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Conceptual foundations of cluster mechanisms development in wastes treatment: the regional aspect

Abstract. *Introduction.* Modern calls which appear before Ukrainian economy predetermine the necessity of the new approaches to regional development management search. Cluster approach is foremost the new administrative technology, that allows to promote competitiveness of both separate region or industry and state on the whole. Nowadays, the use of cluster approach has already been ranked one of key places in strategies of highly developed countries' socio-economic development. According to that, the cluster formation mechanism is an important direction of modern economic analysis.
Purpose. To analyze key concepts, problems and prospects of regional wastes management system forming in the context of cluster approach.
Results. The main features of regional, industrial and innovative clusters have been investigated in the paper. The principles of a wastes cluster formation at the regional level are formed. The classification of wastes clusters based on the composition of wastes disposal facilities and their appearance is proposed. By analogy with industry clusters, a three-level structure of a wastes cluster providing interaction and efficient usage of regional resources (secondary, administrative, economic, informational and innovative) has been considered. The determining role of resource-saving technologies in the cluster formation has been highlighted.
Conclusion. The problem of regional wastes management system's formation solving in the context of clustering creates conditions for investment flows that facilitate the introduction of modern resource-saving technologies, jobs creation, and efficient usage of regional resources. This will result in a positive impetus to the social and economic impact and competitiveness of the region.
Keywords: Wastes, Cluster, Regional Management, Secondary Resources, Resource-Saving Technologies
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Концептуальні основи розвитку кластерного механізму поводження із відходами: регіональний аспект
Анотація. Автором визначено основні ознаки регіональних, галузевих та інноваційних кластерів. Сформульовано принципи створення кластера відходів регіонального рівня. Запропоновано класифікацію кластера відходів на основі їх складу й об'єктів утворення. За аналогією із галузевими кластерами, розглянуто трирівневу структуру кластера відходів, що забезпечує взаємодію та ефективне використання регіональних ресурсів – вторинних, адміністративних, економічних, інформаційних, інноваційних. Показано визначальну роль ресурсозберігувальних технологій у становленні кластера.
Ключові слова: кластер; регіональне управління; вторинні ресурси; відходи; ресурсозберігувальні технології.

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Концептуальные основы развития кластерного механизма обращения с отходами: региональный аспект
Аннотация. Автором определены основные признаки региональных, отраслевых и инновационных кластеров. Сформулированы принципы создания кластера отходов регионального уровня. Предложена классификация кластера отходов на основе их состава и объектов образования. По аналогии с отраслевыми кластерами, рассмотрена трехуровневая структура кластера отходов, обеспечивающая взаимодействие и эффективное использование региональных ресурсов – вторичных, административных, экономических, информационных, инновационных. Показана определяющая роль в становлении кластера ресурсосберегающих технологий.
Ключевые слова: кластер; региональное управление; вторичные ресурсы; отходы; ресурсосберегающие технологии.

Introduction. Today's economic map of the world is dominated by clusters: critical masses in one place of unusual competitive success in particular fields. Clusters are striking features of virtually every national or regional economy, especially in more economically advanced nations. Silicon Valley and Hollywood may be the world's best-known clusters. Clusters are not unique, however; they are highly typical – and herein lies a paradox: the enduring competitive advantages in a global economy lie increasingly in local things – motivation, knowledge, relationships – that distant rivals cannot match.

Cluster approach promotes efficiency of realization of economic strategy due to two directions:

1) accent on the issues of competitiveness increase on macro- and microlevel. Cluster approach stimulates support of collective projects, related to development of innovative infrastructure, mechanisms of continuous education, advancement to the internal and external markets of commodities and services.

2) effective use of public-private partnership mechanisms, exposure of «bottlenecks», overcoming of which is extremely important for the increase of regional economy's competitiveness. Therefore, development of clusters is one of Ukraine's modernization strategy priorities for the regional economy.

