studied enough yet and is urgent as the necessity to provide economic and ecological safety as well as social development.

Aim. Taking into account that the cluster structurization is the newest approach in provision of the development of regions and requires the formation of interconnection between economic entities and their integration into separate clusters on the basis of regional peculiarities leading to the minimization of resource expenses, increasing the efficiency of conducting economic activity and also providing the growth of a separate territory, it is necessary to actualize the use of the cluster structurization approach as the base for the circular economy state policy implementation at the regional level.

Statement of the research. The positive effect of interconnection between economic entities that function at a particular territory and in a particular field or branch was described first by the founder of neoclassic economy Alfred Marshal in his work «The principles of Economic Science» in 1890. Chapter ten of this work is called «The Organization of Production. The Concentration of Specialized Productions in Separate Areas» [10]. Alfred Marshal emphasizes on the synergetic effect of concentration of specialized productions on a particular territory in terms of increasing the productivity of firms due to the integration of labour market, specialization of suppliers, transition and increase of knowledge. The increase in productivity and efficiency of productions concentrated on a particular territory in comparison with the similar productions located in a distance, Alfred

Marshal called «external economy». The author initiated the development of the theory of clusters, because using his works professor of Harvard business school Michael Porter substantiated the theory of clusters that was described in the following works: «Competitive Advantage» [13] (dedicated to the research of industrial clusters), and «On Competition» [14] (dedicated to the research of regional clusters).

The essence of clusters is described the most completely by Yu.Kovalyova [8], namely «how localized territorial and production form of integration of interconnected economic entities, bank, private sector, educational institutions, authorities, and adjacent, auxiliary, innovative enterprises/organizations, the objects of infrastructure characterized with the production of competitive goods or services, the presence of the agreed development strategy aimed at the realization of interests of every participant and the territory of cluster localization where it functions, and has a significant social and economic importance for the region».

A cluster is often identified with other similar organizations of economic activity, for instance, cooperation, territorial localization, economic interactions, branch concentration, economic agglomeration, territorial and production complexes, but not all the mentioned organizational forms are clusters. A cluster, first and foremost, is formed in market conditions with the participation or without the participation of a state, requires the presence of inner competition, and the scientific potential attraction. Cluster is usually formed by small enterprises, that increases their specialization and benefits as a result of mutual collaboration concerning the decrease of different kinds of expenses (administrative, transport, raw-materials, etc.) in other words, economic entities get benefits thanks to the effect of scale. On the other hand, the significance of big enterprises in the formation and activity of a cluster should not be underestimated as «the role of a big business in the process of cluster creation is to attract small and middle enterprises for setting up production on the basis of tight cooperation and subcontractual connections under active business and information interaction» [15], this improves the competitive situation of small economic entities in terms of organized cooperation with big companies in comparison with «individual enterprises» of the same branch or field of activity.

Taking into account such a principal peculiarity of cluster structurization as territorial localization, it is reasonable to determine the branch priority in order to realize the regulations of the circular economy as a whole, and to improve the mechanisms of state administration with the present processes, in particular. According to I.H. Honcharenko [6, p. 166] «The state policy of motivation of development of connections between research institutes and industrial sector by means of simplification of administrative regulation of innovative programs became the important factor in the development of clusters in Austria. The program fulfilled by Austrian institute of economic researches together with National research center, aimed at the gathering and processing of the necessary information with the further development of proposals about formation of clusters based on technological innovations and their influence upon the innovative activity. The program included the following modules: the national system of innovation motivation; increasing productivity; employment growth; the regulation of technological policy; consulting. At the same time, the work on the consolidation of small and middle enterprises is carried out under the auspices of Austrian business agency and State consulting company that has its branches in all regions of the country. These organizations contribute to the creation of business infrastructure, development of industrial networks, and formation of regional clusters». However, Ye.Karasyuk [7] considers that.

«As for the amounts of production the agro-industrial complex of Denmark exceeds all other economic sectors taken together and is a key one concerning consumer's market and investment potential. A particular role in it belongs to a «milk vertical» from milk processing to technology and equipment suppliers. Denmark business development board, which is responsible for the development of clusterization concept before the government, initiated a set of new of designs in this branch. Legislation, the structures of administrative management, budgetary appropriation need essential changes to realize the cluster policy. The worked performed in Denmark during a number of years made the country one of the world leaders as for the clusterization of economy».

