

## Conceptualizing International Cluster

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### Abstract

*At the turn of the twenty-first century, scholars around the globe have breathed new life into the concept of clusters – industrial, regional, geographic, Marshallian, innovative, etc. Along with the revival of the theoretical fundamentals, researchers are prone to expand the properties and qualities of a cluster, while placing accent on various contemporary issues. The present paper suggests that the cluster concept has originated not so much as a spatial phenomenon of industrial conglomeration, but rather as a territorial (i.e. geographical) pattern of industrial networking. Thus, localization of industries and its spatial density does not represent nor explain the phenomenon of clusters per se. Author defines clusters as networks of individual aspirations being driven by a common vision, and shaped via commonalities expressed in shared knowledge, ideology, and regional identity. Drawing on extensive literature review, the study provides a conceptual framework to a type of cluster that transcends national borders – an international cluster.*

**Keywords:** industrial cluster, industrial complex, regional cluster, international cluster, interstate cluster, cross-border cluster, transnational cluster

### 1. Introduction

In the foreword to “The cluster initiative greenbook” (Solvell et al., 2003, p. 5), Micheal E. Porter stated that today, “clusters have become a prevalent component of national and regional economic development plans. Hundreds of cluster initiatives have been launched involving virtually all region of the world”. Just over a decade after this statement, one can witness over two thousand clusters and cluster initiatives located in Europe alone (Note 1). Clusters of today are being increasingly studied via complex surveys (e.g. see Lindqvist et al., 2013) unlike the in-depth case studies of the past (e.g. see Saxenian, 1994; Swann et al., 1998). The not subsiding interest with regard to clusters is due to a number of positive externalities they demonstrate: increase in employment rates (partly due to the formation of new businesses and general industry growth); enhancement of competitiveness of the regional and national economy (e.g. via productivity growth); attraction of FDI; increase in exports, patenting and innovation activities; etc. (see Arthur, 1990; Delgado et al., 2014; Feser et al., 2008; Glaeser & Kerr, 2009; Neffke et al., 2011; Porter, 1998a; 2000). The cluster concept has long become an effective tool for policy makers and regional authorities in leveling the national socio-economic space of the core and periphery. Meanwhile industry clusters, as “parts of the sub-national or global innovation and production system” (Enright & Roberts, 2001, p.66), have taken a central place in the active regionalization process that occurs around the globe.

The traditionally lagging border regions have received a new status since the formation of a single economic space in Europe. Borderlands increasingly play a role of a development corridor rather than a national frontier. The underdeveloped periphery acts as a ‘gateway’ for unidirectional flow of new knowledge, competences and resources, aiming to attract and host heterogeneous nodes of trans-local linkages (‘global pipelines’ – a metaphor suggested by Bathelt et al., 2004). Rosabeth M. Kanter – a Professor from Harvard University, suggests that in order to gain a long-term competitive advantage companies, as well as regions, must undertake a strategy of linking their business operations to the global networks (Kanter, 1995). Supporting extra-regional networks updates the regional industry and services to the standards of the global community, facilitates the inflow of extra-regional knowledge, and ultimately influences innovation (Dahlström & James, 2012; Doloreux et al., 2014; Isaksen & Onsager 2010; Kanter, 1995; Tödtling et al., 2009).

Following “the new development philosophy” (Bufon & Markelj, 2010, p.19) of global integration, pan-European, national and regional authorities are keen to eliminate borders as barriers in order to boost regional growth of less developed areas (Clement, 2004; Dorelaite et al., 2007; O’Dowd, 2003; Trippi, 2010). A cross-border region (Note 2) that manifests physical, functional and relational proximity becomes a central place of dynamic interactive learning and new knowledge generation processes (Lundquist & Trippi, 2013). By adhering to the research findings of a broad spectrum of

fairly recent studies (e.g. see Steinle et al., 2007; Giblin, 2011; Mikhaylov, 2013a, 2013b), one can argue for the emergence of international type of clusters that transcend national borders in a single cross-boundary network of interactions. Despite the numerous case studies and the empirical evidence on such spatial-network structures, it is still necessary to provide a conceptual framework to an international type of cluster in concert with the classical understanding of the cluster concept. Thus, the aim of this article is to alienate the fundamental distinctions that characterize an international cluster, as to provide a certain basis for its subsequent study.

