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REGIONAL CLUSTER DEVELOPMENT
IN EUROPEAN UNION AND CROATIA

This paper investigates the main characteristics of regional clusters in EU-27 and Croatia. The main research question is: what characterises regional clusters in EU-27 and Croatia, and what are the main tendencies in cluster development? The research shows that clusters in EU-27 and Croatia differ in many dimensions: the reason they arise, the type of products and services they produce, their stage of development, and the business environment that surrounds them. The study concludes that in agricultural clusters the highest number of employees is in the region of the Mediterranean Spain, and in construction clusters, IT, tourism and hospitality clusters and transportation and logistics clusters it is in Italy. The majority of clusters in Croatia function in manufacturing and agriculture, have more than 500 employees (40%), are mainly financed by membership (68%), and produce for Croatian market (72%).

Keywords: regional clusters; cluster development; industrial activity; Croatia; EU 27.

JEL classification: L10, L25.

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РОЗВИТОК РЕГІОНАЛЬНИХ КЛАСТЕРІВ У ЄС І ХОРВАТІЇ

У статті досліджено основні характеристики регіональних кластерів у 27 країнах-членах ЄС і в Хорватії. Основні питання дослідження: що характеризує регіональні кластери в 27 країнах ЄС і в Хорватії, які основні тенденції розвитку кластерів? Дослідження показує, що кластери в ЄС і Хорватії відрізняються за багатьма параметрами: причинами появи, типами продуктів і послуг, стадіями розвитку, бізнес-середовищем. Зроблено висновок, що в сільськогосподарських кластерах найбільша кількість працівників — в регіоні середземноморської Іспанії, а в будівельних, ІТ, туристичних і готельних, транспортно-логістичних кластерах — в Італії. Основна частина кластерів у Хорватії функціонують у промисловості і сільському господарстві, мають більше 500 робітників (40% від загальної кількості), в основному вони фінансуються членськими внесками (68%) і виробляють продукцію для хорватського ринку (72%).

Ключові слова: регіональні кластери; розвиток кластерів; промислова діяльність; Хорватія; ЄС-27.

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РАЗВИТИЕ РЕГИОНАЛЬНЫХ КЛАСТЕРОВ В ЕС И ХОРВАТИИ

В статье исследованы основные характеристики региональных кластеров в 27 странах-членах ЕС и в Хорватии. Основные вопросы исследования: что характеризует региональные кластеры в 27 странах ЕС и Хорватии, каковы основные тенденции развития кластеров? Исследование показывает, что кластеры в ЕС и Хорватии отличаются по многим параметрам: причинам появления, производимым типам продуктов и услуг, стадиям развития, бизнес-среде. Сделан вывод, что в сельскохозяйственных кластерах наибольшее количество работников — в регионе средиземноморской Испании, а в строительных, ИТ, туристических и отельных,

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транспортно-логістических кластерах — в Італії. Основна частина кластерів в Хорватії функціонують в промисловості і сільському господарстві, мають більше 500 робочих (40% від загального числа), в основному вони фінансуються за рахунок членських внесків (68%) і виробляють продукцію для хорватського ринку (72%).

Ключові слова: регіональні кластери; розвиток кластерів; промислова діяльність; Хорватія; ЕС-27.

1. Introduction. A regional cluster approach is becoming increasingly recognised as a valuable tool to foster economic development. Therefore, the interest in regional clusters and their role in economic development has grown substantially over the last several years. Even though it is still a new phenomenon as an economic development strategy, there is a number of European cluster success stories showing that significant positive effects can be achieved when implementing cluster concepts in a consequent manner. One key to understanding clusters is to recognize that there are multiple dimensions to cluster relationships, including geography, social distance, technology and production flows (Cortright, 2006, 4). Yet many policymakers and practitioners have only a limited understanding of what regional clusters are and where they are mostly developed. Therefore, this paper reviews the academic literature on regional clusters, firstly, giving their most popular definitions, and secondly, explaining their main risks and benefits.

