# Cluster, Competitiveness, Attractiveness, Innovativeness – How Do They Fit Together?

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**Abstract** This paper is an attempt aiming at developing theoretical concept providing guidance for cluster analysis. It is organized around four concepts: cluster, competitiveness, attractiveness and innovativeness. The proposed simple framework may constitute basics for cluster conceptualizing. It can also offer a platform for some more empirical cluster analysis since it combines concepts central for this phenomena. In particular: (1)It shows relations linking cluster with competitiveness, attractiveness and innovativeness (*inside* relations of the scheme); (2)It delimits these concepts by outlining alternative dependencies (*outside* relations of the scheme); (3)It feeds the created scaffolding with some theoretical and empirical content.

The preliminary review of selected literature seems to confirm the existence of suggested relations. Proposed framework should be seen as first step towards further more detailed and so much needed cluster studies. Perhaps it can be regarded as a tiny contribution to cluster theorizing. **Key words** cluster, innovativeness, competitiveness, attractiveness

### **1** Introduction

*Clusters have the discreet charm of obscure objects of desire* [1]. This is attributable to regional specialization, complementarities, multifaceted cooperation among public and private sphere, synergies, atmosphere of trust, and many other economic social advantages – however defined. Higher competitiveness and innovative capabilities commonly associated with clusters render this places attractive locations [2,3,4]. Yet, as argued often, *cluster concept seems to be very elastic and imprecise in academic as well as policy circles [5].* 

This fashion item is in fact a *chaotic term* equating quite different types, processes and spatial scales of economic localization under a single all-embracing universalistic notion [6]. Bearing in mind G. Tichy remark that the more successful cluster is, the more likely it is to become a problem area [7] or M. Steiner concerns that today's cluster-specialized regions will be the problem areas for tomorrow [1], since specialization increases the efficiency but also increases the risk [7] all attempts aiming at shedding more lights on cluster phenomenon are legitimate.

This paper is a tentative attempt aiming at developing theoretical concept providing framework for cluster analysis. It is organized around four concepts: cluster, competitiveness, attractiveness and innovativeness. It starts with explaining briefly three notions and more detailed outlining cluster concept. Part two introduces the framework for cluster analysis which refers to earlier defined notions. This conceptual scaffolding is in section three filled with mainly theoretical and some empirical content. The last part concludes.

## 2 Setting the Scene

**Competitiveness** may be understood in two ways. On the one hand it relates to companies and their ability to compete on international markets, on the other hand it refers to countries or regions and their positions in international factors flows. Broadly defined, competitiveness is a comparative concept of the ability of a firm, economic sector or country to sell and supply goods and/or services in a given market. In recent years, the concept of competitiveness has emerged as a new paradigm. Although widely applied in economics and business management, the usefulness of the concept, particularly in the context of national competitiveness, is vigorously disputed by some economists [8]. Geneva-based World Economic Forum produces each year the World Competitiveness Report [9]. According to the applied methodology country competitiveness derives from the set of factors, institutions, as well as policies determining productivity. Depending on the role a group of selected factors play in a country's economy its competitiveness can be classified as factor-driven, efficiency-driven or innovation-driven. The latter type is particularly desirable and sought after form of competitiveness.

The term **innovation** is *somewhat ambiguous* since it denotes both a process and its result [10]. According to the definition proposed by OECD in Frascati Manual, it involved the transformation of an idea into a marketable product or service, a new or improved manufacturing or distribution process, or a new method of social service [11]. In this case the term refers to the process, whereas when it is used with reference to the new or improved product, equipment or service which is successful on the market, the emphasis is on the result of the process. The ability to create innovations (in terms of company's capacity as well as region's conducive environment) is thus labeled as innovativeness. It has characteristics of an endless and continuous process being a function of intellectual capital and knowledge transfer [12].

The above mentioned ability to create innovativeness is not only restricted to companies, business entities and other institutions but can also refer to geographic units. In this respect concept of countries and regions innovativeness is linked with attractiveness, which is usually defined as a set of advantages and disadvantages in the place of investment [i]. Criteria such as: market capacity for absorption, infrastructure, labor market, industry development level and business environment may encourage or discourage investors from a given location [13].

Constant changes taking place in globalizing world seem to challenge this conventional understanding, thus the growing importance of new set of factors and new tools aiming at increasing this attractiveness such as clusters. According to M. Porter, they are geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that are present in a nation or region [14]. Clusters undergo lifecycle, evolving from pure agglomeration, through the stages of emerging, developing and mature cluster until transformation [15].



