ISSN 1392-2785 ENGINEERING ECONOMICS. 2008. No 1 (56)
ECONOMICS OF ENGINEERING DECISIONS

Extended and Dynamic Clustering of SMEs

Takis Damaskopoulos[1], Rimantas Gatautis[2], Elena Vitkauskaitė[2]

[1]*European Interdisciplinary Research Institute*
8 Rue du Général de Castelnau, 75015 Paris

[2]*Kauno technologijos universitetas*
K. Donelaičio g. 73, LT-44029 Kaunas

The convergence of forces such as the deepening of the Single Market in the EU, the wider process of globalization and the growing embedded use of information and communication technologies (ICT) in economic and business practices, among others, have brought about a structural break in the theory and practice of regional innovation policy. The need of assessment of these structural breaks the concept of extended and dynamic clustering is designed. The concept refers to cluster arrangements that have the following characteristics: though embedded in, transcend geographical location, focus on global markets, operate as ad-hoc and/or long term business networks, are ICT-enabled, and are based on dynamic aggregations of capabilities of different, often small and medium size enterprises (SME). It might be assumed that new organizational arrangements can help SMEs improve their global market access, their capacities for innovation and business performance. In the light of the structural changes underway the challenge for regional innovation policy is how to enable clusters to operate not as regional constellations nurtured by the regional economic base but rather as 'hubs' within a system of flows of economic activity which is increasingly defined on a global basis. This involves the elaboration of an approach to the development and innovation potential of SMEs based on institutional organs dedicated to building regional economic capacity in terms of skills and network development and the construction of international connections to enable regional SMEs to function as 'hubs' operating between a global economy and regional business ecosystem.

The new approaches to cluster analysis develop new conceptual dimensions that encapsulate the key aspects of this new phase and better enable all cluster stakeholders address the challenges confronted by regional economies. This requires a change of perspective where clusters are no longer seen as regionally bound constellations nurtured by regional economic systems but rather as 'hubs' within a global system of flows of information, knowledge and economic activity. This is what the concept of extended and dynamic clustering is designed to capture.

Current challenges faced by regional clusters can be confronted through a process of extended and dynamic clustering that improves market access, innovation capabilities and adaptability to the emerging structural realities of the EU. Extended and dynamic clustering involves selecting and aggregating capabilities of clustered SMEs at regional, national, cross-regional or international levels, thus overcoming regional geographical boundaries and operational limitations of 'traditional' clusters.

Currently, due to size, scale, specialization and not least regulatory and legal impediments, SMEs in the EU lack the capacity to respond adequately to emerging challenges from international locations and market opportunities, or participate in tenders in international procurement contracts. This shortcoming is related to both the conditions that SMEs face and the restrictions associated with 'traditional' geographically defined regional clusters.

Keywords: *ICT and clustering, extended and dynamic clustering, regional policy, innovations.*

Introduction

Clusters and the broader patterns of economic specialization across geographies have become an important concern for European policy makers. One driver of this is the set of objectives on productivity growth, innovation and competitiveness that European leaders have defined for the EU in the Lisbon-Agenda. In international perspective the EU tends to rank high on the quality of institutions and many factor conditions that underpin innovation but low on its ability to mobilize them through entrepreneurship, new firm formation and corporate renewal.

Another driver for the growing emphasis on clusters is the impact of globalization on the nature and intensity of competition between and across regions in the EU. Falling transport and communication costs coupled to continuing liberalization measures are increasingly exposing larger segments of regional economies to heightened global competition. Increasing liberalization and heightened competitive pressures on business environments and company practices have increased pressures for adjustment not only in regional microeconomic foundations but also in the wider social and political fabrics in which regional economies are embedded. With an increasing number of regions in the EU and globally, notably in the transition

economies of Eastern Europe and Asia, providing attractive conditions for investment, regions in the EU are under increasing pressure to define the differentiating value they are offering to companies looking to locate business activities.

Against this background, clusters at both national and regional levels of government and associated agglomerations of business communities are seen as having the potential to be a key dimension of a region's value proposition in a global economy as they provide key matrices that concentrate regional economic capabilities and competence. In particular, clusters are thought to provide higher value for companies that are active in the economic fields in which they operate, thus increasing considerably the locational comparative advantage of regions (Ketels, Sölvell, 2006; OECD, 2007).

The paper draws on stream of research under the auspices of the European Commission and the OECD. The first is the EFFORT project. The EFFORT project (Governance, Policies and Legal Conditions for Access to Market through Extended and Dynamic Clustering of SMEs)[1] is funded by the European Commission. Its objective is to gain understanding of the policies, governance structures, sustainability and constituency drivers of 'extended' and 'dynamic' clustering in order to improve the competitiveness of SMEs and the regional clusters in which they operate. The project covers 10 EU regions and 60 clusters irrespective of industrial specialization in order to extract principles of policy, governance, and constituency drivers that structure regional industrial systems with emphasis on entrepreneurship. Its key outputs are a White Paper and a Roadmap that will articulate policy recommendations for national and regional governments on cluster policy.

The object of research – factors affecting clustering.

The *main objective of this research* is to enhance understanding of novel emerging forms of *extended and dynamic clustering*. By this term we refer to cluster arrangements that have the following characteristics: though embedded in, they transcend geographical location, they focus on global markets, they operate as both systematic, that is stable and long-term, but have also the ability to operate as *ad-hoc,* business networks able to reconfigure business practices and re-aggregate capabilities according to emerging market shifts and opportunities and production needs, they are ICT-enabled, and they are based on dynamic aggregations of capabilities of economic units of diverse origins and functions, often involving small and medium size enterprises (SMEs).

The *working hypothesis of the research* is that these new organizational arrangements can help SMEs improve their global market access, their capacities for innovation and overall business performance. However, this approach is not deterministic but rather dialectical. Given the complexity and diversity of clusters spatial extension is understood as an element that can contribute to economic dynamism and business regeneration.

The methods of research are systemic, logic and comparable analysis.

Clusters and clustering: theoretical and historical perspectives

Clusters draw their rationale from the concept of 'external economies of scale' developed by Alfred Marshall (Marshall, 1920). The concept refers to sources of productivity that can be leveraged outside the formal boundaries of individual firms, normally embedded in regional economies, e.g., sharing fixed costs of common resources, such as infrastructure and services, skilled labor pools, specialized suppliers, and a common knowledge base. When these factors are geographically concentrated, firms gain economic and business benefits associated with spatial proximity. Because of the proximity among them – both in terms of geography and of activities – cluster constituents enjoy the economic benefits of several types of positive location-specific externalities. These externalities include access to specialized human resources and suppliers, knowledge spillovers, pressure for higher performance in head-to-head competition, and learning from the close interaction with specialized customers and suppliers (Krugman, 1991, 1996, Saxenian, 1994, Porter, 1998, Gambardella and Malerba, 1999, Castells, 2000, European Commission, 2002, OECD, 2007).

