



# World Scientific News

WSN 57 (2016) 388-403

EISSN 2392-2192

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## **Transbordering Clusters: European Experience and Opportunities for Ukrainian Companies**

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### **ABSTRACT**

This study focuses on opportunities for Ukrainian companies in transbordering clusters. The study used empirical evidence of EU. The existing definition of clusters that appear in scientific literature are summarized. Based on theoretical sources the features of transborder cluster are allocated. The positive European experience of creating clusters is considered with concrete examples of national and international cluster policy implementation. The clusters positive effect is considered in terms of opportunities for inter-company collaboration, sharing innovation and knowledge and, consequently, achieving firm competitiveness.

**Keywords:** transborder cluster, European experience, cross-border cooperation, cluster concept

### **1. INTRODUCTION**

The researchers note that in the era of globalization geographical proximity does not lose its importance, in fact - it is growing. Among the critical factors that explain the development of cluster organizations are incentives associated with market competition, technology and technological change. The changes in the technological paradigm and trajectories that affect the competitiveness of sources, determine the company's strategy. Participation in the cluster is an important element of individual firm competitiveness. Companies even have to track clustering processes in the region.

The experience of the European Union in the cluster development can be useful for Ukraine in the cross-border cooperation. Adapting to the home conditions the European practice can be an effective lever of economic development.

An important contribution to the theoretical study of cluster concept made E. Bergman, D. Hague, B. Garrett, E. Dahmen, E. Giuliani, M. Enright, E. Mensfeld, M. Porter, C. Price, S. Rosenfeld, P. Swan, M. Feldman, D. Jacobs, L. Yeung, and others. The functioning of cluster structures is considered in the scientific works of Ukrainian authors: E. Bezvushka, K. Dudkin, S. Sokolenko, D. Stechenko.

Prospects for clusters in certain sectors of the Ukrainian economy are highlighted in the works of V. Gorohov, H. Lozova, O. Mech, N. Kostenko, A. Nestorenko, E. Popov, I. Tkachuk and others.

However, many methodological issues of business on the basis of the clusters are not in the discussion. In particular, the study of practical tools for creating transborder clusters in Ukraine and using of foreign experience that allows to find the solution of social and economic problems.

## **2. REVIEW OF CLUSTER CONCEPT**

Review of works shows that the economic category of "cluster" remains controversial. Differences of researchers opinion are in publications about history of cluster theory.

The most scientists called M. Porter as an ancestor of cluster theory. He formulated the theory of national competitiveness in "National competitive advantage" in 1990. The clusters play an important role in the "competitive advantage diamond". However, in 1979 the definition of industrial cluster as a subset of close connected production, flows of goods and services was in the works of S. Czamanski and L. A. Ablas [7].

However, the authors agree that the cluster concept related to research in many areas of economic: from transformation of socio-economic systems (M. Castells, B. Milner, E. Toffler) to the national industrial and regional policy (T. Anderson, S. Rosenfeld, M. Enright and others) (Table 1).

**Table 1.** Basic theoretical concepts, which are associated with cluster theory.

<b>Title</b>	<b>Author/ authors</b>	<b>Key provisions</b>
The theory of regional specialization	A. Smith D. Ricardo, E. Heckscher and B. Ohlin	Attention to the factors that explain the agglomeration of various sectors in certain regions, the study of relationships between geographical agglomeration and economies of scale, specialization of different areas at different stages and types of production activities.
Theory of accommodation industry	A. Weber	According to elements of industrial product cost there are two factors or "orientation" that affect the process of location the main industries - the transport orientation and the orientation of cheap labor. Later, these factors were added by a third, called agglomeration (the concentration in one place of many

