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THE INDUSTRIAL CLUSTERS - EVOLUTION AND TYPES

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ABSTRACT

The industrial territorial and branch organization depends on the “industrial environment”. This “industrial environment” is characterized by geographic concentration and proximity of the “growth factors”, which significantly increase the aggregate economic product. The “factors concentrations” allow identification and management of the competitive advantages of the industries, sectors and regions. Lot’s of the recent analytical concepts of the industrial environment processes are on the cutting edge of the cluster concept, which has some key advantages: First, cluster is geographically limited, which allows easy adaptation to regional analysis approaches /spatial context/. Second, the clusters exist due to product and technological spillovers, evidence for its existence, significance and completeness. This makes the cluster typology comparable with the functional typology of the settlements. Third, the cluster development is phase divided in accordance of its technological and product specialization. This makes the cluster development more predictable even trough traditional analysis and forecast methods /indicative planning/ and the implementation of cluster based regional policy more desirable.

The report concerns the ideas that have brought the notion “industrial cluster”. The main authors and their standpoints regarding this new concept are represented. Most famous cluster typologies are discussed.

Key words: industrial clusters, cluster concept, cluster typologies;

The recent development rates are a result of the industrial concentration and specialization stage. These categories have been belabored for a long time in the economics and the economic geography. In our days the international business success in the industrial economic activities has become a willing task for every government all over the world. This task makes the point of view over the industrial concentration and specialization very potential over the last century. The evolution of the “clusters” as a notion has appeared as a result of the real existence of such concentrations and specializations showing significant common externalities.

The idea for localized concentrations and industrial specialization is traceable to Alfred Marshall (1890)². The author argued that Britain’s economic growth and leadership during the 19th century was founded on the development of several examples of localized industries. He says that the origin of industrial specialization in a particular locality may have been due to the existence of natural endowments, nearby markets, or simply an ‘accident of history’. But once established, such geographical specialization tended to become self-reinforcing through the operation of what Marshall called “localization economies” reinforcing business in several ways:

- Attracting different Medium sized companies and subsidiary industries providing row materials and details for the companies already localized;
- Initiation and growth of Skilled and specialized Labor Pool;
- Development and transfer of specialized machineries between the local firms involved in variety of aspects in the concrete industry;
- Technological transfers between local companies.

To these characteristics Marshall has proved that these concentrations and industrial specializations were also surrounded by an “industrial atmosphere”: “...that is a set of formal and informal customs, traditions and practices associated with the industry and institutionalized in the social and cultural fabric of the area concerned”. These: “localization economies” somehow creates higher competitiveness levels of the certain industry and consequential outcomes in production chain and trade profits.

In our days two interrelated issues have changed the scientific view over the recent economic development: the “new trade theory” /modern recovery of protectionism/, and the renewed focus on “increasing returns” subject of a great number of publications. According to the new trade theory, economies of scale, increasing returns and imperfect competition are empirically more important than

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² Alfred Marshall - Principles of Economics (1890)
constant returns, perfect competition and comparative advantage in shaping patterns of international trade.

The economic agglomeration and specialization could maximize the potential consisted in the technological, market and other externalities that underpin increasing returns. Many scientists even argue, that increasing returns could not appear if the industries were dispersed could be created in local clusters. This is likely to happen in the cases when industries are “learning by doing” in the so-called “learning regions”. These two theories were very complementary to the areas with high rates of economic agglomerations. So, the arguments concern geographically localized industries in one nation or regions in way which makes these industries more competitive /than single location/ on the international trade market. /M. Porter, 1990; Krugman, 1991, 1993; Fujita, Krugman and Venables, 1999/

In some way this works are renovation of Marshal’s industrial localization. In the late of 80’s Michael Porter has identified the recent industrial localizations by large scale empirical analysis concerning the international industrial competitiveness. This analysis has imposed the “Cluster” notion as a standard conception over these topics. The Krugman’s NEG /New Economic Geography/ has mostly elaborated on the spatial features of the localization processes. Both authors, has proved that the Economic Geography of the Nation holds the “key” to the International economic growth and national competitiveness.