Figure 1 Cluster Life Cycle

Firms in cluster can both cooperate and compete. Competition and cooperation can coexist because they are on different dimensions or because cooperation at some levels is part of winning the competition at other levels [16]. P. Maskell and M. Lorenzen see clusters as ... hybrid forms of long-term contracting, reciprocal trading, residing somewhere between hierarchies and markets [17]. Definitions of clusters are abundant, yet they have three main elements in common: specialization (division of labor, interlinked activities, cooperation), proximity regarded as precondition for emergence of these linkages, and synergies as a third element resulting from the two previous [1]. It should be stressed, however, that, there is no cluster theory per se, rather the broad range of theories and ideas that constitute the logic of clusters [1].

#### **3** Creating the Framework - Its Elements and Relations

The connections and mutual dependencies roughly outlined in previous section can be organized in a more structured way. Framework stipulating innovativeness (I) as a source of company's competitiveness (C) and region's attractiveness (A) is put forward. It rests on two pillars. The one regarding innovativeness as a common denominator for all concepts examined, the other assuming cluster stretches over all categories.



Figure 2 Cluster Against the Background of Attractiveness, Competitiveness and Innovativeness

Following *inside* relations (i.e. existing *within* the core of the scheme) between these concepts can be identified:

- C&C denotes the supposed role clusters play in enhancing competitiveness,
- C&A stands for clusters capabilities to boost attractiveness,
- C&I refers to clusters as phenomena facilitating innovativeness.

As the scheme suggests, attractiveness, competitiveness and innovativeness are broader categories than cluster, i.e. they can originate outside cluster and stem from other factors. Thus their roots might be found somewhere else. This sort of casual linkages is labeled for the purpose of this framework as *outside* relations [ii].

- OC non-cluster competitiveness sources,
- OI non-cluster conditions determining innovativeness,
- OA non-cluster factors decisive for attractiveness.

The next section seeks to feed the proposed framework – notably the identified inside relations - with some theoretical and empirical content [iii].

## **4 Feeding the Framework**

## 4.1 Cluster & Attractiveness Relations

T. Anderson argues clusters are tools for policy makers aiming to attract FDI. He treats clusters as new generation of Foreign Direct Investments (FDI) policies [15]. The FDI policy has been evolving from traditionally adverse, through the one resting on information providing and marketing activities, to the new one concerned with fostering spillovers, encouraging higher-value added FDIs, creating networks and thus embedding foreign firms in local environment.

Similar reference to subsequent generations of FDI policies can be found in E. Yehou., who claims that whereas first generation approach can be labeled as market friendly policy, second generation stipulates active marketing the countries [18]. However, against the purpose of this paper really important is the model proposed by E. Yehou - the formal conceptualization linking explicitly FDIs and clusters. Clusters emergence *can reduce the costs associated with policy reforms and can help attract FDI*. The model stipulates that places with accumulated critical mass of companies do reveal a substantial advantage over other location which render them attractive for foreign investors. This attractiveness stems mainly from linkages between suppliers and customers (input-output relations) as well as from the presence and active involvement of other entities such as research institutes, universities and public bodies (knowledge spillovers). The various economic benefits available there not only draw firms to a region but are able to offset possible "policy induced distortion" such as higher

taxes. Quite specific and detailed premises laying foundation for E. Yehou approach allow for comprehensive and precise investigation of clusters attractiveness.

Interesting approach towards attractiveness implicitly linking it with cluster take A. Malmberg and P. Maskell [19]. According to them, localized capabilities determine the spatial distribution of economic activities, as they influence firms' competitiveness. These capabilities are made of four elements:

- The region's infrastructure and built environment;
- The natural resources accessible in the region;
- The region's specific institutional endowment; and
- The knowledge and skills available in the region.

Whether they can be regarded as attractive depends on their characteristics. In particularly they should be: valuable, rare, not subject to substitution and imperfectly imitated. Aiming at sustainable attractiveness of a given place implies safeguarding that elements constituting localized capabilities are attractive and cannot be easily replicated in other places. This in turn requires some conditions to be met.

• Asset mass efficiency – regions that already have a large stock of certain factors are often in a better position to make progress.