		industrial enterprises that reduce production costs primarily in the construction of new productions)
The localization theory	A. Marshall	He advanced the idea that the economic performance of companies depends on the location and proximity of economic agents. Marshall identified three specific resources of agglomerated economies: knowledge sharing between firms, associated labor market and the advantages of sharing resources. It is important in localized economies of Marshall that all companies and businesses are belong to the same industry sector and the proximity of firms in the same industry.
Regional economic development theory	F. Perroux	Focused on innovation and investment, which are the drivers of industrial development. Large firms - poles of growth – spread positive economic effects to other firms in a small geographic location, and such growth poles serve as a catalyst for positive economic development. This growth poles pass through two stages: the first stage, in which the firm and cluster, and the second stage, which covers external growth through flows of goods, investment, and information.
The concept of "social glue"	P. Morosini	The informal network of contacts between individuals occurs across borders of firms and acts as a knowledge flow channel. These communication channels promote the diffusion of knowledge, providing the firms in the cluster certain advantages in innovation.
The concept of local knowledge sharing	A. Saxenian, M. Feldman	Based on numerous studies the authors emphasize the importance of informal channels for knowledge sharing and creating new knowledge
Product cycle theory	R. Vernon	Argues that the location of firms is affected by combination of market demand, technological change and labor costs. According to Vernon, companies and businesses go through a series of technological and geographic stages. New products are developed in modern industrial clusters that demonstrate a high level of knowledge sharing. Regional competitiveness depends largely on changes in demand, changes in technology and changes in production costs. The maturity of the product - the product cycle - dictates stage of cluster.
The concept of innovative environment	R. Camagni	Focuses on the relationship between the capacity for innovation and regional economic environment. Defines an innovative environment as a complex network of mainly informal social interactions in a limited geographical area, which increases local innovation through synergy and collective learning processes.
The theory of transaction costs	R. Coase, K. Arrow, O. Williamson	The theory of transaction costs is contrary to "ideal market", highlighting the role of organizational forms. It provides an explanation of the interaction (joint) market and businesses and thus help in choosing the type of cooperation and forms of organization. The authors, citing transaction costs, suggests the enterprise as a non-market forms of transactions.

Relational theory	J. Mayer, H. Singh, R. Gulati, N. Nora, A. Zeyer	Possibility of coexistence of competitive strategy and cooperation. Company instead of maximizing profits and minimizing costs, are looking for ways to reduce the level of uncertainty in the market by concluding agreements and arrangements, even with competitors. Unlike more traditional approaches that determine competitive advantage as a result of available resources or capabilities within the firm, the theory states that the most important resources of the company are located abroad and companies that combine their resources with resource of partners can provide a competitive advantages
The idea of collective invention	R. Allen	Collective invention is characterized by a high level of inventive and rapid accumulation of knowledge that are because of the openness of information between competing. It stimulates circulation and exchange of knowledge and information on the established social group. Two social aspects of the invention: - requires a high level of technological knowledge and skills; - expectation of reciprocity.

It is difficult to summarize existing theoretical approaches to cluster, its components, characteristics, key success factors, despite the "youth" of cluster concept and great attention to the issues, and perhaps because of it. D. Jacobs and A. de Man [14] used the following criteria to determine the cluster:

- geographic concentration;
- horizontal and vertical relationships between the sectors of industry;
- the use of common technology;
- the quality of cooperation between firms;
- availability of key actors (large firms, research center, etc.).

And M. Enright provides the following cluster features [8]:

- geographical size - natural vs. virtual;
- density - dense to loose;
- depth - vertical;
- potential of growth - innovation to mature;
- innovative power - high to low;
- industrial organization - the relationship between the firms.

However, these criteria are not general, as the spatial size and form are increasingly differentiating in modern conditions [1]. Cluster boundaries are constantly changing with the emergence of new firms and industries, growth or decline of existing fields and the development of technology and the market, new bonds. If in the early 90's the clusters mostly had a national character (Silicon Valley in the US), then in the mid 90s first international clusters emerged. All this explain the difference in the definition of "cluster" (Table 2).