As for the implementation of cluster structurization theory regulations, the experience of foreign countries shows the necessity of state authorities' interference in cluster formation to promote the process. The actuality of state administration of cluster structurization processes is being intensified under conditions of the implementation of policy about the transition to the steady model of production and consumption, that is, the circular economy. The cluster structurization is the most effective way of circular economy policy implementation. To build a cluster in accordance with the circular economy effectively it is necessary to research the region and find out its branch potential. It is not always that a predominated regional branch shows possible potential of the present territory. Michael Porter [16] examined the importance of determination of regional countries' specialization that influences competitiveness of produce at the world market and its place in world trade. For four years, Michael Porter studied the economy of the countries that took up the first positions in the world, namely, Great Britain, Denmark, Italy, Germany, Korea, Singapore, the USA, Sweden, Switzerland and Japan. On the basis of the analysis of over than one hundred leading branches of economy of the mentioned countries, the professor drew a conclusion that competitive advantages are a catalyst for constant growing productivity of the present countries, and the most successful economic entities of a separate branch at the world market are concentrated in particular regions. This research is described by the work «The Competitive Advantage of Nations» [236] where he substantiated the model of «Porter's Diamond» (is also met as «Porter's

Rhomb». The present theory is formed by the determination of the factors, which make the competitive environment of the countries; however, it can be applied for the determination of the competitive advantages of the regional environment. According to the model «Porter's Diamond» [16], the competitive environment of the country is formed by the following four factors, which are interconnected and can influence upon each other:

– the peculiarities of environmental conditions that are divided into basic (land, climate, natural resources, etc.) and improved conditions (infrastructure, the level of education, the level of corruption, etc.);
– the condition of consumers' demand influence upon the activity of economic entities concerning business improvement of the quality of products and decreasing their cost price due to the effect of scale;
– the branches connected and supported that make a strong chain of supply and provide positive influence on quality and cost price;
– internal competition, its condition and character in the domestic market that influences upon the possibilities of functioning a separate branch.

The above mentioned factors together enable to create the cluster of economic entities that will have, according to Michael Porter's opinion [16] «unique and powerful competitive advantages in the global market».

The regional environmental analysis is a necessary condition for the successful implementation of regulations of circular economy by a cluster way and a state policy in this branch. However, if the branch for implementing these projects is chosen irrationally, then it will have no economic, ecological and social effects and bring threat for the regional development in particular. To determine the branch and region for implementation of circular economy by a cluster way, it is necessary to conduct the analysis for avoiding QWERTY-effect. The QWERTY-effect theory was introduced by Paul David in 1985 and published in the work «Klio and economic theory of QWERTY». The title of the theory characterizes its essence, namely, a London producer of typewriters set up the letters in the following order Q, W, E, R, T, Y on the keyboards for advertising the name of their own company. Nevertheless, specialists affirm that such placement of the keys are not rational, but no one decided to change the keyboards of those modern computers for over than a century.

The QWERTY effect, that is, the effect when the wrong decision of ancient years is used, further was applied in more wider historical sense by Douglas Nortom. He tried to explain why countries reach different economic and social growth. There are paths where countries move like planets and leave the paths difficult enough. The mistakes made in the economic development in the past, reproduce further and affect on everything» [6].

The facts mentioned above confirm the necessity of determining the directions of economic activity for a country as a whole and for its separate regions also. The most suitable methodology of the regional analysis is the SWOT-analysis aimed at determining Strengths, Weaknesses, Opportunities and Threats of a region. To determine a branch for cluster formation based on the circular economy regulations, the SWOT-analysis will be performed on the data of Zhytomyr region. The SWOT-analysis can be conducted: firstly, to substantiate the potential of the region concerning cluster formation based on the circular economy regulations; secondly, to substantiate the necessities and advantages of cluster formation in a particular branch and on a particular territory in the context of implementation of state policy about the circular economy.

The SWOT-analysis of Zhytomyr region was conducted taking into account the data included in the Strategy of Zhytomyr region development before 2020 [11]. Zhytomyr state regional administration which developed and approved the Strategy in 2016, determined a strategic aim which is the steady regional development, the intensification of investments and building up the regional economy also due to the strengthening the cluster structurization.

Table 1 is showing the results of the SWOT-analysis for Zhytomyr region and includes the data about the strengths, weaknesses, opportunities and threats in the context of cluster formation that will provide the implementation of state policy about the circular economy.

The above shown SWOT-analysis of Zhytomyr region as the region favorable for the implementation of the circular economy state policy by cluster structurization is the instrument that allowed to structurize the information. The discovered regional strengths and weaknesses, opportunities and threats allow to substantiate the recommendations for the implementation of the circular economy regulations by cluster structurization in the following way (figure 1).