Brief Literature Review. The study of academic sources testifies that the theoretical base of scientific researches and practical problems solving in the area of forming the system of regional wastes management in the context of cluster approach is created due to efforts of such foreign and domestic researchers as: D. Jacobs & A. De Man (1996) [1], M. Enright (1992, 1996) [2, 3], E. Feser (1998) [4], M. Porter (1998, 2001) [5, 6], E. Yehoue (2005) [7], S. Tiwari & J. Vinals (2012) [8], M. Voynarenko, O. Demedyuk, O. Kushniretska, G. Kleyner, A. Sigayov and others. They probed the phenomenon of clusterization in connection with increase of economy competitiveness and key problems of wastes management system's forming and functioning.

At the same time, theoretical aspects of intercommunication between regions' economy structural organization and their branch complex in the context of cluster ideology forming and the regional wastes management system introduction are still not enough developed.

Purpose of this article is to analyze problems and prospects of regional system of wastes management forming in the context of cluster approach.

Results. Radical transformation of modern economy updates an introduction of new organizational and economic technologies of regional development management on the basis of territorial associations' creation, interconnected enterprises, and establishments known as «in-plant network systems» or «clusters» occurring in Ukraine [9]. In different countries of the world and in some regions of Ukraine certain experience of clusters creation and functioning, various by their specialization, scales, structure and amount of the incorporated enterprises has already been accumulated. World practice shows that clusters make investment more efficient, strengthen domestic markets, increase returns via spillovers.

According to the definition of M. Porter, clusters are «...concentrated by the geographical sign group of associated companies, specialized suppliers, providers of services, firms in the defined industries, and also the organizations related to their activity (for example, universities, standardization agencies, trading, tourist, building associations) in certain competitive spheres» [5]. The essence of cluster is that co-ordination of his constituents' activity and horizontal external copulas more substantially influence on efficiency of functioning, than traditional vertical subordinate copulas. Because of the above-mentioned, we can establish that clusters are the real sphere of co-operation between local firms, regional enterprises and other institutions.

Nowadays in foreign economic literature various cluster formations, principles and methods of their exposure, and also features of the cluster systems forming are fully enough studied and analyzed. At the same time, classification of clusters is important and it needs subsequent development and clarification. Three basic types of clusters are distinguished: regional, branch and innovative clusters [10].

Under a regional cluster we understand an innovative structure, which is formed in a region on the basis of concentration of producers, suppliers and users networks, connected by the general charts of products production and realization, problems of regional recreation and institutional environment development. Forming of such cluster organizations must provide the increase of regions' economy competitiveness due to market self-organization, enterprises redevelopment and corporatization, innovations distribution by inwardly corporate channels and others.

Examining a regional cluster, foremost, we mean the group of localized in a region interconnected companies, enterprises, firms which co-operate with each other in the field of production and realization of commodities and services for economic effect achievement and realize the competitive edges of this region.

Branch clusterization is taken foremost to the rule «four C»: 1) concentrations of enterprises in one geographic area; 2) co-operation with the high level of development; 3) competitiveness of products increase; 4) conquest and maintenance of clients [5].

The cluster formations provide a concentration, specialization of production in combination with additional infrastructural possibilities. Through development of commercial infrastructure, introduction of innovative technologies the level of innovative development of industries is determined. Thus, development of a particular branch clusters is the most frequently examined at the level of one region, and each cluster can be built on principle by choice: technological chainlet; community of products; market of resources suppliers (network principle); community of products and markets of products sale; community of services provided and by relative independence of separate links.

It should be noted that regional clusters are divided by the types of economic activity, which allowed systematizing them in industrial clusters and clusters in the field of services, coming from their signs. Unlike industrial clusters, innovative ones have a necessary participant – organization which is the generator of knowledge [11].

The innovative cluster, being the most effective form of high level of competitiveness achievement, is an informal association of different organizations (research centers, industrial companies, individual businessmen, governments, public organizations, higher educational establishments etc.). Such association in an innovative cluster on the vertical integration basis forms the strictly oriented system of new knowledge, technologies and innovations distribution. Forming of proof connections between all cluster participants is the major condition of effective transformation of inventions to innovations, and innovations – to competitive edges [12]. The use of innovations in such cluster is carried out at the level of technologies, commodity, marketing and organization of works. The innovative cluster simplifies for its participants access to financial resources, new knowledge and technologies, and also to the receipt of information about market state and advantages of potential products users.