**Table 2.** The approaches to the definition of "cluster".

<b>Author</b>	<b>Definition</b>
S. Czamanski, L. A. Ablas [7]	a subset of productions associated by flows of goods and services more than with other sectors of the national economy
M. Porter [19]	the geographically concentrated group of interconnected companies, specialized suppliers, service providers; firms in related industries, as well as activities related to their organizations (eg, universities, agencies, standardization and trade associations) in particular fields that compete but work together
M. Porter [19]	system of related firms and institutions that are more than just the sum of the components
E. Guiliani, C. Pietrobelli, R. Rabelotti [11]	limited territorial assemblies in which the company within certain industries and sectors involved in economic transactions related to certain production chains that are lighter, but not necessarily by spatial proximity
A. Gary [10]	the relationship between buyer and supplier, competitor and cooperatives, which together allocate resources
S. Rosenfeld [22]	organic geographical concentration of similar, related or supporting companies that use active channels for transactions, communications and dialogue, using a common infrastructure, labor markets and services and facing common opportunities and threats
D. Power [20]	system of interconnected subjects that interact and develop within a specific socio-institutional environment
A. Carrie [3]	network of companies, their customers and suppliers of materials, components, equipment, financial resources, educational services, etc.

The differences in the definitions of "cluster" explain the difference in definitions of "transborder cluster" (crossborder, binational, transnational, international) as derivative category. A transborder cluster consists of a group of firms usually geographically close to one another but separated by a border. The feature of transborder clusters is that participants have different tax, customs, legal environments of neighboring countries, but can use a common infrastructure and operate first of all on cross-border markets. Enhanced interaction between participants and subjects helps leveling the barriers of the border.

The transborder cluster is not just a set of elements in the location it's a dynamic system that provides common rules and common face in interaction, a system of exchange that includes informational, technological, financial flows, flows of human resources and raw materials and components.

### **3. TRANSBORDERING CLUSTERS: EUROPEAN AND UKRAINIAN EXPERIENCE**

In our opinion, existing in Ukraine clusters do not fully use the potential benefits of localization. Moreover, we can conclude that the situation does not improve in the future.

There are initiatives on the cross-border logistics cluster in the Zakarpattia region (Ukraine, Hungary), "First Agrarian Cluster" (Ukraine, Romania), cross-border tourism cluster of green tourism "Dnipro". In 2008 the Kharkiv National Economic University, Kharkiv Regional Support Fund, Belgorod State University, Belgorod small businesses support regional fund established a cross-border tourism cluster.

The European countries are running various programmes to foster the development of high-performance clusters. In doing so, they focus on various aspects, such as the establishment of structures, the funding of research and development projects, and financial support for regional development, attracting investment, and internationalisation activities.

**Table 3.** The examples of some transbordering European clusters.

<b>Title</b>	<b>Description</b>	<b>Countries</b>
Dommel Valley	The Group (DVG) was founded in 1998 by a group of Learning Professionals from several High Tech companies in the Dommel Valley region, such as Philips, ASML, Océ and Assembléon, and the Technical University of Eindhoven.	Belgium/the Netherlands
Medicon Valley	Big, small and medium-sized innovative life science companies continue to energise the area. Many of them choose to become members of the regional network organization Medicon Valley Alliance.	Denmark/Sweden
Øresund Science Region	The Øresund is an example of European cross-border collaboration, building on the metropolitan area around Copenhagen and, across the sound, southern Sweden with the cities of Malmö, Lund and Helsingborg. Cross-border integration intensified following the opening of a fixed-link bridge/tunnel. Commuting, student flows and cross-border residency have been on the rise in this knowledge-intensive area. After hitting a plateau in terms of integration, the area is seeking renewed inspiration for cross-border efforts. The bi-national region is characterised by a concentration of research-intensive multinational companies, innovative SMEs, and leading higher education and research institutions, specialised in life science and ICT. Large infrastructure adds to the scientific potential and high-tech image of the region.	Sweden/Danmark
Baltic Biomaterial MedTec Cluster	It is a special interest group, consisting of research departments, SMEs and representatives of academia and administration. The aim is to develop the regenerative medicine in the whole Baltic Sea Region, according to the policy of the ScanBalt flagship project "Baltic Sea Health Region" as part of the EU Baltic Sea Strategy.	Germany/Poland/Lithuania