Table 1

Zhytomyr region SWOT-analysis aimed at substantiating the implementation of circular economy state policy by cluster structurization*

Strengths	Weaknesses
1. Favorable geographic position: 1.1. the close position to the capital of Ukraine; 1.2. international highways and sections of the Southwestern railway going through the territory of the region; 2. The availability of a considerable amount of natural resources: 2.1. deposits of useful minerals: peat, granites, labradorites, gabbro, sand, beryllium ores, quartzites, kaolin, ilmenite ores, limestones, etc.; 2.2. forest resources; 2.3. mineral water of radon type; 3. Provision with water resources 4. Favorable climatic conditions 5. Diversified regional economy: food, timber industry, mining industry and working out of open pits, the production of building materials, light industry, agriculture, etc.; 6. Developed small and middle businesses; 7. The developed network of higher educational institutions of I–IV levels of accreditation; 8. Available scientific and research basis; 9. Sufficient amount of qualified labour force; 10. The availability of land plots for the development of clusters and industrial eco-parks; 11. The pollution level of atmospheric air is lower than a middle index in Ukraine; 12. Developed foreign economic relations; 13. The organized dialogue between authority and business: authority initiated the project of industrial park creation in the town of Korosten, the project is a first one in Ukraine; 14. Patriotic spirited population with з active public position	1. International disproportion in the development of regional territory; 2. The low technical condition of local automobile roads; 3. The part of regional territory is not used in economy because of the accident at Chernobyl atomic power station (APS); 4. Natural reduction of population, specially the age able of work (the effect of demand postponement); 5. The high level of population unemployment, specially in a rural area; 6. The movement of qualified specialists abroad; 7. The regional budget uses dotations; 8. The low ecological consciousness of a considerable amount of population and economic entities; 9. The problem of utilization of industrial and solid consumer by-products; 10. The considerable specific gravity of raw materials and products of low processing degree in the export structure of products; 11. The high level of capital assets depreciation, and resource and energy capacity of production; 12. The lack of good connections between scientific and research organizations and businesses; 13. The imperfect system of the cluster structurization and self-administration; 14. The low innovative activity of enterprises and insufficient level of investment attraction
Opportunities	**Threats**
1. The popularization of steady development regulations as a whole, and stable production and consumption models, in particular; 2. The signing of convention about association with EU; 3. The improvement of business climate and the intensification of small and middle businesses; 4. Conducting administrative reforms, the decentralization of authority, the state policy concerning prevention of corruption; 5. Providing international help and international support attraction about the implementation of priority programs; 6. The labour productivity increasing due to the transfer of technologies; 7. The popularization of cluster approach and realization of cluster projects in Ukraine as a whole and in Zhytomyr region in particular; 8. The introduction of mechanisms for the development intensification of «green economy», «green» energy sources and implementation of energy-efficient programs; 9. The access to the raw material base of a different type; 10. The increase in export potential due to the opportunities of coming into the international markets; 11. The development and popularization of closed cycles among domestic companies as the instruments for extension of specialization and inter-branch connections; 12. The positive tendencies in the development of collaboration between higher educational institutions and businesses and authority and training of specialists for market needs; 13. The qualitative training of specialists with higher educational institutions for engineering and technical, information and computer, economic and other fields; 14. The intensification of regional potential use and foreign investment attraction	1. The increasing competition in the sphere of innovative growth among the developing countries; 2. Political instability and the continuation of anti-terroristic operation in the East of Ukraine; 3. The decreasing of selling markets because of the occupation of the Crimea and a part of Donbas territory; 4. A considerable amount of forced migrants from the area of ATO (anti-terroristic operation) and Crimea that cause an extra loading on local budgets, infrastructure, the market of labor and lodging, law-enforcement system; 5. The strengthening of Ukrainian positions as a raw material importer on the international market; 6. The worsening of competitiveness of Ukrainian goods because of the increasing the amounts of imported substitutes and eco products; 7. The instability of national currency rate and continuation of inflationary processes in the economy; 8. The risks of coming into new markets, the loss of competitiveness among enterprises because of inability to modernize production and join the EU standards in time; 9. Unfavorable demographic situation, natural reduction of a part of population able to work that causes «the effect of demand postponement» – that is, the decrease of consumption amounts for goods and services; 10. The low level of state support for business projects and initiatives; 11. The complete or partial taking over domestic producers by western companies; 12. The increase of international requirements and standardization of products in an ecological aspect; 13. The existence of shadow import and inner shadow sector; 14. The worsening of investment climate as a result of the armed conflict continuation in the East of Ukraine, inflationary processes and political instability