For a very long time, economic geographers also have elaborated these kinds of issues. Unfortunately, neither one of the notions proposed by geographers has not obtained common adoption as the cluster one. According to us, the reasons are hidden in the so called by the geography science “case studies”. This has made the creation of principle theory /and notion/, fully concerning the industrial agglomeration process impossible. Geographers has called the “clusters” with a variety of names - industrial districts, new industrial spaces, regional industrial complexes, local high tech, and so on, in accordance with the local empirical evidences, space structure and communal needs. At this period of time /80’s, 90’s/ a great geography efforts has been directed to Neo-Marshals industrial localizations /input-output method, agglomeration cost reduction, local labor pools, technological spillovers/. Others have embraced the so called “soft” secondary factors. They concern the local social milieu, the institutional and culture cluster bases, and some others non-market externalities which exist between the companies, complementing the cluster. The knowledge spillovers and the adopted by the science and the policy makers notion “collective learning” were argued as key role factors at the process of stimulating innovations and entrepreneur dynamism into the cluster. /Keeble and Wilkinson, 2000/

In our days the cluster concept is quite popular. All science researches, forums, National Development Plans in some way concern the cluster concept and use the achievements in the analysis. The great aim is a new kind of industrial dynamism, based on a constant renovating competition. We could find out an equilibrium model with constant inequalities, ensuring the system dynamics. Michel Porter’s work gave to the world enough evidences that the cluster phenomena do exist and they have economic matter. Some Governments made the market and non-market externalities the “corner-stone” of cluster based regional policy. This opportunity is very significant to Bulgarian industrial agglomerations, urban agglomerations and regional policy. Indeed government can not create clusters but could make innovative and institutional milieu – vital for the cluster success.

The fully cluster concept originates to Porter’s contemporary work about international competitiveness /Porter, 1990/3, where the author argues that the leading export oriented companies in variety of countries are not isolated success stories, but belongs to a group of rivals within related industries. Porter calls these groups - clusters, which concern only industries with vertical and horizontal linkages of various kinds. In his theory, the high productive growth is a result of interrelation between the four factors of “the diamond” /Figure 1/:

This concept is the first one that stands up “against the stream” of the traditional economic theory, mentioning the traditional growth factors and fortifying the concept of comparative advantages. These traditional factors are: Land, Location, Natural resources /minerals, energy/, Labor, Local population size. The common characteristics between these factors are the opportunity to influence the economic development, which makes the comparative advantage quite passive concept.

3 The competitive advantage of Nations, 1990
In the last decade these factors are called the “First nature” in NEG models and their role is not so valuable as before. /Fujita, Venables, 2005/

Ten years earlier /1979/ Porter creates some conclusions based of the verification of empirical data. This framework aims to diagnose the industry structure, built around five competitive forces that erode long-term industry average profitability. The industry structure framework can be applied at the level of the industry, the strategic group (or group of firms with similar strategies) or even the individual firm. Its ultimate function is to explain the sustainability of profits against bargaining and against direct and indirect competition4. /Figure 2/

Both models “The diamond” and “The 5 forces” are powerful tools which has changed the way of searching and making industrial policy – cluster based policy, at regional, national and international scale. Their big advantage is the close meaning with the “chain supply” concept, the network concept and the innovative milieu.

Indeed the cluster concept has its origins in different types of features and countries. Even Porter says that three notions are having played significant role in his work. They have appeared in variety of ways and reveals only separate features of the cluster. We have to mention the French filieres – which mostly concern technological linkages /Toledano, 1978/ In Sweden has been used the “Block development idea”, where the externalities of ones sector helps to the others. This process has been identified for a very first time by Dahmen. /Dahmen, 1950/ The next one feature identified separately were the networks between companies, which has make possible the assumption of the cluster exchange between them. /Lars Gunnar Mattsson, 1987/

Porter’s recent works has continued this themes, arguing that while co-location is not sufficient for cluster formation, it ‘supercharges’ and magnifies the power of domestic rivalry which is the major stimulus for innovations and improvements. His recent cluster definition is: “Geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also co-operate” (Porter, 1998)5

In addition he says that clusters leads to higher economic growth in three main ways:

First, they raise productivity by allowing access to specialized inputs and employees, enhancing access to information, institutions and public goods and by facilitating complementarities.