BioValley	<p>4 universities, numerous research centers, headquarters of the world's pharmaceutical giants, branches of large pharmaceutical companies, technology transfer centers locate in the region, highly skilled human resources are involved (about 250 000 people or 10% of the region total population).</p> <p>The four supporting bodies of BioValley are the three national BioValley associations incorporated in France, Germany and Switzerland and the BioValley Plattform in Germany. The collaboration is supported by the INTERREG program.</p> <p>Areas of activities: pharma/biotech, medical technologies</p>	France/ Germany/ Switzerland
Bothnian Arc	<p>The aim of the project is to create favourable conditions for economic growth in this part of Europe and to develop different kinds of networks and partnerships between the actors within the area. The industry consists partly of traditional branches, like mining, steel, manufacturing, forestry, energy and food production, and partly of firms within the “new economy”, such as IT, music, electronics, telecom and a variety of other high-tech businesses.</p>	Sweden/ Finland

#### 4. THE CLUSTER FORMATION MODELS

*Spontaneous formation* is the result of accidental accumulation of resources and key economic actors. The initial motives of geographical location may be the proximity to markets, the availability of specialized labor or specific natural resources, low cost operations, access to information, performance related to relations with institutions, companies and customers outside the cluster [27].

**Table 4.** Factors of emergence and development of some European clusters [19].

Region	Field	Founded	Initial impulse	Growth factors
Aalborg, Denmark	Mobile Communication	1948	Shipping	Technology transfer, communication with universities
Sassuolo, Italy	Ceramic	1600	Clay	Innovation, competition, value chain
Scotland	Electronics	1940s	Convenient location - distance from the theater of possible hostilities	Foreign investment, government R&D
Lahti, Finland	Furniture	1918	Qualified workforce, transportation networks	Specialization and modernization
Tupelo	Furniture	1948	Sources of cheap labor and raw materials	The involvement of suppliers, entrepreneurship of former employees of the company

*Initiative formation* – the government structure (top-down) or group of companies (bottom-up) [27] tries to provide form, completeness to existing geographic concentrations of companies or to create favorable conditions for clusters. Such formation is only possible on existing environment that can be enhanced with additional, such as access to information, financial resources, legislative support and so on.

**Table 5.** Examples of policies targeting clusters in some European countries [21].

Country	Features of cluster policy
Belgium (Flanders)	The policy consists of steps: (1) Accreditation by the Flemish Government of clusters. The operating costs of cluster organisations are then subsidised. The organisations have a coaching role in the creation and working of the ‘cluster network’. (2) Cluster may get some ‘soft’ support (advice from a consultant, training), and grants and loans for R&D and innovation projects.
Denmark	The policy stresses the need in particular to support the very specific competence of individual clusters to develop a critical mass of companies, of specialised services and infrastructure, and of organisations and channels for the spreading of knowledge. The first step taken to construct an industrial policy addressing the Danish clusters entails identifying relevant clusters of competence. The second step is to tailor measures for individual clusters. Thus, critical factors of success are seen to vary from cluster to cluster. Policy instruments must then be created within the context of a dialogue between cluster firms and the political entities, either at the national or regional level.
Finland	The aim is to pool local, regional and national resources to develop internationally competitive fields of expertise. Two important functions have been to advance networks and co-operation between different regional players, and to contribute to increased competencies in SMEs through training.
France	The spatial planning agency DATAR carries out a policy targeting Local Productive Systems (LPS). The policy aims to encourage the co-operation of firms within LPS, further contact between firms and higher education and research institutions in the regions, and institute communication between public authorities and local players in order to develop local development policies.
Italy	Policies targeting information and technological diffusion to SMEs in local productive systems are characterised by the intertwining of national policies with regional and local initiatives, which have arisen in a decentralised and bottom-up manner. Important actions have been the creation of science parks, centres for innovation support at the regional level, and sectoral centres for technology transfer and general technical assistance aimed at the local level.