## 2. The Cluster Concept – A Matter of Location?

One of the most prominent scientists who have ever published a manuscript on clusters is Michael E. Porter. His empirical verification of the beneficial clustering effects has revived the rather classical concept of industrial clusters (Porter, 1990). According to Porter (1998a, p. 197-198), “clusters are geographic concentrations of interconnected... [actors] in particular field that compete but also cooperate”. Porter continues implying that “cluster is a form of a network” (Ibid., p. 226) of a geographically proximate group of interconnected firms, industries, and institutions “linked by commonalities and complementarities... [whereas the] geographical scope of a cluster can [even be] a network of neighboring countries” (Ibid., p. 199). Oddly enough, clusters are often conceived as industry agglomerations differentiated from industrial complexes and districts based on either a multi-industrial inter-organizational structure (e.g. see Schmitz, 1992; Swann & Prevezer, 1996; Egan, 2000; Visser & Boshma, 2002; Voyer, 1997) or the market structure (i.e. market relations) – majority of Russian scientists see cluster as a type of territorial-production complex (TPC), which is operating in a market economy. Thus, in order to understand the basic idea behind the cluster concept and its distinctions from such concepts as industrial complex, industrial district, territorial-production complex and the alike, we shall review some of the earlier publications on clusters.

Edgar Malone Hoover, one of the founders of Regional Economics, and the author of such books as ‘Location theory and the shoe and leather industries’ (originally published in 1937) and ‘The location of economic activity’ (originally published in 1948), was among others who stated that agglomeration of firms and businesses of the same or different industry is important for individual firm success (Hoover, 1948). According to Edgar M. Hoover and Frank Giarratani (1999, p. 43; first published in 1970), “the basis for clustering is the mutual attraction among the competing units of a particular activity, and this attraction outweighs any repulsion that might arise from their rivalry”. However, one of the main ideas, which they elaborated, was to see a cluster as a business network rather than a spatial phenomenon. Edgar M. Hoover and Frank Giarratani consider cluster as one of many forms of the ‘location patterns’ outlined in the process of mapping the locations of different business activities, being the backbone of the clustering phenomenon (Ibid., 1999). In line with this statement, we can naturally allocate a significant body of literature serving as indirect antecedents to the formation of the cluster concept. For example, Erik Dahmén’s ‘development blocks’ concept (first published in 1950), which are essentially “a set of factors in industrial development, which are closely interconnected and interdependent” (Dahmén, 1989, p.109). The work of Albert Otto Hirschman (1958) on ‘linkage effects’ of ongoing and new activities (i.e. backward linkage of demand based on input and forward linkage of output utilization acting as input in new business activities). Francois Perroux’s (1950) ‘growth poles’ as catalysts of regional growth and driving forces behind economic and industrial development. Gunnar Myrdal’s (1957) ‘core-periphery model’, to name just a few. Thus, we can assert that *the cluster concept has originated not so much as a spatial phenomenon of industrial conglomeration, but rather as a territorial (i.e. geographical) pattern of industrial networking.*

Stan Czamanski and Luiz Augusto de Q. Ablas (1979) have argued for a clear difference between the industrial complex and industrial cluster based on whether or not the industry groups are spatial conglomerations: “cluster means a subset of industries of the economy connected by flows of goods and services stronger than those linking them to the other sectors of the national economy...thus [cluster concept is being] devoid of any spatial connotation. A complex, on the other hand,...[is] defined as a group of [interconnected] industries ... showing in addition a significant similarity in their locational pattern. Thus, complexes emphasize the spatial aspect of industrial concentration” (Ibid., p. 62). A study on the clustering of industries held by Stan Czamanski in 1974 has revealed as many as sixteen industrial clusters being purely a-spatial, once again supporting the statement on industrial complex being “a subgroup belonging to an industrial cluster” (Czamanski & Czamanski, 1977, p. 94).