Research, despite significant disagreements, tends to define clusters as geographical constellations of companies (producers, suppliers, services providers) and institutions (research laboratories, educational institutions, and other institutions in a given economic field) co-located in a specific geographic location and linked through relations of interdependence and complementarity in providing a group of products and/or services. However, the concept of a cluster refers not to the relative presence or absence of these critical factors. Instead it refers to *the dynamic interrelationships between economic and technological transformations, firms' organizational and value-creating capabilities, emerging market and industry structures, and public institutions underpinning regional constellations of economic dynamism and competitiveness* (Porter, 1998, 2003, 2006; Castells, 2000, 2001; European Commission, 2003; Saxenian, 2006; Ketels, Sölvell, 2006).

Clusters are part of a broader conceptual framework to understand the drivers of regional and national competitiveness. This framework provides a connection between firm-level performance and economic policy at the micro- as well as the macroeconomic level. Existing research indicates that to understand value creation in an economy, it is essential to understand the drivers of value creation and innovation at the firm level. In this context, research distinguishes between two sets of factors: The first includes the overall macroeconomic, policy legal, social, political and institutional context. This is an area which exhibits a general consensus in terms of theory and practice. However, while a stable macroeconomic context is beneficial, the experience of many countries has also

[1] The EFFORT consortium is composed of the following organizations: Umbria Innovazione s.c. a r.l. [Italy], T6 Società cooperative [Italy], NetSmart S.A. [Greece], European Institute of Interdisciplinary Research (EIIR) [France], Institute of Communication and Computer Systems (ICCS) [Greece], Corvinus University of Technology [Hungary], Kaunas University of Technology [Lithuania], Katholieke Universiteit Leuven [Belgium], Fomento del Trabajo Nacional [Spain], TECHIN Sp.Z.o.o.) [Poland], University of Navarra - IESE Business School [Spain].

shown that it is not sufficient. A stable macroeconomic framework creates opportunities for companies to raise productivity, improve innovation capabilities, and value creation; it is not sufficient to generate value itself. Macroeconomic conditions need to be complemented by sound microeconomic foundations and capacity. These include both the competitive fitness of companies and the quality of the microeconomic business environment that surrounds them (Porter, 1998).

Transformative tendencies in clusters

The theoretical and practical work on clusters has generated a wealth of knowledge on the microeconomic foundations of growth, innovation, competitiveness, and economic impact. Clusters across the EU are today held as an example to the rest of the world. Their flexibility has usually been contrasted with slow-moving manufacturers that depend on mass production who suffered in the recessions of the closing decades of the 20th century.

Yet research indicates that the strengths of yesterday might be becoming the liabilities of tomorrow. Several EU regional clusters, especially those usually associated with process of innovation in product, service and process, are facing a crisis related to the high euro and competition from low-wage countries. Companies and the regional clusters in which they operate across the EU, in sectors ranging from automobiles, textiles, footwear, leather goods, and software development among others, struggle to compete against regional production centers in Eastern Europe, countries of the former Soviet Union, China and India (OECD, 2007).

During the pre-euro era national currency devaluations and formal or informal trade barriers could be used to restrain competitive pressures from more efficient and cost-effective locations. Today the regional clusters of the EU are exposed to competitive forces stemming not only from the process of liberalization associated with the Single Market but also from competition related to the wider process of globalization. As a result many of them have to adjust. Many industrial companies outsource production to eastern European countries and globally to such countries as China to the detriment of regional industrial capacity.

The problem goes deeper than the immediate effects of a strong euro and labor costs. Regional clusters in the EU are showing their age as a way to organize business in a maturing and changing global economy. Several EU regions have grown increasingly conservative and inward-looking, focused more on finding outlets for the goods or services they have traditionally produced on a regional basis than designing and marketing innovative products or services on a global basis.

Structural changes are also fueled by the global strategies of multinational firms operating in different sectors of economic activity. In contrast to earlier approaches that tended to follow the 'product cycle' today multinationals are organizing their R&D activities on a global basis. Increasingly, success for a multinational development has come to depend on correctly spotting which locations best suit which kinds of the firm's activities. Today that judgment, rather than tariff barriers, determines location. Picking the right location to invest in activities ranging from production, logistics through to R&D becomes both harder and more important (OECD, 2007).

Research indicates, for instance that there is a paradigmatic shift underway in the practice and organization of R&D on the level of the firm (especially the multinational firm). For most of the postwar period large firms, since they considered it as part of the very 'core' of a company's competencies, located R&D within the firm while they sought collaboration with universities, public and private research centers and government bodies. AT&T's Bell Labs and Xerox's PARC are probably the best known examples of this economic rationale and organizational logic.

Today big corporate labs are on their way out. Companies make incremental changes to products and services rather than pay for in-house basic research. Increasingly large firms look for M&As, partnerships with universities and takeovers of innovation and research focused venture capital-backed startups. The approach to R&D is changing because long-term research was affordable only under and earlier phase of quasi-monopoly conditions. Modern technology firms today are much less vertically integrated. They use geographically dispersed networks of outsourced suppliers and assemblers, which leads to the organizational splintering and geographical dispersion of research divisions.

In this process the 'R' is coming closer to 'D' – which according to corporate calculation and reckoning makes research 'better' and more 'relevant'. This has two implications: first, the relocation of R&D within the global organizational structure of the firm (closer to markets, and geographically placed according to corporate operating strategy and cost and development efficiencies); second, R&D is increasingly organized on a different geographical basis and in search of 'ecological' synergies (talent and skill, and concentration of supportive institutional infrastructures, and 'friendly business environments', among others).

These tendencies are part of a process of the redesign of the multinational company. Multinationals began when the 19th-century firms set up sales offices abroad for goods shipped from factories at home. Firms later created smaller versions of the parent company across the world. Now multinationals are in the process of piecing together worldwide operations, placing different activities wherever they are done best, paying little attention to geographical boundaries. (OECD, 2007).

On the other hand, SMEs that mainly interact with their counterparts in a regional cluster often lack the expertise to manage a global supply network, which normally functions as a comparative advantage for big companies. The implication is that the geographical site of the firm can become a constraint when the supply chain is increasingly complex and defined on a global basis.

One of the major problems that regional clusters in the EU face is that of being rooted largely in craft industries rather than value-added services such as design and marketing. In the days of lower competition and trade protection measures it sufficed to outsource such services from established specialized agencies. But now they must

compete with rivals that focus their efforts on services instead of manufacturing.