Netherlands	The cluster policy uses two main instruments. First, creating favourable framework condition by the use of several policy fields. Second, by acting as a broker. The Ministry of Economic Affairs tries to stimulate clustering by giving information upon the opportunities and possibilities of clustering, arranging dialogue and contact between potential cluster parties, directing the cluster process, and bringing in its own contacts, networks and financial instruments.
United Kingdom (Scotland)	The Scottish Enterprise Network (SE) has given priority to supporting clusters in the Scottish economy. Instruments have to be tailored to the needs of the specific cluster. In a fragmented industry like Food, one of the key actions has been to create an atmosphere where collaboration and competition can happen alongside each other. An emerging cluster like Biotech has a greater emphasis on delivering infrastructure, e.g. research and incubation facilities. In Semiconductor, the cluster approach has encouraged industry to work closely with academics in devising new strategies for research collaboration.

It should be noted that the control of cluster formation process makes it possible to avoid the negative effects of monopolization and conflicts of interests. Initiative cluster formation involves management of these processes, including initiation; planning; implementation; control and monitoring.

The results of an initiation process input data for the planning process, the results of which, in turn, is input for execution. Initiation involves the idea of creating a cluster, an analysis of existing opportunities. The results of this analysis form the basis for the development of cluster project or the conclusion that plan is unavailable. It is believed that modern economic theory does not answer why some objects (companies) were located in one place [17]. Accordingly, it is almost impossible to analyze and identify favorable environment for the creation of the cluster, and therefore plan specific actions within the cluster initiative. However, we consider this statement false because of successfully implemented programs to build clusters in many European countries.

One of the conditions of early cluster formation is an intend of potential participants to become members of the cluster, based on the vision of the benefits of clustering:

- minimizing the cost of negotiating, networking, eliminating differences (theory of transaction costs);
- new opportunities to transfer knowledge and skills in flexible structures, consisting of multiple partnerships (information theory);
- cost savings due to proximity to other firms, reducing risk and uncertainty, greater awareness (theory of industrial location);
- economies of scale (theory A. Marshall);
- growth of innovation through synergy and collective learning processes in a complex network of mostly informal social relationships (the concept of innovative environment);
- strengthening the competence of individual member companies and the creation of competencies that do not belong to any specific company (synergistically theory).

In works on theoretical approaches of cluster system the cluster analysis is offered to start with identification of accumulation. However, there is no single method: cluster analysis differs across countries (Table 6).

**Table 6.** Methods of cluster identification.

Title	Essence
The method of using input-output matrix	<p>Focuses on industrial relations between the various branches in the chain of values, implying that the products of one industry (output) is a resource (input) for other areas. The main data for such studies - information on material flow between branches in monetary terms.</p> <p>In the simplest form it can be represented as follows. The first step - to find a "substantial" links between sectors. One simple method to do this - to include only those connections that exceed a certain threshold [12]. For example, if the industry <i>i</i> receives 15% of the resources sector <i>j</i>, then <i>j</i> → <i>i</i> communication is essential. The next step - to group these connections in several important categories in order to identify a small number of clusters.</p> <p>According to another point of view, the more important is flows of information</p> <p><i>Disadvantages:</i></p> <ol style="list-style-type: none"> <li>1. there is no consideration of regional boundaries;</li> <li>2. The matrix is usually conducted at a high level of sectoral aggregation, which does not include the analysis of lower level division in the sector and sub-sector</li> </ol>
The method of determining local production systems	<p>Finding local production system by criteria:</p> <ul style="list-style-type: none"> <li>- number of companies: at least 5 companies in the same field in the region, at least 3 of them must have 5 or more employees;</li> <li>- number of employees: at least 100;</li> <li>- density: density concentration of firms in selected geographic region for analysis must exceed at least twice the national average;</li> <li>- specialization: localization rate should be higher than 1.</li> </ul> <p>Localization ratio (LQ):</p> $LQ = \frac{E_{ij} / \sum_i E_{ij}}{\sum_j E_{ij} / \sum_i \sum_j E_{ij}},$ <p>where <math>E_{ij}</math> - employment in industry <i>i</i> in region <i>j</i>. <math>\sum_i E_{ij}</math> - full employment in region <i>j</i>, <math>\sum_j E_{ij}</math> - national employment in industry <i>i</i>, <math>\sum_i \sum_j E_{ij}</math> - national employment. Values greater than 1 means that the region is relatively more specialized in this area [235]</p> <p><i>Disadvantages:</i></p> <ol style="list-style-type: none"> <li>1. unclear what connects concentration of certain industries in certain regions, without clear information about such relationships it is difficult to call these accumulations "clusters";</li> <li>2. the method is based on the use of sector classification system. Biotechnology is a typical example of which is connected with many areas and research results which are also used in several areas</li> </ol>