Other studies held in the 1960s and 70s have also shown that networking within an interdependent system spans beyond urban and regional conglomerations, utilizing the diversity of market opportunities, actors and information (Berry, 1964; Pred, 1977; Pred & Tornquist, 1973). Doloreux et al. (2014, p.6) suggest that it demonstrates the “a-territorial perspective” on the bidirectional process of innovations diffusion, transcending the locality outward along the movement of people and information flows. Thus, the concept of regional clusters falls in the same category as ‘industrial networks’

(Håkansson, 1989), 'innovation milieus' (see: Aydalot, 1986; Maillat, 1995), 'creative regions' (see: Andersson, 1985; Törnqvist, 1990), 'new industrial spaces' (see: Christopherson & Storper, 1986; Piore & Sabel, 1984; Scott, 1986), and 'innovation systems' (see: Edquist, 1997; Lundvall, 1992; Nelson, 1993). While according to Juan Palacios (2005, p.194) "growth poles, industrial districts, industrial complexes, and technopoles all can be called clusters using this noun's generic, functional, non-territorial connotation".

Thus, the localization of industries (in a sense of the spatial density) does not represent nor explain the clusters' phenomenon per se. *Clusters are networks of individual aspirations* (of a single person, firm, institutions, industrial complexes, etc.), which are united under a certain common vision being shaped by various factors (e.g. shared culture, ideology, people's identity, institutional framework). According to Isard et al. (1959), Roepke et al. (1974), Doeringer and Terkla (1995), Porter (2000), to name just a few, clusters do not follow a single industry category, they are unique combinations of 'cluster categories' (see Delgado et al., 2014; Ketels & Protsiv, 2013) representing the 'binder' of a cluster. Yet this binder is far more specific than the cluster categories allocated predominantly for their statistic accountability. A vivid reflection of this statement are the names of clusters that are being allocated in the course of research: 'Silicon valley' (not the IT cluster), 'California wine cluster' (instead of agricultural cluster), 'Surfing cluster' (not recreational cluster), etc. Similar pattern can be observed in studies on industry clusters held in European regions (e.g. see Bergman & Feser, 1999).

### 3. Cluster as an Aspatial Geographic Concept

According to Storper (1992), formation of a globalized world created a series of distinct 'islands of innovation' (i.e. districts of intensive use of advanced technologies) build upon unique assets of knowledge and innovative capacity. Synergies and complementarities in innovation process are the opportunity for "actors to establish contacts and capitalize on the learning potential" (Lundquist & Trippel, 2013, p.15-16). In line with the open invention process model (see Chesbrough et al, 2006; Mikhaylova, 2014), it is recognized that knowledge is being acquired from a variety of sources and locations. Thus, the notion of "*being there* is no longer a constraint of geographical proximity" (Amin & Cohendet, 2005, p.472). In other words, "proximity need not, and should not, be defined primarily in spatial terms" (Maskell et al., 2004, p.3).

Maggioni and Uberti (2007) have defined three primary types of proximity – physical, functional and relational, while a growing body of literature reveals a diversity of pillars within these groups. Of particular attention is the 'relational proximity' expressed in cognitive, organizational, social, institutional, cultural and technological terms (Boschma, 2005; Gertler, 2003; Moodysson & Jonsson, 2007; Sternberg, 2007; Torre & Gilly, 2000), which can exist between the geographically distant actors (Maskell et al., 2004). This type of proximity is centered around the prevailing importance of shared organizational and technological cultures, codes of conduct, shared norms, institutions and regulation, mutual understanding and trust required for collaboration, interactive learning and knowledge exchange. A strong asymmetry in the properties and innovation capacity of firms, organizations and locations will limit these opportunities. Meanwhile, strong 'socio-cultural' proximity, a common 'technological knowledge base', similar 'technological trajectories', 'institutional set-ups', 'social dynamics', 'governance structures', 'cultural identities' and the alike (Anderson & O'Dowd, 1999; Cohen & Levinthal, 1990; Hospers, 2006; Johnson, 2009; Lofgren, 2008) can form a 'collective learning system' (Lundquist and Trippel, 2013).