It should be noted that presently forming of innovative clusters is carried out on the base of existent technoparks. In world practice technopark is an independent legal entity, interested in maximization of own profit within the framework of the set limitations, in the founders composition of which are included, first of all, commercial organizations together with the representatives of educational and scientific organizations, and also local authorities. Technoparks as objects of innovative infrastructure, unlike industrial parks, are characterized by the presence of hard requirements to innovative character of enterprises-residents of technoparks activity, and also by the grant of the specialized services which provide support of small innovative enterprises development and contribute to the effective transfer of technologies. Effectively working, technoparks can become the important element of innovative infrastructure for development of clusters, including innovative clusters.

Maturity and competitiveness of innovative cluster elements comes with time. Rising their potential, innovative clusters answer high requirements of world market [13], that's why there is a necessity of refocusing of the regional economy on the innovative model of development.

The basic cluster characteristics, which determine its creation, are:

- presence of homogeneity between the entities through community of region/industry;
- presence of connections which exist between the entities;
- presence of synergistic effect between the entities due to community of region /industry [6].

Analyzing the cluster of wastes, we should note that it is selected on principle of community of creation from the financial resources of category of wastes and regulations on handling wastes of production and consumption. It is thus important to mark that wastes are subdivided into: utilized and unutilized. The last at the modern level of technological base development cannot be attracted in the secondary production and subject to be buried or destroyed. The presence of the proper technologies on wastes processing allows examining all of wastes as potential secondary resources.

Consequently, basic characteristic signs of wastes cluster are: homogeneity (formation of wastes as second raw material), presence of co-operation connections (organizations on collection and transporting and others) and synergetic effect (getting profit from recycling at resource-saving technologies). More shallow subsections can be selected into a cluster: subclusters and subsubclusters. Every selected subsection must meet described above characteristic signs of cluster also, at the same time selected shallow subsection based on more detailed specification of signs, inherent to this subcluster or subsubcluster. In this connection, it is expedient to consider principles which can be fixed in basis of wastes clusters.

Resource principle of cluster forming. Herewith wastes are examined as raw material elements of cluster. A basic task at regional level is determination of resource base volume of wastes cluster. The foundation of resource base is made by wastes of production and consumption.

Principle of the regional districting is taking into account natural resource potential (climate, primary resource base of region, administrative-territorial division, economic infrastructure).

Principle of leading role of Administration in ecological policy on management wastes forming. Herewith the basic tasks are: long-term prospect determination within the framework of the regional targeted programs of basic objects for the investment from the side of state and private sectors of economy. Development of normative legal base. Drafting of the territorial planning charts.

Development wastes producer's responsibility for raw material streams forming in the wastes cluster. A problem can be solved at the level of declaration, when an enterprise declares its activity: on volume of wastes diminishing by introduction of new technologies, scientific developments, logistic charts; on the permanent volume (or increase of volume) of wastes in connection with work of enterprise stability (by expansion of production); on creation or lining up the group of participants on collection, transporting, processing of raw material for the cluster of wastes, contributory infringement profitability of organizations-participants in a chainlet from a producer to utilization [14, 15].