Second, they increase firms’ capacity for innovation by diffusing technological knowledge and innovations more rapidly. Moreover competitive pressure within each cluster increases firms’ incentives to innovate. Thus, they could be described as types of ‘learning’ region, showing higher rates of technological and organization innovation and retaining their adaptability to unexpected exogenous changes (Morgan, 1997).

Third, clusters stimulate higher rates of new business formation, as employees become entrepreneurs using ventures capital.

The wide and dimness cluster concept is at the same time strength and weaknesses. Very often variety of science fields and researchers are using it for very different types of issues. The lack of structural links specification means that the idea does not concern only one established strategy that “fits” everything. In reality very good examples could be found where the cluster concept contains one of the best explanations in variety of context and phenomena. The concept could be used for strategy based decisions about the supply and demand components of the industrial systems. Indeed, the cluster idea is enough wide to be applied from service sector to manufacturing industries and High tech agglomerations, and to industries with low-skilled labor force6.

The great weaknesses of the cluster approach are his elasticity and dimness, which makes difficult to identify the cluster itself. Their multiples create science difficulties at theoretical and empirical degrees, and so to the methodology approaches and the possible compares. It becomes hard to distinguish cluster externalities from general urbanization economies and infrastructural externalities (Harrison et al, 1996).

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6 O’Mahony and Bart van Ark (2003), EU productivity and competitiveness: An industry perspective. Can Europe resume the catching-up process?.

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Actually the difference between cluster and agglomeration is not very clear, but the cluster concept is always much more industrial oriented. The cities have been always in hand at the geography science as economic activities agglomerations, but these activities may not contain clusters, as Porter says. On the other hand we have the cluster as a special kind of agglomeration in the case when the companies are subsidiary, and create externalities coming from the specialization as well as marker, as well as non-market. Such interrelations depend of the spatial proximity – agglomeration.

A survey of the literature reveals six main types of clusters. The first type is a vertical production chain (filiere) in which adjacent companies in the production chain form the core of the cluster. Chains from suppliers to customers may be identified by the input-output analyses, very common in economics and economic geography.

The second and quite popular definition of clusters is the used by Porter (1990), namely a large aggregation of connected sectors, which are also successful exporters. Sixteen possible cluster types can be identified in Porter’s work as a basis for international comparisons. These large-scale clusters have the advantage to overcome the conventional industry classifications. In Porter’s analysis such clusters often are but may not be geographically concentrated within a nation.

The third one is the Regional cluster which consists of connected sectors concentrated within a particular region and competitive on the world markets – distinctive feature. The company coherence can be based on anything from pecuniary externalities to knowledge sharing and spillovers, which have to lead to a high rate of firm start-ups. In our country many regions are trying to establish stable regional clusters in variety of industries. In the future this process will be deepening.

A fourth and more specific type of cluster is the industrial district. Industrial districts were summarized in the literature as local concentrations of small and medium enterprises which are specialized in stages of the production process (Beccattini, 1990). These clusters are export successors and have the cluster firms pursue a strategy of flexible specialization which enrich the production portfolio and the competitiveness. However, their definition has since been broadened in several ways. The firms may supply several production processes and may not always be flexibly specialized. Many industrial districts depend on and include large companies, so there is also a variety of industrial districts depending on the size, and structure of relations between the firms (Markusen, 1996). The localized concentration of specialized firm’s benefits from high-levels of trust and collaborative relations and industrial districts tend to compete on quality and innovation.

The network is closely related to the industrial district, and is argued by some to be type of cluster. Networks have been defined as a specific form of relationship between economic actors which are neither markets nor hierarchies but are based on mutual dependence, trust and co-operation. They are not necessarily geographically concentrated, but some authors argue that they also work best when localized (Cooke and Morgan, 1994).

A final type of cluster refers to local concentrations of high-technology industries. In leading high-tech regions it is argued that an elusive synergy of economic and institutional factors produces an innovative milieu, marked by high rates of knowledge diffusion and learning (Keeble and Wilkinson, 2000).