Inter-organizational linkages of modern clusters are increasingly shaped by functional and relational proximities (i.e. commonalities, complementarities, and interdependencies) highlighting its 'non-territorial nature' (Palacios, 2005) and 'boundaryless' (Methodology of Wood cluster on cross-border, 2007). Literature review suggests that nowadays the cluster boundaries (i.e. diffusion of network ties) are driven by commercial factors, and are no longer bound to particular local or regional setting (Amin & Cohendet 1999; Lee, 2001; Oinas, 1999). Empirical evidence tend to support an assumption that innovative capabilities of clusters rest upon 'trans-local relationships' (Maskell et al., 2004). Meanwhile the factor of 'place' (i.e. Japanese 'ba' concept) is increasingly regarded as a complex structure of physical, virtual, and mental setting (Nonaka & Konno, 1998).

### 4. Emergence of Transboundary Clusters

After the Second World War, European states have started to introduce internationalization and cross-border integration policies, to establish a common socio-economic space (e.g. the Nordic Passport Union, the European Union) for the stake of national and regional (e.g. Scandinavia, Europe) security. Over the years, scholars around the globe have observed numerous examples of successful long-term cooperation between regional clusters located across borders. Especially remarkable development of clusters' internationalization activities and integration processes took place in

borderland areas of some European macro-regions (e.g. Baltic region; see Mikhaylov & Mikhaylova, 2014). Density of national borders and a barrier-free environment (i.e. unrestricted movement of people, goods and services, institutional and legal proximity, etc.) has boosted different types of transboundary cluster cooperation. The less developed areas with strong differences in the level of economic and technological development, industry specialization, and scientific knowledge base became involved in the global value chain process, acting as resource supply base (e.g. cheap labor, raw materials, other resources). While strong competence centers have started to realize strategic alliance strategies, building on existing 'proximities' and the benefits from integration (e.g. synergies in competing at the global market). According to Lundquist and Trippel (2013, p.456), "potential benefits from establishing relations and investing in new cross-border linkages" can significantly enhance the innovation processes by bringing novel ideas and expert insights on knowledge recombination.

In the late 1990s – beginning of 2000<sup>th</sup>, scholars recognized that "while some clusters are local to a region, others can cross regional boundaries" (vom Hofe and Bhatta, p.6). A great variety of terms have been used in defining these type of clusters: 'transboundary cluster', 'cross-border cluster', 'transnational cluster', 'international cluster', 'interstate cluster', 'over the border cluster', 'transborder cluster', etc. (e.g. see Brunet-Jailly, 2008; Dudarev et al., 2002; Emelyanov, 2008; Feser & Bergman, 2000; Feser & Luger, 2002; Kibitkin & Emelyanov, 2006; Porter, 1998b). Based on a comprehensive literature review, author suggests the following classification of international clusters:

- a) a single cluster whose internal network of actors spans beyond the borderland area of two or more countries, i.e. a cross-border cluster;
- b) a single cluster with an extensive network of members located in different states, with at least one of the regions being non-border, i.e. transnational cluster or an interstate cluster in case of a multinational state.