The research analysis in this paper investigates the main characteristics of regional clusters in the EU27 and Croatia. The research is especially valuable, because there are rather few scientific articles written about clusters in Croatia. The sources for the data are the databank of the European Cluster Observatory¹ and the last survey on clusters in Croatia, "Clusters in Croatia in 2009". The European Cluster Observatory gives information and analysis of regional clusters and cluster policy in Europe. It is based on a fully comparable and consistent methodology². The "Clusters in Croatia in 2009" is the most recent survey about clusters in Croatia, conducted by entrepreneur incubator BIOS from Osijek and the agency for market research and public opinion "Audeo" at the end of 2009.

The paper is divided into 5 parts. After the introductory part, the second part of this article explains the concept and some facts on regional clusters and indicates regional clusters benefits and risks. Descriptive analysis of regional clusters in Europe follows in the third part. The fourth section explains the development of regional clusters in Croatia and examines their difference in relation to European ones. Conclusions regarding the regional clusters are drawn in the fifth section.

2. Theoretical background. Regional clusters have attracted growing interest of both academics and policy-makers during the last decades. In the 1970s and 1980s clusters established a strong position in the world market for both more traditional products (e.g., "Third Italy") and high technology products (e.g., information tech-

¹ Online platform - <http://www.clusterobservatory.eu/index.html>, accessed 15 March 2012 .

² The purpose of the observatory is to inform policy makers and government officials at the European, national, regional and local levels, cluster practitioners, academics and researchers, throughout the world about European clusters, cluster policies and cluster initiatives. It provides data and analysis on clusters and competitiveness, a cluster library, and a classroom for cluster education, also produces analysis and reports on regional competitiveness conditions, transnational cluster networks, clusters in emerging industries and studies on better practices in cluster organisations. <http://www.clusterobservatory.eu/index.html> Accessed 15 March 2012 .

nology cluster Silicon Valley, automotive clusters in Southern Germany and Detroit, telecom clusters in Stockholm and Finland). During the 1990s clusters were widely recognized as an important setting in stimulating the productivity and innovativeness of companies and the formation of new businesses (European Commission, 2002, 9). In global economy, which boasts rapid transportation, high-speed communication, and accessible markets, one would expect location to diminish in importance (Aristovnik and Pungartnik, 2009). But Belleflamme, Picard and Thisse have shown that the impact of localization economies rises as transport costs between regions fall. The formation of regional clusters seems to obey the same general principles: "full or partial agglomeration of firms into one region occurs when transport costs are low, when products are differentiated enough, and when localization economies are strong" (Belleflamme et al., 2000, 161).

2.1. Definitions of Regional Clusters. Regional clusters refer to geographically bounded concentrations of interdependent firms, and may be used as a catchword for older concepts like industrial districts, specialised industrial agglomerations and local production systems. Regional clusters are limited geographical areas with a relatively large number of firms and employees within a small number of related industrial sectors. Thus, clusters specialize in a small number of industries (European Commission, 2002, 9-13). Regional clusters arise in the presence of the so-called Marshallian externalities, which states that firms benefit from production and innovation activities of neighbouring firms in the same and the related industries. There is an abundant evidence that such externalities exist and lead to industry-level agglomeration (Rosenthal and Strange, 2004).

Porter employs a somewhat wider meaning of clusters, as "geographic concentrations of interconnected companies and institutions in a particular field" and Parker's definition consider a regional cluster as "a concentration of "interdependent" firms within the same or adjacent industrial sectors in a small geographical area" (European Commission, 2002, 13). The rationales for geographic concentration of industries into regional clusters have been explored by a number of authors dating back to Weber (1929) and Marshall (1920). They include the presence of unique natural resources, economies of scale in production, proximity to markets, labour pooling, the presence of local input or equipment suppliers, shared infrastructure, reduced transition costs, and other localized externalities. Governance frameworks and the spatial nature of the benefits of clusters both play a role in the development and implementation of policies to effectively promote regional specialisation and clusters. For such programmes, there are economic justifications for all the levels of government (local, regional, national and in some cases supranational) to support them. These justifications are based on different perspectives on the value of clusters, for example, as the basis for the EU competitiveness policy or a national growth programme at macro-level versus as a local employment centre for regions (OECD, 2007, 14).