Research indicates that regional clusters are falling behind in innovation. The traditional strengths of EU regional industrial districts have become weakness as well as strength. For instance, though Italian factories remain pre-eminent in the making of the finest textiles, the companies that own them and operate them can become trapped in craft tradition. The challenge is how to move their business focus to less tangible things like consumer research, cutting-edge design, expert marketing and skill in global sourcing.

This requires a change of optic where clusters are no longer seen as regional constellations nurtured by the regional economic base but rather as 'hubs' within a system of flows of economic activity which is increasingly defined on a global basis. This involves the elaboration of an approach to the development and innovation potential of SMEs based on institutional organs dedicated to building regional economic capacity in terms of skills and network development and the construction of international connections to enable regional SMEs to confront the challenges of being 'hubs' operating between a global economy and a regional business ecosystem. The companies that have followed this path have emerged as 'global SMEs' that market products and services globally. Such companies have set themselves free from being the creatures of their regional clusters or have reconfigured their functional relationship to them. Instead of being one among many members of a regional cluster, they become the central point of a global network of suppliers and retail outlets.

Indeed, research indicates that the concept of the cluster, despite its recognized benefits, especially access to skill and talent, might be too restrictive in the era of globalization, shifting attention to business networks that extend beyond the geographical boundaries of clusters. For instance, while a quarter of cluster companies in the EU do not actively participate in any business network, almost as many participate in more than one, and the majority of companies is active in one such network. The highest level and intensity of networking is in the Nordic region: Finland, Sweden, Denmark and Norway. In these countries the majority of cluster companies actively participate at least in two business networks (Flash Eurobarometer, 2006).

In addition, clusters tend to primarily help companies to compete on the local and regional markets. Research shows that: 69% of SMEs in new member states and 65% in the EU-15 confirm that their cluster helps facilitate access to these markets. Also, the clusters' role is important in improving competitiveness on the national market for the majority of cluster companies in the EU, as well as in the candidate zone. Managers and strategic decision makers of most companies active in a cluster-like environment consider cooperating with other European clusters an opportunity rather than a threat. However, 51% of SMEs also confirm that being a member of a cluster does not help developing relationships to compete on the European market (while 42% find that this is the case in their experience).

At the same time, over two thirds of cluster company managers agree that public authorities play have at least important if not fundamental roles in supporting the cluster. In most areas of public support significant improvement is desired by most companies that operate in a cluster-like environment in the EU. Only 15% in the European Union say that public authorities do not have a role to play in supporting their cluster. State interference with business operations is seen unnecessary more in the new member states, and even more in the candidate countries.

Yet, remarkably almost two-thirds of the cluster companies in the EU desire more public support in developing cross-regional and trans-border relations with other clusters or geographic regions. Seven out of ten strategic managers in the EU expressed a need for improved assistance from public authorities to enhance the perception of their region/cluster in the outside world. Currently almost half of the cluster company leaders do not perceive strategic plans to be in place to improve the image of their cluster or regional industry branch they are active in (Flash Eurobarometer, 2006)

Extended and dynamic clustering

In this paper we try to concentrate on understanding the behavior, governance structures, sustainability and constituency drivers of dynamic cross-border and cross-regional clustering of SMEs in order to improve their ability to access a more competitive and global market. By 'accessing the market' we mean not only joint marketing and promotion, but enabling and facilitating collaborative R&D efforts, production, distribution and delivery of products and services, as well as responding to procurement contracts of public or private organizations.

Current challenges faced by regional clusters can be confronted through a process of *extended* and *dynamic clustering* that improves the market access, innovation capabilities and adaptability to the emerging structural realities of the EU. *Extended and dynamic clustering* involves selecting and aggregating capabilities of clustered SMEs at regional, national, cross-regional or international levels, thus overcoming regional geographical boundaries and operational limitations of 'traditional' clusters.

As discussed earlier, currently, due to size, scale, specialization and not least regulatory and legal impediments, SMEs in the EU lack the capacity to respond adequately to emerging challenges from international locations and market opportunities, or participate in tenders in international procurement contracts. This shortcoming is related to both the conditions that SMEs face and the restrictions associated with 'traditional' geographically defined regional clusters.

In setting out approach to *extended and dynamic clustering* we distinguish *internal* conditions (specific to the SMEs) and *external* conditions (specific to clusters and insufficiently developed cross-border and cross-regional collaboration mechanisms among clusters) whose coexistence and dynamic interrelationships constitute the 'enabling framework' of *extended and dynamic clustering*:

- *Internal conditions* refer to the microeconomic foundations of clusters and have to do with the resources and capabilities of companies. SMEs

often do not posses all the relevant skills, competencies, and capacities required to participate in collaborative cross-border or cross-region processes for the co-creation and delivery of products and services;

- *External conditions* cover the macroeconomic framework and span from the perceived complexities of international contract negotiation, to trust and financial issues, as well as the perceived disadvantages in terms of size and skills. They include also regulatory and legal gaps that create roadblocks to cross-border cluster collaboration, contract negotiation, intra- and inter-cluster governance policy and institutional issues which hinder the formation and efficient operation of cross-border and cross-regional collaborative networks.

From these two perspectives, the fundamental challenge for reinvigorating regional clusters is how to facilitate *extended and dynamic clustering*, not only among SMEs within a given cluster but also how to build such capacity across regional clusters and networks of SMEs.

This challenge has two facets:

1. Building *internal capabilities* by enhancing the organizational, knowledge and technological capacity of SMEs to enter into cross-border and cross-regional collaborative processes for jointly producing and delivering products and services;
2. Building *external capacity* in the environments in which SMEs and their clusters operate. The key issues here have to do with regulation, policy, legal framework, governance mechanisms and technological conditions that can function as the 'enabling framework' for completing the Internal Market.

In other words, if the *internal* set of issues relates to the *private* business challenges SMEs face, the *external* ones concern the *public* economic framework that will facilitate cross-border and cross-regional collaboration among SME clusters, with the ultimate goal of addressing the issue of uneven development among regions in the EU.

Extended capabilities for dynamic clustering

As discussed in previous sections, the need for physical proximity has led to regional agglomerations and constellations of competencies, or 'traditional clusters'. These to a large extent depend on face-to-face contacts among the cluster stakeholders. But relying exclusively on physical proximity limits the available talent pool and access to specialized facilities. So there is a strong case for linking to distant firms, or groups of firms, professionals and resources, and for taking advantage of ICT to do so.