• Time compression dis-economies – all capabilities of a region have been developed through the number of years and the lack of any time compression device will in itself tend to discourage the initiation of any imitation process

• Inter-connectedness of asset stocks – assumes the existence of complex web of multilevel relations between various elements. Thus, even if some factors can be duplicated, the comprehensive pattern of linkages among these factors cannot [20].

J.H. Dunning considers potential clusters' attractiveness for FDI as their drawing power [21]. As he argues, *the more firms engage in FDI to augment, rather than exploit their existing assets, the more likely is the development of specialized centers of excellence (cluster like)*. Several studies on the distribution of investments within countries have shown that foreign affiliates tend to favor regional clusters. Results obtained indicate that the presence of indigenous firms has attracted FDI into the same region, or the establishment of one investor has had a positive signaling effect on other foreign investors [21].

Clusters impact on companies locational decisions (thus their role in attractiveness) derives from the institutional and social framework. As underlined by J.H. Dunning, *one frequently voiced need of foreign investors (particularly first-time investors) is to reduce the costs of producing in an unfamiliar environment as much as possible* [21]. Clusters are supposed to provide so called "organizing capacity". It denotes social support, public-private partnerships, views, strategies, and leaderships as intangible assets [22]. Studies conducted in seven European metropolitan clusters revealed that these capacities have been indeed provided by clusters. The high degree of such capacity, as these studies argue, can be of great help to identify chances, to implement strategies, to prevent wrong investment and other business decisions and thus presumably to reduce uncertainty.

C. Zeller studies stress the role of collocation in *saving of all kinds of transaction costs*. It facilitates face-to-face interactions, and helps monitoring of resources. Spatial proximity serves the emergence *of interpretative communities that filter and transform noise, rumors, impressions, and recommendations into valuable interpretations* [23]. In this respect clusters, due to their features, seem to offer environment conducive for reduction of transaction costs, hence being attractive localization.

Social capital can be perceived as a cluster feature and an asset sought by foreign investors [24]. It encompasses *a set of norms, networks, and other forms of local social connections. These together with personal ties and trust are intangible benefits that develop only through long-term relationships in an individual's home community [25]. Since the process of internationalization in industrialized countries is increasingly based on knowledge-intensive relationships, the companies who possess relational assets will gain a competitive advantage as compared to companies that are "myopic" and less focused on developing long term relationships in places where they invest [24]. The importance of social capital for strategic FDI decisions makes it economically efficient to choose locations, which can offer favorable conditions for cooperation and networking.* 

A sort of empirical confirmation of cluster & attractiveness relations can be provided by one of the EU Reports indicating the multinational enterprises (MNEs) interests in clusters [26]. It advances the hypothesis that the *increasing importance of MNEs in the clusters reflects an interest to tap into cluster's resources.* The obtained results indicate the positive changes in the importance of MNEs in

the surveyed clusters over last 10 years which is interpreted as growing popularity of clusters among foreign investors.

Studies by R. Cappellin draw attention to the increasing investments of foreign multinational firms in the local production systems in Northern Italy [27]. Highly specialised industrial districts, famous as world leaders in some production segments, are endowed with external economies, understood as specific know-how, a well-trained labour force, and specialised suppliers. As R. Cappellin argues, this has led multinational groups to locate production plants in these areas or to acquire local SMEs.

Last but not least, NorCOM (North Jutland Wireless Communications and Maritime Communications and Navigation Cluster) the successful high-tech cluster being home of several multinational firms' R&D units located in a peripheral region of North Jutland has also confirmed the attractiveness of such "created places".

Listed above have been some cases of cluster role in boosting attractiveness. One has to be aware of plethora of other factors determining region attractiveness, and not deriving from clusters. Other more conventional factors influencing companies locational decisions include natural resources endowments, country's transparency and corruption level, presence and maturity of civil society, market size and potential, as well as inflation rate, taxation system, fiscal stability, infrastructure, and many others. In the end of the day, *the attractiveness of a region depends upon the match between its own attributes are those, which are important to the investing firm* [21].

## 4.2 Cluster & Competitiveness Relations

Apparently, the same factors, which contribute to clusters attractiveness and location of FDI may also determine competitiveness being for companies the prerequisite to participate in international trade and to retain and develop their position in globalizing economy. This in turn can be the result of increased competition, which requires companies to adapt to fast changes. Thus competition or at least monitoring competitors can be regarded as necessary to remain competitive. Clusters, as consisting of critical mass of concentrated companies, which cooperate as well as compete with each other, may be the source of such competitive advantage. M. Porter claims that companies located in clusters tend to be more competitive, export more and generally are more involved in international trade [2]. In other words they are more internationalized than companies residing outside cluster.