The empirical evidence on international clusters are found in the US-Mexican border region (Scott, 1999), the Cascadia (Canada-US) cross-border region (Brunet-Jailly, 2008), the Central Europe (Johnson, 2009; Trippel, 2008), the Baltic region (Mikhaylov & Mikhaylova, 2014), and a number of other regions, featuring such examples as 'Medicon Valley', 'Bio Valley', 'Minalogic', 'NANOMAT', 'IVAM', etc. (see Köcker et al., 2011). Undoubtedly, some of the examples of international clusters given in reports and scholarly articles do not coincide with neither traditional cluster nor international cluster concepts, but rather reflect the strategic objectives of a cluster organization, regional authorities or a certain development project. Be that as it may, most of the identified international clusters in Europe are developed in the framework of the pan-European programs, such as 'Competitiveness and Innovation Framework' (CIP), '7<sup>th</sup> Framework Programme for Research and Technological Development' (RTD), 'Europe INNOVA', 'PRO INNO Europe', 'INTERREG', 'INTERACT', 'Regions of Knowledge', and a number of other.

The key distinguishing feature of international cluster is the plurality of its stakeholders, in terms of jurisdiction and national legislation, language, cultural and institutional context, codes of conduct, historical circumstances, etc. While these factors are vital for classic trans-local relationships (i.e. international business; e.g. see Gertler, 2001; Morgan, 2004), they become even more profound in mediating the complex 'double triple helix' (Mikhaylov, 2013) system of ties within a single international cluster.

## 5. Conclusion

Spatially diffused trans-local interactions become essential in reinforcing innovation capacities of regions (Gontar & Gontar, 2013; Hughes, 2007). Adrian Kuah (2002, p.210-221), based on the research conducted by Oakey (1985) on input and output linkages, postulates: "co-location itself does not imply clustering", while the "linkage of local origins [become] less significant in today's context". Acknowledging this fact, scholars define various concepts that highlight the a-spatial (i.e. a-territorial) feature of a cluster. e.g. the concepts of 'temporary clusters' (Maskell et al., 2004), 'temporal clusters' (Lundequist & Power, 2002), etc. It is expected that 'extra-local' or 'extra-regional' links (i.e. the 'pipelines'; see Bathelt et al., 2004) provide an inflow of tacit and codified knowledge, novel ideas and expert insights on recombination of the existing knowledge base (e.g. Echeverri-Carroll & Brennan, 1999; Rosenkopf & Almeida 2001), as well as ensure the enhancement of the 'socio-territorial capital' (Fontan et al., 2005).

At least some of these internationalization activities end up in integration of independent stakeholders under the 'umbrella' of an international cluster. One of the first who mentioned the existence of international clusters was the ideological leader of the cluster concept – Michael E. Porter (1998b). According to Porter (2000, p.16), "the geographic scope of clusters ranges from a region, a state, or even a single city to span nearby or neighboring countries (e.g., southern Germany and German-speaking Switzerland). The geographic scope of a cluster relates to the distance over which informational, transactional, incentive, and other efficiencies occur".

However, it should be noted that a conceptual framework of an international cluster is yet to be established. Having

allocated a number of striking examples of international clusters, scholars have largely neglected to give due consideration to specific features of this type of clusters. By adhering to the misleading opinion that clusters are industry conglomerates, researchers are keen to describe and explain international clusters via the 'threads of cooperation' between the distant isolated localized actors. Meanwhile, the usage of conventional terms in describing different types of clusters cause a significant terminological confusion, and difficulties in allocating an international cluster from an international network of regional clusters and other forms of inter-organizational networking.

Current article provides some conceptual basis and suggests a classification of international clusters. Meanwhile the literature review reveals a plethora of theoretical developments on describing the antecedents and effects of international inter-organizational networking of actors from various institutional helices. Further research has to deal with particular issues of the international cluster concept, such as the distance of collaborative ties within a cluster, largely defined by the absorptive capacity.

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## Notes

Note 1: "A cross-border region as an area consisting of adjacent territories belonging to different nation states... regardless of differences in terms of size, geographic conditions, history, culture and socio-economic conditions" (Lundquist and Trippel, 2013, p. 452).

Note 2: based on the data from The European Cluster Collaboration e-Platform and the Cluster observatory run by the Center for Strategy and Competitiveness in Stockholm.