<p>Graph analysis</p>	<p>group companies and other types of network connections between companies and industrial groups are identified.                  The initial phase - converting input-output matrix, the matrix of ones and zeros. If the deposit subject to exchange balance is higher than the threshold, it gets a "1" or - "0". The next step - move the chart identified significant inter-relationships adjacency matrix where the components are industry and connectors - streams industry [2]  <i>Disadvantages:</i>                  1. method is rather complicated;                  2. The software is still imperfect.</p>
<p>Correspondence analysis</p>	<p>cluster analysis with many variables to find regions that are similar to "innovative styles." Used variables are:  <ul style="list-style-type: none"> <li>• innovative result (the number of patent applications, a number of product and process innovation);</li> <li>• innovative environment (level of education in the region, private research, the structure of the local economy);</li> <li>• resources for innovation (average investment in private research, percentage of innovative firms that receive state support);</li> <li>• object innovation (product, process or quality);</li> <li>• sources of knowledge and information (internal, professional, social);</li> <li>• cooperation (domestic, business, social);</li> <li>• factors that impede zatrudnyayut innovation (risk, lack of financial resources and personnel);</li> <li>• characteristics of firms (number of employees)</li> </ul> </p>
<p>Model of point processes with method of control groups</p>	<p>Compared spatial distribution within the value chain (control group) with the placement of similar industry. The main goal is to consider the reason why the companies that belong to the same value chain, located close to each other.</p>
<p>Interviews with experts</p>	<p>The estimate of the number, frequency and quality of communication and fellowship, and the number of agents belonging to the cluster.                  One type is a survey of potential participants to identify whether they are part of the cluster.                  The disadvantage of this qualitative method is its heuristic nature, moreover, it can be difficult to establish a systematic analysis</p>
<p>Mixing quantitative and qualitative methodologies</p>	<p>For example, studies of biotechnology clusters [25] use a combination of data on company accounts, patent statistics and official statistics at the regional level. Employment growth is used as a measure of economic operation and the growing number of patents as a result of innovation. Employment in own sector firms and employment in other sectors is used as a measurement of the strength of the cluster.                  Model in simplified form model:  <math display="block">GROWTH_{i,t,c}^n = a_0 + b_1 \times AGE_t + b_2 \times EMP_{i,t,c} + b_3 \times EMP_{j,t,c} + b_4 \times S_{c,t} \varepsilon</math>                 where GROWTH - employment growth (or patents) in the firm n, which belongs to the sector and cluster c i in time t, AGE - age of firms; EMP<sub>itc</sub> - full employment in the sector and cluster c in time t; EMP<sub>jtc</sub> - full employment in other sectors, located in the cluster, and S - scientific base cluster.</p>

Benchmarking	In the beginning it is grouping interdependent and related sectors of the economy with the use of detailed data on the links in the economy. This method identifies what appears and what the economy could have. The first step - the study of interdependence in the cluster. The second step - measuring time or stage of development. Third - geographical proximity.
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Each method has certain limitations that should be considered. That's why, it is appropriate to supplement the qualitative and the quantitative methods, for example, a survey of top managers with graphical analysis.