Innovative uses of ICT enable a 'de-spatialization' of economic activity, and at the same time, offer new opportunities for codifying information, which may enhance learning and innovative activity. Our research looks at clusters as virtually proximate inter-organizational systems of learning and economic and social activity which are globally networked and enabled by the effective use of IT. They are also embedded in supportive policy, legal, regulatory and governance frameworks which encourage and sustain cross-regional clustering.

Based on such frameworks we set out to understand the key questions involved in the construction of extended clustering mechanisms, especially through the use of ICT. These questions are as follows: How will ICT affect traditionally perceived needs for physical proximity and introduce virtual and functional proximity as a complement to physical proximity? What combinations of physically proximate and virtual arrangements best augment the social and economic performance of networked clusters?

One way to address these questions is by focusing on the enablers of *extended and dynamic clustering* and examining the potential roles that ICT can play to enable clustering capabilities along the two dimensions identified in Figure 1, i.e. virtual proximity capabilities and dynamic clustering capabilities.

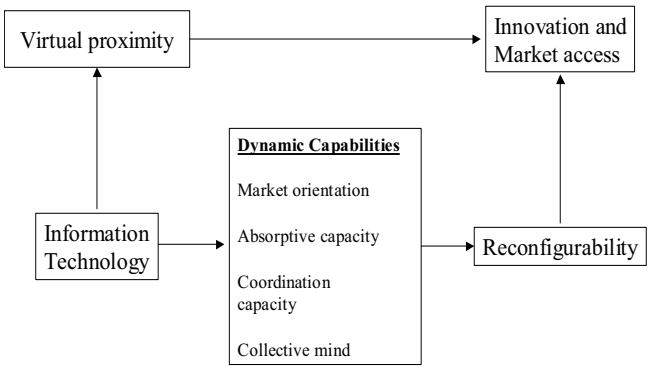

Figure 1. Role of ICT in extended dynamic clustering

The following subsection focuses the potential role of ICT to enable or support *extended and dynamic clustering* capabilities. The discussion is structured around four dimensions we deem critical for improved performance: market orientation, absorptive capacity, coordination, and collective mind.

ICT and market orientation

Market orientation reflects the ability to sense the environment and understand customer needs and competitive dynamics. It is defined as 'the process of generating, disseminating, and responding to market intelligence about customer needs' (Kohli, Jaworski, 1990). The relevant issues for the role of ICT and extended clustering are the following parameters: capturing market intelligence, e.g. external communication links for sensing market trends or discover new market opportunities; disseminating market intelligence to the appropriate parties in the business network / virtual cluster; analysis and interpretation of market intelligence; responding to market trends, e.g. by enabling processes and supporting operations that capitalize on market intelligence.

ICT and absorptive capacity

Absorptive capacity reflects the ability to learn by identifying, assimilating, transforming and exploiting existing knowledge resources to generate new knowledge (Cohen, Levinthal, 1990; Zahra, George, 2002). Regarding extended clustering, the relevant research issues for further

investigation are the following conditions under and ways through which:

- extended clustering can help acquire or "broker" knowledge;
- extended clustering can help assimilate knowledge (e.g. through knowledge articulation and codification);
- extended clustering can help transform knowledge (e.g. in generating new thinking, brainstorming and experimentation, innovative problem-solving);
- extended clustering can help exploit knowledge (e.g. in pursuing new initiatives and identifying new solutions).

ICT and coordination

Coordination capability reflects the ability to manage interdependencies among resources and tasks in order to create new ways of performing a desired set of activities (Crowston, 1997; Malone, Crowston, 1994). Pertinent issues in this respect are the following ways in which:

- extended clustering can be used to allocate resources (including distribution of knowledge);
- extended clustering can help assign tasks among partners;
- extended clustering can be used to appoint the right person to the right unit;
- extended clustering can help synchronize activities among collaborating partners;
- extended clustering can be used to capture synergies among tasks and resources.

ICT and the "Collective Mind"

The concept of collective mind in a business context has been defined as the "ability to integrate disparate inputs through heedful contribution, representation, and subordination into a group system" (Weick, Roberts 1993). It can also be conceptualized as the architecture for the whole system. In this respect, collective mind helps implement a set of complex activities by specifying the organizing principles by which individual knowledge is integrated (Grant, 1996). Relevant issues for ICT in extended and dynamic clustering are the following conditions under and ways through which:

- extended clustering be used to model and structure the cluster/ network;
- extended clustering can be used to monitor how partners fit in, interact, and their activities affect others;
- extended clustering can be used to interrelate diverse inputs (including knowledge) from constituent firms to execute the collective activity of the cluster / network;
- extended clustering can help individual inputs contribute to the group outcome? How can extended clustering support the sharing of knowledge among partners?
- extended clustering can be used to keep network managers informed?

Dynamic capabilities for extended clustering: the valorization process

Innovation management and strategic management theory has traditionally focused on the analyses of firm-level strategies for sustaining and safeguarding competitive advantage. However, it has performed less well with respect to understanding how and why certain firms build competitive advantage in regimes of rapid change. To address this problem, recent research has developed the *dynamic capabilities* (Teece et al., 1997) approach to analyze the sources of wealth creation and capture by firms operating in environments of rapid technological change. Dynamic capabilities constitute a set of elements that bestow upon organizations the "ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments".

Dynamic capabilities should not be confused with functional competencies. Though relying on 'competence blocs', that is, functional competencies and purposive combinations of resources that enable tasks or operational activities (e.g. logistics and manufacturing), dynamic capabilities refer to the ability to revamp functional competencies. Research distinguishes between dynamic capabilities that connote change (first-order), and functional (zero-order) competencies (King, Tucci, 2002, Winter, 2003).

Dynamic clustering aggregates SMEs from different industrial sectors, involved in different processes, operating in different markets. The advantage is that the resulting dynamic clustered activity is more responsive and enjoys a steep learning curve. The knowledge base and competence mix in the dynamic cluster determine the speed and level of the response as well as the necessary structural changes (e.g. industrial culture, internal and external processes, relationships) many of which could not be possible to achieve for an SME operating in a standalone way.

This knowledge-based view of clusters is incorporated in our approach and underlies its conceptual underpinnings. Our research examines how changes inside a cluster (e.g. changing or adding a key new partner) can bring significant changes in the ability to respond to emerging market opportunities. This involves a knowledge-transfer process. Let's consider, for example, a cluster specializing in producing mechanical parts and tools for the automotive sector. They decide to respond to a tender from an aerospace company, and, because they lack some necessary skills, they decide to include in the cluster a supplier operating in the aerospace sector. The added competence of this new partner gives the cluster the possibility not only to access the new market place, but to learn 'by immersion' in a new industrial environment.