Results obtained by M. Gorynia revealed that Polsih firms located in clusters are more competitive, they reveal higher productivity and export more than those located outside [28]. The improved internationalization of many companies particularly small and medium enterprises (SMEs) can be attributed exactly to cluster membership. Although, the precise reasons and hierarchy of particular clusters benefits may differ between firms subject to the industry branch, or size they all seem to relate to various form of broadly understood knowledge spillovers.

Cluster role in improving firms competitiveness seems to come down to the fact these places are *repositories of competences* – i.e. they are equipped with specific knowledge and provide for mechanisms facilitating effective application of such knowledge – diffusion, accumulation and absorption [v]. This approach neatly corresponds with N. Foss, C. Knudsen theory of competences [29]. As they argue firms are in fact a bundle of competences, and their long-term competitiveness is determined by the right composition of competences. The latter being defined by C. Lawson as *capabilities, capacities, potential* [30], or as a *typically idiosyncratic knowledge capital than that allows its holder to perform activities* – *in particular to solve problems* – *in certain ways, and typically do it more efficiently than others* [29]. If firms are indeed made up of competences determining their competitive edge and clusters are repositories storing such competences then their role for boosting competitiveness seems undeniable.

Rising awareness by MNEs of specific location-bound advantages as a source of companies competitiveness has become fundamental [16]. Increased mobility of factors of production means their increased availability, and what is available to everyone is not really a competitive factor [31]. Thus, in more advanced economies decisive aspects for competitiveness are cluster-specific [2].

According to M. Porter, firms' competitiveness is defined by their productivity. This in turn rests on how firms compete, in other words it depends on the competition among companies. Linking both of these statements may lead to the conclusion, that competitiveness can be derived from competition, with the latter frequently attributed to clusters [2]. As far as productivity is regarded it shall be mentioned about R. Camagni and R. Capello, who have measured agglomeration's impact on firms' productivity [32]. By applying Translog (Transcendental Logarithmic function) they estimated production function.

 $LnY = ln\eta + alnK + blnL + c \frac{1}{2} lnK^2 + d \frac{1}{2} lnL^2 + fln K ln L$ 

Where, Y is the firm's outcome, and K and L respectively capital and labour. As argued by R. Camagni and R. Capello, if the firm is located in a cluster, factor productivity is influenced by inter-companies links, particularly by the presence of other firms and relations established with them. The theoretical assumptions for factors efficiency parameters (labour as well as capital) is following:

 $a = a_0 + a_1 CP + a_2 CIO;$  $b = b_0 + b_1 CP + b_2 CIO,$ 

Where *a* is capital efficiency parameter and b – labour efficiency parameter. They both depend on CP – presence of innovative customers a in the area and CIO institutional and organisational proximity with customers. This approach shows how cluster relations, through their impact on factors' efficiencies, can be utilized in firm's production function.

Numerous statistical and econometrical studies have pointed indirectly to the importance of pecuniary agglomeration economies – available in clusters – for firms productivity. These agglomeration economies can be understood as positive external effects deriving from the spatial concentration of companies leading to cost reduction and revenue rise [33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49]. The impact of existing companies on new-comers (mainly foreign investors) have been investigated with the reference to CLM Models (conditional logit models), which assume that investor decides to choose one localization out of many possible locations. Obtained results confirmed that investor prefers this one, which offers him the highest possible profit (i.e. is guided by maximizing profit function).

It is needless to say that many other factors, not originating in clusters, determine competitiveness. Just to mention such as exchange rate, factor endowment, labour market (flexibility or rigidity), stable rule of law, health system, demography, and many others. [9].

#### 4.3 Cluster & Innovativeness Relations

The more firm competitiveness depends on innovation-based production (and different sets of tacit knowledge) the more differences in location become important and meaningful. Innovation seems to be intrinsically territorial, localized phenomenon, which is highly dependent on resources, which are location specific, linked to specific places and impossible to reproduce elsewhere.