All the above methods can be used to find potential cluster. However, they are directed primarily at determining the groups (clusters) of firms. For full clustering environment is important to review:

- the cluster environment that is around (economy, industry, region and its resources);
- the internal environment - participants and information, social, economic, technical resources, form of organization.

The cluster's external and internal factors depend on the type and characteristics of formed cluster. As the base of the cluster can be local consumers, the main markets, suppliers; the final product or service; process technology [13], so the different types of clusters have various system-factors.

The basis of transborder cluster is the common infrastructure and cross-border markets so the critical issue to its formation is possibilities of using different tax, customs, legal environments of neighboring countries.

On the base of European study [6] we can determine the external factors for transborder clusters' creation in Ukraine:

- 1) the size of the country / transborder market;
- 2) state cluster policy;
- 4) educational and scientific base;
- 5) entrepreneurial culture and network;
- 6) access to financial sources;
- 7) industrial factors;
- 8) the positive experience of already operating clusters;
- 9) access to specialized services;
- 10) public and international support for the cluster project.

P. Krugman [15] claims that the size of the market is critical for the competitive clusters formation, so the bigger a country, the bigger a market. However, due to the economy globalization, it is not so crucial.

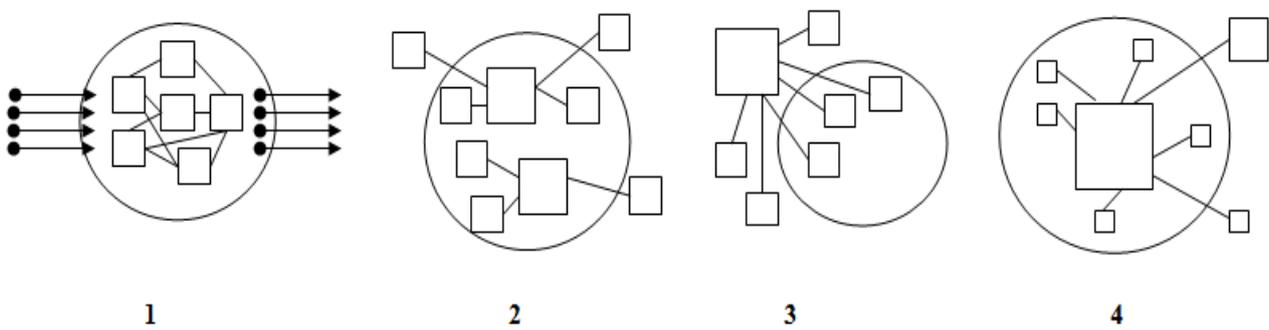
It could be useful during the analysis to take into account S.Stenli's and H. Schiele's interesting idea about the necessary and sufficient conditions for clustering. The necessary condition is a divisibility of product creation process and transportability of products (otherwise the cluster association is technically impossible). The sufficient condition is flexible interaction of several subjects that have many dissimilar but complementary competences [24].

The cluster analyses in case of transbordering cluster should be made from the “international” point of view, not only one country but neighbors and considering the following models of formation:

- monopolar/asymmetric cluster, which is formed mostly on one side, involving some subjects from the adjacent regions of neighboring countries;
- bipolar cluster, based on the existence of regional networks as constituent elements on both sides of the border.

The result of the cluster environment analysis is to assess the current situation and the prospect analysis, the economic effect forecast.

On this basis, a plan of cluster creation is formulated. At the stage of planning the main thing is the cluster structure. There are four main types [8]: Marshallian, the hub and spokes, satellite platform, state centered.



**Figure 1.** Chart of Marshallian, “the hub and spokes”, satellite platform, state centered clusters

The procedure of integration into the cluster consists of two phases:

- 1<sup>st</sup> phase - construction of social capital - a framework to understand the idea of building a cluster;
- 2<sup>nd</sup> phase 2 - implementation of specific actions [5] – the partnership agreements are transformed in legal agreements with accepted obligations.