This 'immersion learning' is generated not only from the new partner, but also from all the players in the aerospace environment, i.e. customers, competitors, suppliers, the regulatory agencies and other regional government bodies, etc. Thus, in a short period of time, the cluster learns and evolves into a 'new' type of cluster that now can operate in a new sector. Repeating this process several times improves the dynamic capabilities and thus the flexibility of the cluster to innovate, incorporate new

technologies and access new markets.

The novelty of this approach is that it develops a theoretically grounded framework for *extended and dynamic clustering*, which provides a better understanding of SME's current barriers to market (organizational, technological, legal, regulatory/policy), tests the hypothesis that dynamic clustering contributes to market access, identifies the factors that enable or impede it, and describes requirements on existing and emerging technology platforms in order to lower the technology-related access barriers.

Reconfiguration of existing competencies

Reconfiguration of existing competencies and their application for innovation and market access is generally viewed as the ultimate outcome of dynamic capabilities. Most studies in the dynamic capabilities literature stress the importance of reconfiguring existing resources into new configurations of functional competencies. For instance, research has drawn attention to the concept of 'reconfigurability' which refers to the timeliness, speed and efficiency by which existing resources can be reconfigured (Galunic, Rodan, 1998; Zott, 2003). The concept refers also to the concept of 'combinative capabilities' (Kogut, Zander, 1992) that describes the novel synthesis of existing resources into new applications. Reconfigurability has also been referred to as the ability to "quickly reconfigure resources into the right combinations at the right scale to address shifting market opportunities" (Eisenhardt, Brown, 1999).

Applied to extended clusters, the concept of *dynamic capabilities* implies that SME networks can re-deploy their existing (often outdated) competencies to build new products or services through innovative, aggregated competencies that better match emerging market and technological needs.

The dynamic capabilities and related literature streams describe four processes that drive reconfiguration, innovation, and change. These are as follows:

- *Sensing the environment:* Sensing helps understand the environment a company operates in, identify market needs, and spot new opportunities (Zahra, George, 2002).
- *Learning*: Learning builds new thinking in the key operational lines of a company, generates new knowledge, and enhances existing resources (Zollo, Winter, 2002).
- *Coordinating activities*: Coordinating helps effectively allocate resources to the different activities of a company, assign tasks, and synchronize activities (Teece et al., 1997).
- *Integrating resources*: Integrating resources helps implement the new architectural innovations by developing the patterns of interaction (Grant 1996, Henderson and Clark, 1990).

The above four tangible enabling processes can be operationalised and measured. Research proposes the use of the four dimensions discussed above in the context of ICT, namely market orientation, absorptive capacity, coordination capability and collective mind, this time not from the standpoint of ICT use bur from that of valorization (Pavlou, El-Sawy, 2005). These dimensions originate from different streams of literature and have been studied at different levels and units of analysis. The methodological challenge is to adapt and extend these constructs to units of analysis appropriate for cluster / business network research.

While dynamic capabilities can reconfigure all resources (Prahalad, Ramaswamy, 2004), it is important to stress the nature of knowledge as an intangible resource (Galunic, Rodan, 1998; Glazer, 1991). This introduces a certain liquidity and fungibility to knowledge-based assets. Indeed, as resources become increasingly less tangible, visible, and explicitly codified, they tend to become easier to reconfigure (Leonard-Barton, 1992).

Dynamic capabilities thus reflect 'the ability to learn new domains' (Danneels, 2002). Hence, their value lies in the configurations of functional competencies they create (Eisenhardt, Martin, 2000, Zott, 2003). For example, by spotting market trends and accordingly revamping functional competencies, dynamic capabilities can prevent rigidities (Leonard-Barton, 1992) and competency traps (March, 1991). Also, by replacing outdated configurations of functional competencies and architecting more relevant ones, dynamic capabilities can create better matches between the new configurations of functional competencies and environmental conditions (Teece et al., 1997).

Typology of extended and dynamic clustering

So what is the conceptual specificity of this approach to the understanding of clustering? One way to understand the concept of *extended and dynamic clustering* is to position it against traditional forms of business agglomeration and regional constellations of what we have called 'traditional' cluster, e.g. industrial clusters and business networks. The diagram in Figure 2 shows the two dimensions that characterize this evolved cluster form.

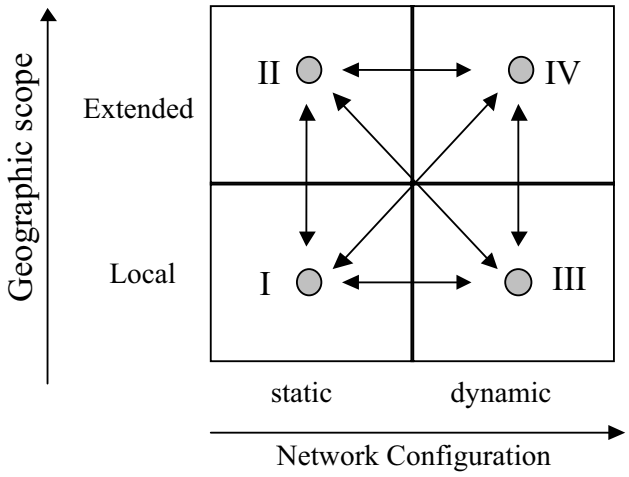

Figure 2. The extended and dynamic approach to cluster analysis

The horizontal 'network configuration' dimension is based on the typology found in the literature on business networks that differentiates *dynamic* from *static* networks (Miles and Snow, 1986, 1992). The vertical dimension

represents the 'geographic scope' (operations space) of a given 'virtual' or 'extended' cluster. This dimension can be operationalised essentially as the geographic distance between and across firms that collaborate across geographies. In practice, it may be useful to differentiate between local, regional, national, and transnational domains. This differentiation is particularly important for governance. The governance issues and potential policy recommendations are likely to differ at local, regional, national and supra-national level which has policy and management implications for *extended and dynamic clustering*.

Extended and dynamic clustering and economic development implications

Extended and dynamic clustering development and management are important because they create economic benefits that 'traditional' clusters cannot offer. The benefits of *extended and dynamic clustering* come in three dimensions:

- First, companies can operate with a higher level of efficiency, drawing on an extended geographical basis on specialized assets and suppliers with shorter reaction times than they could in isolation or through 'traditional' cluster approaches.
- Second, companies and research institutions can achieve higher levels of innovation in light of the global redesign of R&D strategies of multinational groups. Knowledge spillovers and the close interaction with customers and other companies create more new ideas and provide intense pressure to innovate while the cluster environment lowers the cost of experimenting.
- Third, *extended and dynamic clustering* introduces flexibility into the process of regional economic adjustment while enhancing the potential of greater business formation. Start-ups are more reliant on external suppliers and partners, all of which they find in an *extended and dynamic clustering* environment.