In the globalizing world what companies search for is knowledge. It is a source of competitiveness and thus prerequisite to stay in play in globalizing world. Knowledge however, requires specific circumstances to be created, diffused, shared, developed, etc. These are of regional and local dimension. As firm need knowledge and in turn knowledge needs favorable environment, which is spatially limited, this implies that firms shall be attracted to regional clusters or other local entities such as science parks [21]. Theoretical concepts such as learning region, regional learning, Innovative Milieux (GREMI -Gropue de Recherche Europeen sur les milieux Innovateurs'), explain the role played by territory understood as relational space - for innovativeness and knowledge processes [50]. The Innovative Milieu *concept* focuses on innovation as the key motor of growth of local and national economies. It argues that innovation is fundamentally a collective process - complex and interactive. Innovation stems from a creative combination of generic know-how and specific competencies, and territorial organization is essential component of this process. It emphasizes the role of inter-firm relationships, territorial socio-economic embeddedness, and dynamic local collective learning processes. The concept of learning region stresses also the concept of localized collective learning. As argued by D. Keeble and F. Wilkinson, whereas the *learning region approach* focuses attention on the nature and role of regional institutions and organizations, which facilitate knowledge development and learning by local firms, the regional collective learning perspective pays attention to processes of regional inter-firm networking and interactions, which have evolved between firms, and which are embedded in wider regional institutional and socio-cultural relationships [50].

As argued by A. Maskell and P. Malmberg the process of knowledge codification increases the speed of its transfer by lowering transaction costs [19]. Nevertheless much knowledge remains in a tacit form – unarticulated, sticky and restricted to few people. At local level, where firms share the same values, background and understanding of technical and commercial problems, a certain interchange of tacit knowledge does in fact take place. This exchange of otherwise purely internal information constitutes an important part of the competitive advantage of spatial agglomerations of related firms and clusters. The interactive character of learning and peculiarities of knowledge creation introduce geographical space as necessary dimension, which has to be taken into account. The more tacit the

knowledge, the more important is spatial proximity and direct, face-to-face contacts.

Enterprises do not innovate and learn in isolation, but in interaction with, suppliers and clients, with public research institutions, universities and even competitors [51]. Innovations usually occur as a result of interactions between various actors, rather than as a result of the solitary genius [52]. Most innovations are based on some form of problem solving. Someone perceives a problem and turns to someone else for help and advice. Then spatial proximity, intensified face-to-face interactions, common language, trustful relations, easy observation and immediate comparison all enhance processes of interactive learning and innovation. The attitude stressing the importance and beneficial character of other firms' presence has been reveled also in field studies conducted in NorCOM and can be attributed to companies growing awareness that they cannot be competitive *staying alone or, remaining isolated*. This is especially true for R&D activities, as innovations require interactive learning and interactions with others [26].

The 2005 UNCTAD Report on FDIs emphasizes the peculiarities of knowledge production as well: Most learning, mastery and adaptive activity requires close and continuous interaction with other enterprises like suppliers, subcontractors, competitors and consultants, as well as with other actors such as public R&D institutes, universities, venture capital funds and export marketing or training institutions [51]. Moreover rapid technical progress and the rising costs and risks of innovation force innovators to seek centers of scientific excellence internationally.

Strong argument in favor of clusters role for innovativeness is suggested by J. Cantwell, who notes that technology differs across locations because technology depends on location-specific factors, such as innovations previously established, the education system, and the linkages between educational institutions and firms [53]. Similarly, B. Kogut and U. Zander, argue that accessing localized knowledge requires physical proximity as some knowledge is partially tacit and transfer requires frequent interaction [54].

Studies on Canadian biotechnology firms done by B. Aharonson, J. Baum and M. Feldman confirmed the impact of industrial clustering on firms' innovativeness and returns [55]. Particularly their results indicate that clustered firms are up to eight times more innovative than geographically remote firms.

Interestingly, A. Malmberg and D. Power have revealed that indeed clusters facilitate knowledge creation but surprisingly it is rather due to competition than cooperation [52]. Based on the extensive review of theoretical foundations as well as empirical evidence of three possible channels of knowledge creation they claim, however, tentatively, that rivalry and labor market mobility together with knowledge spillovers following from informal types of social interaction are more likely to be important advantages of spatial clustering than organized inter-firm transactions and cooperation. In other words, rivalry together with labor mobility and informal knowledge spillovers may account for knowledge creation in clusters.