The cluster types are overlapping and difficult to delimit empirically. For this reason, some analysts have sought to classify clusters according to their stage of development. For example, Rosenfeld (1997) distinguishes three types. Working clusters are self-aware and produce more than the sum of their parts. Latent clusters present opportunities that are not fully exploited. Potential clusters have some of the key conditions but lack some inputs and critical mass. All such typologies are too subjective and open to criticism. Here are presented the most common classifications and understandings about the cluster types.

Stage of cluster development: The idea is that clusters experience a “life-cycle” from embryonic to emergent, to high growth stage, to maturity and eventually to diminish. The meaning of stage of development identification allows different types of measures to the clusters. For example the embryonic cluster needs more capitals, but the maturity cluster restructuring and additional product diversification to overcome diminish.

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7 Business clusters in the UK – a first assessment, A report for the Department of Trade and Industry by a consortium led by Trends Business Research

8 Markusen A. 1996 “Sticky Places in Slipping Space: a Typology of Industrial Districts”
Cluster specialization.

Clusters may vary in degree of sectoral specialization, from a single sector to networks of different but complementary and interrelated sectors. In most cases, there is some distinguishing sectoral or technological feature that identifies the cluster.

Geographical configuration

The “ideal type” of cluster would be a single localized agglomeration of firms. Such single location clustering does exist, but in most cases the sectors have more than one cluster. Such multi-location clusters are characterized by the relation “hub and spoke” in which one cluster dominates the others. Graphically it will looks like “bunch of grapes” showing the subsidiary structure.

Geographical scale

Clusters can vary considerably in spatial context. Some are highly concentrated within a small area, while others may be quite diffusive.

In accordance with the literature we find out three distinguishing features commonly used for clusters identification:

- Cluster depth: the possibilities are “deep”, “shallow” and “unknown”. Cluster depth is a key variable in the assessment of cluster strength. A deep cluster will have a large number of industrial linkages. In some cases, the cluster depth is difficult to be defined.
- Cluster employment dynamics is based on job growth. The possible types are ‘growing’, “declining” or “stable”. Annual dynamic of plus or minus 10 percent; classify the cluster as “stable”.
- Significance: geographic significance of the cluster could be established at regional, national or international level.

The implication of cluster based policy in Bulgaria is only a matter of time. At these moments the whole planning process concerns the municipalities as main beneficial and administration level. The national planning indicators revealing aim-regions are not based on concrete industries. Because of that, some of the structural measures will be very ineffectively on time, not because their wrong or not enough, but just not in the right business. A very short time will be enough to the government and to the planning institutes to realize this point and to redirect their efforts, but with eventual losses.

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Индустриалните клъстери – еволюция и типове

Косьо Стойчев

Развитието на отрасловата и териториална организация на индустрията зависи от формираната "индустриална среда". Тази среда се характеризира със силна географска концентрация на "факторите на растежа", които увеличават съвкупния продукт от дейността на отделните стопански единици. Тази "концентрация на фактори" позволява да се създават и управляват ефективно конкурентните предимства на отделни индустрии, сектори или региони. Един от съвременните подходи за анализ на процеса на възникване на "индустриалната среда" се основава на клъстерната теория. Тя има няколко ключови предимства: Първо, клъстерът е географски ограничен, което позволява относително лесното адаптиране към системата на регионалните изследвания /пространствен аспект/. Второ, клъстерът съществува на основата на продуктови и технологични връзки, което доказва неговата функционална значимост и завършеност. Това прави функционалната класификация на клъстерите сравнима с функционалната класификация на селската кръвна. Трето, клъстерът преминава през определени фази на развитие преко свързани с неговата отраслова и продуктова специализация. Това позволява да се правят изводи за развитието на клъстерът с помощта на доказани методи за анализ и прогнози /индикативно планиране/, което ще оптимизира управлението на регионалната политика.

В доклада е направен ретроспективен анализ на идеите довели до възникването на понятието "индустриален клъстер". Посочени са основните автори и техните становища относно тази сравнително нова теория. В обобщен вид са представени клъстерните типологии.

Ключови думи: индустриален клъстер, клъстерна теория, клъстерна класификация.

![Porter's Diamond Model for the Competitive Advantage of Nations](source: www.valuebasedmanagement.net)
Porter's five forces

- Threat of new entrants
- Bargaining power of suppliers
- Rivalry among existing competitors
- Bargaining power of buyers
- Threat of substitute products or services