The on-line platforms support cluster cooperation in Europe. The main objective of the cluster virtual network is to provide cluster organisations with modern tools. These tools allow to: make efficient use of networking instruments (search/find potential partners and opportunities); develop collaboration trans-nationally (within Europe) and internationally (beyond Europe); support the emergence of new value chains through cross-sectorial cooperation; access the latest quality information on cluster development; improve their performance and increase their – as well as their members’ - competitiveness.

The most successful examples of such platforms are:

- Interactive Cluster Initiative Database;
- European Cluster Organisation Directory;
- Cluster-IP;
- European Cluster Collaboratioin Platform that collects and structures a wide variety of information relevant for cluster organisations from various European programmes and

initiatives like the ones below. ECCP offer the opportunity to find out the most relevant cluster-related projects and learn from them;

- EU Cluster Portal that provides tools and information on key European initiatives, actions and events for clusters and their SMEs with the aim of creating more world-class clusters across the EU;

- European Cluster Excellence Initiative (ECEI) is a part of the EU efforts to create more world-class clusters across the EU by strengthening cluster excellence.

The same on-line platforms exist on the state level. For instance, "go-cluster" programme (Germany) provides a stimulus to improve cluster management and help turn German clusters into highly effective international clusters. The initiative provides support for innovative services and raises the international visibility of innovation clusters. Members of the "go-cluster" programme can obtain funding for novel solutions. The essence of clustering is a new structure that has emergent properties, i.e. there is some emergent (synergistic) effect. The cluster research in the EU note the cluster strength rating which consists of: employment, specialization and cluster influence on level of employment/specialization. Beaudry, C., S. Breshi and G. M. P. Swann [26] use a combination of companies statistics, patent statistics and regional official statistics to analyze economic and particularly innovation of firms in cluster. Employment growth is considered as an indicator of overall performance of the cluster, and the increase in the number of patents - as a result of innovative activity.

Effectiveness of the cluster is determined by the difference between the results of the cluster members and firms that are not members of the cluster. A similar approach was used to analyze clusters in Belgium; analysis was conducted in terms of: the share of new products in total sales, the number of product innovations, research activity, employment, export activity, the share of foreign capital in the company [4].

### **3. CONCLUSIONS**

The characteristic features of the world economy at XXI century are the deepening of globalization, increasing competition, consolidation of business and complexity of the environment. Under these conditions, the range of organizational alternatives is expanding, primarily due to the intensive development of different forms of inter-firm cooperation, accelerating information flow. The cluster structures that are successfully operating at the international, interregional and global levels, acquire significance.

The clusters plays an important role in enhancing the firm competitiveness, determine the level of economic development and provide impetus to the development of related industries. So the study of cluster phenomenon is one of the actual theoretical and practical problems and there are necessitates of methodological approaches to the cluster management.

Clusters are only specific route for competitiveness. Each cluster is unique in its own way. The firms in the cluster must actively harness the power of location; in the global competition the neglect of local potential is unacceptable. The forming clusters should take into account the experience of Finland and other countries: in some cases cooperation ends as soon as the government stops funding. Also it is necessary to take into account the heterogeneity of the regions of Ukraine, as the measures and activities, optimal in some circumstances, may not work in others. The analysis of foreign practice is a key tool in shaping successful cluster policy. Clusters can even be dangerous strategy through: - a

specialization in a particular field can lead to problems if there is a recession. The concentration of resources makes complex business process reengineering; - reduction of competitive pressure that can harm innovation processes as the main driving force for innovation is competition; - autonomy syndrome, through which firms in the cluster no longer consider the opportunities and trends outside the cluster. In other words, companies can suffer from the "weaknesses of strong ties". Analysis of national works define existing opportunities in the economy of Ukraine. In our opinion, the subjective deterrents to implement transborder cluster initiatives are -imperfect existing legislation; - the lack of a coordinated cluster policy, which takes into account the peculiarities of the Ukrainian regions; and - the passivity of the Ukrainian companies.

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( Received 26 September 2016; accepted 09 October 2016 )