NorCOM can serve as *best practice* of concepts of *milieux innovateurs* and a *learning region*, which assume that learning is the most important process, knowledge – the most significant production factor, and University – the crucial actor. Being defined as a *joint knowledge base which includes electronic signals transmitted in the air by radio waves* [56] it seems to be a model cluster, which is not only well-equipped with knowledge base (University and other scientific and research institutes) but possesses simultaneously mechanisms facilitating knowledge processes. The analysis of knowledge flows through informal contacts confirmed that these informal ties are one of the main carriers of knowledge between firms in cluster [56]. Engineers do share even valuable knowledge with informal contacts, suggesting that these are important channel for knowledge diffusion.

Likewise important role of clusters in boosting innovativeness may be attributed to spin-offs [vi] as the vehicles of knowledge transfer [57].

Notwithstanding the cluster role for innovations, which as presented stems from peculiarities of knowledge processes, there are plenty other factors presumably influencing innovativeness notably R&D expenditures – particularly the ratio between public and business outlays, education system, intellectual property rights, or the age structure of population. Figure 3 presents all identified and briefly discussed relations inserted into the proposed framework.



#### GREMI, Learning Region, Regional Learning concepts NorCOM studies

Figure 3 Cluster, Attractiveness, Competitiveness and Innovativeness - Identified Relations

## **5** Conclusions

Competitiveness, attractiveness and innovativeness serve for the purpose of this paper as reference variables for cluster analysis. Although, seemingly related, the exact links between these concepts are anything but clear.

Innovativeness may be a source of company's competitiveness and region's attractiveness, but also competitiveness can serve as an umbrella concept encompassing both innovativeness and attractiveness.



Figure 4 Innovativeness and Attractiveness as Forms of Competitiveness

Clusters are frequently associated with these concepts, yet as argued by Martin and Sunley their highly generic nature comes at the cost of theoretical depth and precision. Much of the theoretical exposition on clusters is quite tautological and teleological (the outcomes of cluster can be also used as explanation of its origins). The casual logic is collapsed into a blurred mixture of simultaneous cause and effect [6].

The simple framework proposed and outlined in this paper is an attempt to address this criticism. It does it, not by providing answers or solving risen problems, but rather by setting limits and defining some basic interrelations. In particular; it shows relations linking cluster with competitiveness, attractiveness and innovativeness (*inside relations*), it delimits these concepts by pointing to the alternative dependencies (*outside relations*). The preliminary review of theoretical and empirical literature seems to confirm the existence of suggested relations. Moreover some regularities can be

spotted. Relations between cluster and innovativeness - labeled as I&C – seem to have its starting point in innovation and knowledge features. Whereas studying linkages between cluster and competitiveness or attractiveness – respectively C&C and C&A relations – departs from plethora of clusters features (productivity, atmosphere of trust, local input-output linkages).

Many relations particularly those *outside* the framework are barely touched upon and need further development. Moreover, there seems to be an obvious overlap between these concepts – competitiveness and attractiveness or competitiveness and innovativeness which shall be address next.

However, given the *cluster hype* this study and proposed framework may constitute a minor contribution towards more balanced and structured cluster research. All in all it is conceived as a starting point for more accurate research. It will perhaps help to avoid the tautological and teological character of cluster concept, and make the blurred line between competitiveness, attractiveness, innovativeness and clusters more pronounced. So that comments like the one made by sarcastic physicist and cited by P. Krugman, M. Fuijta and A. Venables, "(...) so you are telling that agglomerations form because of agglomeration economies" become less frequent [58].

## Notes

- [i] In this paper attractiveness refers mainly to the attractiveness for foreign direct investments (FDIs)
- [ii] It bears resemblance to delimitation done in many econometrical and statistical studies on agglomeration economies which aim at distinguishing between pure agglomeration forces and other sources of clusters attractiveness such as coincidental endowment of natural resources or port location.
- [iii] Quoted studies touch upon these concepts in *sensu largo*. Compare very interesting research by A. Alesina, I. Angeloni, L. Schuknecht, What does the European Union do?, NBER Working Paper 2001 (8647), where exact words counting determines the material selection. In this paper broader approach is taken, i.e. papers referring to clusters although not explicitly mentioning cluster term are also cited.
- [iv] Research in NorCOM (2005/2006) was conducted thanks to the SPIRIT Scholarship (Scholarship for Postgraduate Interdisciplinary Research in Interculturalism and Transnationality) at the Aalborg University and constituted part of PhD Studies at Warsaw School of Economics.
- [v] Results of surveys and interviews conducted with foreign investors and cluster representatives in NorCOM
- [vi] Often new firms enter the same industry in which their founders were previously employed. These cases are labeled spinoffs.

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