These benefits are important both for cluster participants and for public policy. For companies, they create additional value that outweighs often-higher costs of more intense competition for specialized real estate, skills, and customers at the location. They are thus the reasons that clusters emerge naturally from profit-maximizing decisions. For public policy, higher productivity and innovation in clusters are critical because they are the factors that in the long term define the sustainable level of prosperity in a region. The interests of these groups are not identical: Public policy is not concerned about the distribution of the cluster benefits among companies, employees, and owners of critical assets such as real estate, while company owners clearly are.

The performance of a cluster at a specific location is driven by the business environment that the cluster is operating in. "Business environment" is a broad and vague term: almost everything – from the quality of the schools to the strategies of local competitors – matters for the level of productivity and innovation that companies in the cluster reach at this specific location.

For many practitioners the motivation to look at clusters is not the analysis of an empirical phenomenon; it is the potential to develop a new approach for economic policy that can help develop regional and national economies. It is important to keep these two aspects of research separated. There is increasing evidence and agreement among researchers that clusters exist and that they feature a number of positive economic effects. There is less evidence and agreement on what exactly the role of policy is and should be and whether it can generate value by speeding up the process of cluster development or increasing the effectiveness of existing clusters. In this context what is needed is a conceptual model for economic policy supportive of *extended and dynamic clustering*. This model would be based on knowledge about existing clusters to identify a set of procedures and activities to be applied when conducting economic policies involving clusters.

For many practitioners, the evidence on the economic benefits of clusters suggests that they should focus on policies that create or support clusters. For many economists, this triggers concerns about the distorting effects of interventions into markets. Nonetheless, there is an underlying economic rationale for cluster-based economic policy that is consistent with standard economic models. This rationale runs as follows: first, the externalities that give rise to clusters indicate the presence of multiple equilibria with different levels of prosperity, not only in different locations but also for the sum of all locations. Policy has a role in pushing locations towards more favorable equilibria. Second, these externalities do not occur automatically but can be triggered or strengthened through purposeful political action. Third, the time it takes for a region to reach its 'equilibrium' state is not set and can be significantly influence by policy.

This rationale has direct implications for some of the key questions that practitioners ask. First, can clusters be created? Based on the available evidence on cluster evolution it seems that the answer is yes (Sigurdson, 2004; OECD, 2007). However, this answer is about as relevant as the answer to the question of whether subsidies can create employment: the more important question is whether the resources spent to create a cluster generate economic value higher than their opportunity cost, and whether the cluster is sustainable once the initial support is removed. The evidence is largely negative, suggesting that cluster creation is a very long and costly process with a high failure rate that for many regions does not pay off and creates long-term dependency on government funds.

Second, which clusters and clustering practices should be targeted for policy support? This question gets to the heart of the confusion of cluster-based economic policy with (strategic) industrial policy. These policies are based on fundamentally different views on the ultimate drivers of economics prosperity. Industrial policy suggests that a few sectors of the economy are inherently more important than others. These sectors, characterized by strong positive externalities (or industry-wide economies of scale), should be targeted to secure their location in a specific country or region. Targeting takes the form of interventions into the competitive process, for example (temporary) trade

barriers or government subsidies, to increase market share.

Cluster-based economic policy suggests a different perspective. First, *all* clusters are important, not only traded or high-tech sectors. The productivity across all of them determines the standard of living a country or region can sustain. Second, cluster efforts are not about targeting but rather about the creation of favorable ecosystemic conditions for development. Given the limitations of resources in different regions it makes sense to concentrate on a few clusters that have both a high ability to succeed and a high willingness to improve at any point in time. But this selection must be driven by the specific regional circumstances, not by some generic view on which clusters are more valuable. Third, cluster efforts are directed at improving the underlying conditions for higher levels of productivity and innovation, not the outcomes in terms of market share or employment directly, even though these latter are usually at the core of government's intervention in the formation and regulation of clusters (Ketels, Sölvell, 2006).

A more productive way to approach *extended and dynamic clustering*-based policy is to think through the concept of 'enabling framework'. Such a framework is focused on removing the most serious bottlenecks for cross-border and cross regional clustering practices in ways that enhance market access and the innovation capacities of cluster participants. This approach is driven by an underlying model of economic development that views clusters as living systems evolving over time depending on the profile of their business environments, the composition of the economic base in which they exist, and other factors driven by location and history. Policy in this context is not the result of some blueprint but rather a function of a non-deterministic assessment of the development trajectory of a given cluster with objective to optimize its positioning as a 'hub' within a value chain that is globally defined.

This approach should not be seen as an evolution of traditional sectoral policy but rather as a new model for regional economic development policy. In the context of *extended and dynamic clustering* existing clusters have a significantly higher potential than just being the motivation for well-intentioned cluster initiatives that are innovative but often isolated and with little sustained impact. To improve a location's competitiveness, all elements affecting the context for productivity and innovation in individual firms and clusters have to taken into account.

Conclusions

In this article we have defined the concept of *extended and dynamic clustering.* The convergence of forces such as the completion of the Single Market in the EU, the process of globalization, especially the global strategies of multinationals in the organization and location of production and R&D processes, and the deepening use of ICT in economic and business practices, among others, has brought about a structural break in the theory and practice of clusters as these have been defined hitherto.

Currently, due to size, scale, specialization and not least regulatory and legal impediments, SMEs in the EU lack the capacity to respond adequately to emerging challenges from international locations and market opportunities, or participate in tenders in international procurement contracts. This shortcoming is related to both the conditions that SMEs face and the restrictions associated with 'traditional' geographically defined regional clusters.

In this context we need novel approaches to both theory and practice which through constructive dialogue with traditional approaches to cluster analysis develop new conceptual dimensions that encapsulate the key aspects of this new phase and better enable all cluster stakeholders address the challenges confronted by regional economies. This requires a change of perspective where clusters are no longer seen as regionally bound constellations nurtured by regional economic systems but rather as 'hubs' within a global system of flows of information, knowledge and economic activity. This is what the concept of *extended and dynamic clustering* is designed to capture.

Extended and dynamic clustering benefits are important both for cluster participants and for public policy. For companies, they create additional value that outweighs the often-higher costs of more intense competition for specialized real estate, skills, and customers at the location. They are thus the reasons that clusters emerge naturally from profit-maximizing decisions. For public policy, higher productivity and innovation in clusters are critical because they are the factors that in the long term define the sustainable level of prosperity in a region.