*Note: *the data about the Strategy of Zhytomyr region development before 2020 are used partially [11]*
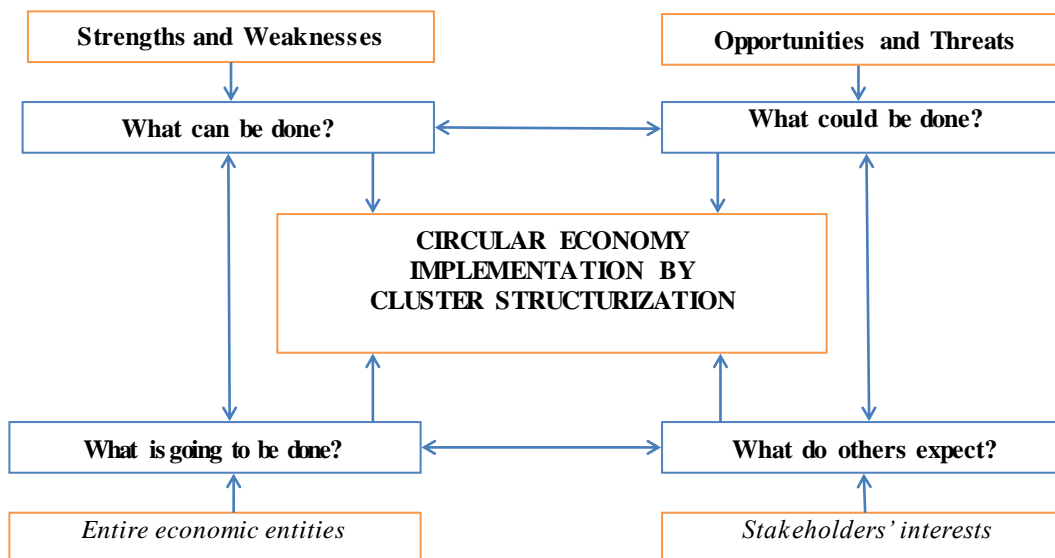
Fig. 1. Preconditions for forming proposals about circular economy implementation

The constructed scheme concerning the preconditions for forming proposals about circular economy implementation by a cluster way based on the SWOT-analysis data allows to discover the directions for state regional improvement, in particular:

– the strengths and weaknesses give the grounds to form real tasks for regional economy clusterization on the base of the circular model;

– the opportunities and threats are showing what potentially can be done for circular economy implementation by cluster building, if the opportunities are used rationally, and in what way the threats can be avoided and/or minimized to provide this;

– the identification of stakeholders' interests (state administration bodies, scientific and research institutions, economic entities, public organizations, population) gives grounds to form conditions for building clusters on the base of circular economy regulations that completely/partially satisfy interested individuals;

– the aims of economic entities, which will make clusters on the circular economy regulations, must be taken into account for substantiating the advantages and determining the directions of state support of such a way of running business.

It is reasonable to mention that the answers to the questions («what can be done?», «what could be done?», «what is going to be done?», «what do others expect?») will be mutually connected and depend upon one another that makes it possible to take into account the most complete list of factors and form the rational list of recommendations about the improvement of state administration of regional clusterization processes, and implement in this way circular economy state policy.

To provide proposals regarding building the clusters based on the circular economy regulations, it is necessary to form a matrix. The SWOT-analysis matrix allows to trace the connections in the following context: – SO (Strong points (Strengths) – (Opportunities)) – how to use the opportunities to strengthen and develop the strong points; – WO (Weak points (Weaknesses) – (Opportunities)) – how to use the opportunities to overcome the weak points; – ST (Strong points (Strengths) – (Threats)) – how to use the strong points to avoid the threats; – WT (Weak points (Weaknesses) – (Threats)) – how to minimize the weak points to avoid the intensification of threats. According to the results of the detailed analysis of the formed matrixes of The SWOT-analysis regarding the determination of interconnection between the strong points and opportunities (SO), and the matrix of the weak points and opportunities (WO) for Zhytomyr region and also the interdependence of the strong points and threats, and the weak points and threats for Zhytomyr region (the description of the methodology is given in the next article of the journal) the authors form the set of immediate actions for state administration in the context of circular economy concept implementation.

Conclusions. The cluster structurization is considered to be one of the ways to implement the circular economy projects. The realization of circular economy state policy by the cluster structurization of the economic system, taking into account the advantages and experience of the foreign countries, is the effective instrument for increasing economic well-being and providing ecological stability. The conducted SWOT-analysis of Zhytomyr region concerning the opportunity of implementation of circular economy regulations by the cluster structurization allowed to make the conclusion that the region is favorable and branch flexible for the circular economy introduction on the basis of the cluster structurization.

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Discovering the strengths, weaknesses, opportunities and threats for Zhytomyr region for the implementation of circular economy projects on the basis of the cluster structurization and the conducted analysis of the interconnections, allowed to form the actions concerning the improvement of state administration efficiency in the current branch, namely, it concerns the development of reasonable system of business entities' state intensification by state support about introduction of the activity in this way, and providing state regulation of adjoining spheres. Especially, the development of state support system of science that will allow to use innovative potential, and the creation of modern serving infrastructure that is necessary for supporting the risky branches of the economy and intensification of external economic activity. On the basis of studying the interconnections concerning the SWOT-analysis, the authors prove that the production of goods in this way will allow to increase the level of competitiveness among home companies on the international markets.

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