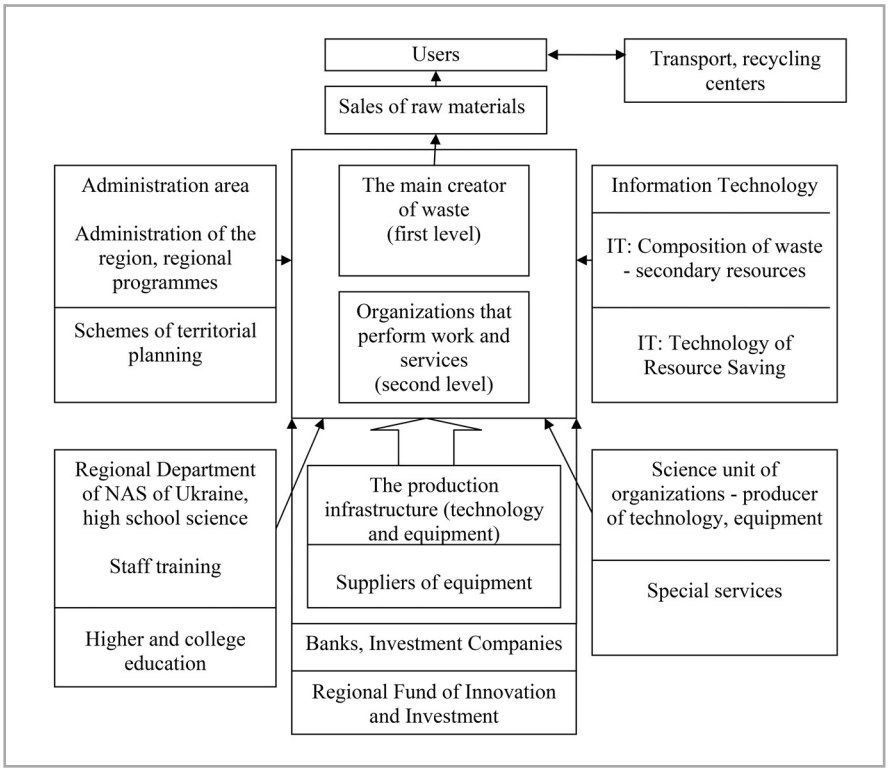

Figure: **The structure of wastes treatment cluster mechanism**
Source: Author's own development

In a wastes cluster, two subclusters are selected: wastes of production (agroindustrial complex, building, wastes of light industry, oil wastes, food industry) and wastes of consumption (cardboard, paper, plastic, polymers, glass, coloured metals, hard domestic wastes). Unfortunately, nowadays there is not sufficient experience of cluster of wastes creation yet in none of regions of Ukraine, that's why there is a need to examine the structure of wastes cluster only by analogy with the most developed branch clusters. In our opinion, the structure of wastes cluster must consist of three levels which are shown in the Figure.

The first level includes all basic creators of wastes in a region. Basic organizations of wastes cluster are enterprises-suppliers of production wastes, and also localities where population forms wastes of consumption.

The second level is presented by organizations that perform various services in the field of wastes management: collection, sorting, transporting of wastes and processing secondary materials with forming of useful product. They also perform different types of research and development work on the creation of technology, logistics schemes on effectiveness of using wastes as secondary resources through technology [16].

The third level is presented by socio-economic and the other infrastructure. This includes: administrative resources, banking resources, human resources (personnel, staff on all activities, training staff with necessary skills); physical and technological infrastructure (transport infrastructure, road networks, communications and equipment, technology park availability etc.). An important element of the third level of cluster organization and therefore the whole cluster, is availability of affordable technological equipment for recycling. In this regard, at the stage of technical and economical feasibility company appeals to organizations that provide action plan development and new technologies for efficient and safe wastes management implementation. These organizations primarily include scientific and research centres that determine the logistics of wastes management in normal mode, and emergency formations responsible for prevention and elimination of emergency situations.

It should be noted that for production and consumption wastes reducing it is important to develop the program «Zero Waste» on the basis of contracts with firms that are wastes processors. According to the current developments in the use of resource-saving technology, now there is a need for an information base creation [3].

Thus, formation of cluster in the field of wastes of production and consumption, and the involvement of secondary raw materials in the economy at the regional level is a promising direction for the development of the regions of Ukraine. Within a cluster of wastes the mechanisms for efficient use of raw materials (recycled resources), administrative resources, economic resources, information and innovative resources based on scientific and technological developments are created.

In the foreground of cluster approach are not the environmental aspects of wastes, but the economic opportunities for their integrated usage and recycling in marketable products. At the same time, environmental issues are already resolved automatically by the planned reduction of wastes.

Conclusions. In general, problem of regional wastes management system formation solving in the context of clustering creates conditions for investment flows that facilitate the introduction of modern resource-saving technologies, jobs creation, and efficient usage of regional resources. This will result in a positive impetus to the social and economic impact and competitiveness of the region. The author's proposals about conceptual foundations of waste cluster creation and functioning (key principles, classification and structure) can become a basis for regional development programs creating. It was proved by the author that cluster approach provides the most efficient usage of waste as well as energy-saving effect.

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