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Takis Damaskopoulos, Rimantas Gatautis, Elena Vitkauskaitė

Smulkių ir vidutinių įmonių tęstinė ir dinaminė klasterizacija

Santrauka

Klasteriai ir klasterizacija sulaukia vis didesnio Europos politikų dėmesio. Vienas iš veiksnių, skatinančių šiuos procesus, yra noras paspartinti įmonių vystymąsi, inovacijų plėtrą ir konkurencingumą – tai, ką Europos lyderiai apibrėžė ES Lisabonos strategijoje. Šiame kontekste klasteriams ir klasterizacijai neabejotinai skiriamas pirmumas ir išskirtinis dėmesys.

Kitas veiksnys, skatinantis augantį domėjimąsi klasteriais, yra - globalizacijos įtaka konkurencijos prigimčiai ir intensyvumui. Mažėjantys transporto ir komunikacijų kaštai bei rinkų liberalizacijos priemonės verčia vis daugiau ES regionų susidurti su globalinės konkurencijos pasekmėmis. Didėjanti liberalizacija ir stiprėjanti konkurencija sukelia pokyčius verslo aplinkoje ne tik regioninės mikroekonomikos kontekste, bet ir platesnėje socialinėje ir ekonominėje aplinkoje, kurioje regionas funkcionuoja. Pasaulyje gausėjant regionų ir įvertinant itin palankiomis sąlygomis investuoti pasižyminčius Rytų Europoje ir Azijoje šalių regionus, ES regionai susiduria su neišvengiama būtinybe sukurti išskirtinę vertę įmonėms, ieškančioms vietos savo veiklai plėtoti. Būtent ši vertė atlieka svarbų vaidmenį priimant sprendimą, kur plėtoti įmonės veiklą. Klasteriai tiek nacionaliniu, tiek regioniniu požiūriu traktuojami kaip viena iš pagrindinių priemonių galinčių pasiūlyti pridėtinę vertę įmonėms išnaudojant regiono galimybes. Vyrauja nuostata, jog klasteriai suteikia aukštesnę vertę įmonėms, veikiančioms atskirose pramonės šakose, kartu gerokai padidindami vietovės santykinį regionų pranašumą (Ketels, Sölvell, 2006, OECD, 2007).

Pagrindinis atliekamo tyrimo tikslas yra išanalizuoti *tęstinę ir dinaminę klasterizaciją* bei jos formas. Klasterizacijos terminas apibrėžia įmonių grupes, kurios pasižymi šiomis savybėmis – nors jos priklauso tam tikrai geografinei vietovei, tačiau peržengia jos ribas; įmonių grupės yra orientuotos į globalias rinkas; jos veikia sistemingai bei turi galimybes veikti kaip *ad-hoc* verslo tinklai, galintys perkonfigūruoti ir pergrupuoti kompetencijas priklausomai nuo rinkos poreikių; jos yra informacinių ryšio technologijų (IRT) įgalintos ir yra grindžiamos dinamiškomis ekonomikos subjektų galimybėmis; dažniausiai smulkios ir vidutinės įmonės (SVĮ) sudaro šių grupių pagrindą.

Tyrimo hipotezė teigia, kad šios naujos organizacinės grupės gali padėti SVĮ pagerinti įėjimo į globalias rinkas galimybes bei SVĮ inovatyvumo ir verslumo gebėjimus.

Pasirinkti *tyrimo metodai* yra sisteminė, loginė ir lyginamoji analizė.

Siekiant įvertinti tęstinės ir dinaminės klasterizacijos galimybes, būtina suprasti SVĮ klasterizacijos elgseną reguliuojančias valdymo struktūras ir veiksnius, sąlygojančius SVĮ galimybes pasiekti konkurencingesnes ir globalias rinkas. „Rinkų pasiekiamumas" suprantamas ne tik kaip tarptautinio ar globalaus marketingo ar rėmimo veiksmai, tačiau ir kaip sąlygos, kurios įgalina ir palengvina bendrus įmonių tyrimus, bendras prekių ar paslaugų vystymo galimybes ir plėtrą, gamybą, paskirstymą ir prekių bei paslaugų pristatymą, taip pat atsaką į viešųjų ir privačių organizacijų poreikius.

Tęstinė ir dinaminė klasterizacija apima SVĮ parinkimo ir grupavimo galimybes regioniniu, nacionaliniu, tarpregioniniu bei tarptautiniu lygiais, peržengiant regionines-geografines ribas ir operacinius „tradicinių" klasterių apribojimus. Šiuo požiūriu tęstinė ir dinaminė klasterizacija yra siejama ne su vienos pramonės šakos dominavimu klasteryje, bet su įvairių tarpšakinių ryšių kūrimu ir jų valdymu.

Pažymėtina, jog šiuo metu SVĮ dėl dydžio, veiklos pobūdžio, specializacijos ir teisinių kliūčių vis dar negali iki galo išnaudoti tarptautinių ar vietos rinkų galimybių bei dalyvauti tarptautiniuose ar nacionaliniuose viešųjų pirkimų konkursuose. Šis trūkumas yra susijęs su SVĮ veiklos sąlygomis ir apribojimais, susijusiais su „tradiciniais" geografiškai apibrėžtais regioniniais klasteriais.

Nagrinėjant klasterizaciją, ypatingas dėmesys skiriamas IRT panaudojimui. Būtent IRT yra traktuojamos kaip „erdvinės ekonomikos" nuostatas griaunanti priemonė, kuri savo ruožtu siūlo alternatyvius

organizacinio mokymosi ir inovacijų skatinimo būdus. Atliekamame tyrime klasteriai traktuojami kaip virtualios organizacinės socialinės-ekonominės sistemos, sudarančios prielaidas tolimesniam įvairiapusiam šių sistemų vystymuisi. Būtent šiame kontekste IRT atlieka svarbų vaidmenį kaip klasterizacijos priemonė. Kaip IRT gali panaikinti tradicinius bendradarbiavimo būdus, pereidama prie virtualios partnerystės ir bendradarbiavimo? Kokia yra geriausia fizinių ir virtualių bendradarbiavimo elementų kompozicija, leidžianti pasiekti klasteriui geriausią ekonominę-socialinę naudą? Neabejotina, jog, ieškant atsakymo į šiuos klausimus, klasterio kaip sistemos, kuriančios ekonominę-socialinę vertę savybės labai priklauso nuo IRT sprendimų taikymo.

Nagrinėjant *testinę ir dinaminę klasterizaciją,* išskiriamos *vidinės* sąlygos (specifinės SVĮ) ir *išorinės* sąlygos (specifinės klasteriams bei nepakankamiems tarpšakiniams ir tarpregioninio bendradarbiavimo mechanizmams tarp klasterių), kurių koegzistencija ir dinamiški tarpusavio santykiai sukuria *tęstinės ir dinaminės klasterizacijos* prielaidas. Iš šių dviejų perspektyvų esminis iššūkis vertinant klasterizacijos plėtros galimybes yra atsakymas į klausimą - kaip palengvinti *tęstinę ir dinamnę klasterizaciją* ne tik tarp atskirų SVĮ konkrečiame klasteryje, bet ir kaip sukurti atitinkamas plėtros galimybes tarp regioninių klasterių ir SVĮ tinklų. Kitais žodžiais tariant, *vidinis* klasterizacijos aspektas yra susijęs su *privačiais* verslo iššūkiais, su kuriais susiduria SVĮ, o *išoriniai* klasterizacijos aspektai yra susiję su *regioniniais ar nacionaliniais ekonominiais sprendimais*, kurie palengvina tarpšakinį ir tarpregioninį bendradarbiavimą tarp SVĮ klasterių ir tinklų.

Vertinant tęstinės ir dinaminės klasterizacijos tęstinumo dimensiją, svarbu išanalizuoti IRT poveikį įmonės veiklai rinkoje šiais aspektais:

- Rinkos orientacija;
- Absorbcinės savybės;
- Koordinavimas;
- Kolektyvizmas.

Rinkos orientacija atspindi sugebėjimą „jausti" aplinką bei suprasti ir patenkinti vartotojų poreikius dinaminės konkurencijos sąlygomis. Rinkos orientacija apibrėžiama kaip procesas, kuris „generuoja, skleidžia ir pateikia atsakymus į klausimus apie vartotojų poreikius" (Kohli, Jaworski, 1990). IRT panaudojimas tęstinės klasterizacijos kontekste siejamas su šiais aspektais:

- Kaip IRT panaudojama rinkos „sekimui"?
- Kaip IRT gali užtikrinti informacijos sklaidą tarp klasterio įmonių?
- Kaip IRT gali padėti analizuoti ir interpretuoti duomenis?

Absorbcinės savybės siejamos su „sugebėjimu mokytis identifikuojant, įsisavinant, transformuojant ir panaudojant žinias tam, kad būtų kuriamos naujos žinios" (Cohen, Levinthal, 1990; Zahra, George, 2002). Šiame kontekste IRT yra svarbus kaip priemonė, įgalinanti įgyti žinių, jas transformuoti ir t.t.

IRT vaidmuo koordinavime siejamas su sugebėjimu suderinti tarpusavio priklausomybę ir įgyvendinimą tarp atskirų išteklių ir užduočių (Crowston, 1997; Malone, Crowston, 1994).

Kolektyvizmo aspektas siejamas su sugebėjimu „integruoti skirtingus požiūrius, išlaikant identiškumą, bendradarbiavimą ir subordinaciją grupėje arba sistemoje" (Weick, Roberts 1993).

Nagrinėjant dinamiškumo aspektus, tęstinės klasterizacijos perspektyvoje analizuojama SVĮ grupių ir tinklų galimybės greitai ir efektyviai perkonfigūruoti savo sugebėjimus kuriant naujas prekes ar paslaugas. Mokslinėje literatūroje išskiriami keturi veiksniai, sąlygojantys konfigūracijos procesą:

- Aplinkos skanavimas – padedantis analizuoti ir suprasti aplinką, identifikuoti rinkos poreikius bei naujas galimybes (Zahra, George, 2002);
- Mokymasis – sukuriant naują požiūrį į verslo operacijas ir naujus verslo modelius; generuojantis naujas žinias bei pritraukiantis naujų išteklių (Zollo, Winter, 2002);
- Veiklos koordinacija – padedanti efektyviai paskirstyti užduotis tarp atskirų struktūrinių vienetų bei sinchronizuoti užduočių įgyvendinimą (Teece ir kt., 1997);
- Išteklių integracija – padedanti sujungti išteklius kuriant inovacijas, grindžiamas naujomis įmonių tarpusavio sąveikos formomis (Grant 1996, Henderson, Clark, 1990).

Tęstinės ir dinaminės klasterizacijos vystymas ir vadyba yra svarbūs kadangi jie kuria ekonominę naudą, kurios „tradiciniai" klasteriai negali pasiūlyti. *Tęstinės ir dinaminės klasterizacijos* nauda išreiškiama trimis dimensijomis:

- Pirma, įmonės tokio pobūdžio klasteriuose gali veikti efektyviau negu jos veiktų izoliuotos ar per „tradicinio" klasterio požiūrį;
- Antra, įmonės ir tyrimų institucijos gali pasiekti aukštesnį inovacijų plėtros intensyvumą, kuris bus sąlygojamas globalių ar multinacionalinių grupių bendra veikla. Žinių susiliejimas, artimas bendravimas su vartotojais bei kitomis įmonėmis sukuria daugiau naujų idėjų ir lemia „intensyvų spaudimą" inovacijoms, o tęstinė ir dinaminė klasterio aplinka sumažina eksperimentų sąnaudas;
- Trečia, *tęstinė ir dinaminė klasterizacija* suteikia regioninės ekonomikos prisitaikymo procesams lankstumo, padidina verslo formavimo potencialą. Naujos įmonės labiau priklausomos nuo išorinių tiekėjų ir partnerių, kuriuos visus randa *tęstinės ir dinaminės klasterizacijos* aplinkoje.

Šiame kontekste sukuriama nauda yra svarbi tiek klasterio dalyviams, tiek institucijoms, formuojančioms viešąją politiką. Įmonėms ji kuria pridėtinę vertę, kuri dažnai atsveria dėl intensyvesnės konkurencijos atsirandančius aukštesnius kaštus (pavyzdžiui, dėl specializacijos). Tai patvirtina nuostatą, jog priežastys, dėl kurių natūraliai atsiranda klasteriai, – pelno didinimas. Viešajai politikai aukštesnis produktyvumas ir inovatyvumas klasteriuose taip pat yra gyvybiškai svarbūs, nes tai veiksniai (ir rodikliai), ilguoju laikotarpiu apibrėžiantys regiono klestėjimo lygį. Šių grupių interesai nėra identiški: viešoji politika nesidomi klasterio naudos paskirstymu tarp įmonių, darbuotojų ar turto (kaip kad nekilnojamojo) tarp savininkų, kai tuo tarpu įmonių savininkai tuo akivaizdžiai domisi.

Raktažodžiai*:* *IRT ir klasterizacija, tęstinė ir dinaminė klasterizacija, regioninė politika, inovacijos.*

The article has been reviewed.

Received in December, 2007; accepted in February, 2008.

DOI: 10.5755/j01.ee.56.1.11517