2.2. Clusters benefits and risks. Clusters offer a number of potential positive benefits, beyond lower production costs, that lead to innovation and productivity growth. The principal reason for policy interest in clusters is that productivity, wages and employment levels appear, at least in some cases, to be higher in these clusters than in the economy as a whole (OECD, 2007, 30). According to Porter, "regions compete in providing the most productive environment. It is not the industry that matters but the way the firm com-

petes, its use of the advantages that the local environment brings" (Porter, 1998, 82). Being part of a cluster allows companies operate more productively in sourcing inputs; accessing information, technology, and needed institutions; coordinating with related companies; and measuring and motivating improvement (Porter, 1998, 81).

Regional clusters entail both greater cooperation and greater competition among direct competitors than geographically dispersed industries. Greater cooperation in regional clusters can come about through the fact that there are simply more activities that firms in close proximity can share, such as bulk purchasing, joint infrastructure investments, environmental control and basic training, than can be shared by dispersed firms (Enright, 2001, 12-13). The success stories show that clusters, by increasing the competitiveness of individual companies, provide macroeconomic benefits, some of which are (European Commission, 2002):

— Raising attractiveness of regions — network and cluster establishments will help stimulate competence development within the region as well as motivating people not to migrate;

— Increasing need-orientation of business supporting services — effective clusters and networks that also strongly work in the field of research and development and will therefore work together with research institutes and universities. Therefore, they contribute to further development of regional competence and research infrastructure.

— Securing employment and fostering entrepreneurship — the production sector in Europe is a large provider of jobs and contributor to the GDP; much of this comes from SMEs supplying large producers.

The advantages of individual regional clusters may vary over time, but in general regional clusters allow certain flexibility in firm structure and in coordination of transactions and that these may progress with changes in technology, tastes, firm strategy, and competitive environment. They can exhibit greater levels of cooperation and competition than might be found among dispersed firms. Regional clusters can benefit from the presence of foreign multinationals and vice versa (Enright, 2002, 20).

A discussion of the benefits to specialisation and clusters would not be complete without mentioning the possible risks associated with a policy strategy in favour of clustering. The notion of risk has many dimensions. Regional economies based on small firms working in the same or related sectors can be vulnerable to market shocks that undermine simultaneously all firms in the cluster. Hub and spoke, platform and state industry clusters can also be seen as vulnerable if the core firm leaves or downsizes. Another form of risks is that firms in a cluster may become too inward looking or rigid, resulting in what are termed lock-in-effects (where major investments to support specific sectors or clusters make it difficult to adjust strategies to new circumstances later) because the cluster is less open to adaptation (OECD, 2007, 33). Enright concludes that in fact many regional clusters of firms and industries do not succeed and that many that do succeed for a time eventually fail. Therefore, he stresses 5 basic failure mechanisms: falling demand for a cluster's products, organizational obsolescence, competition from similar clusters, loss of the ability to coordinate activities, loss of internal dynamism (Enright, 2001, 15).

Porter's findings highlight the need for regional economic development policies to be particularly adjusted to traded clusters, because they not only support higher wages but also appear to drive local employment and especially local wages (Porter, 2003, 571).

Considering these mentioned clusters' benefits and risks, there are still many unanswered questions regarding the benefits and risks of the clusters themselves as well as the effectiveness and efficiency of cluster policies seeking to influence their development. The second part of our paper makes an overview of the European regional clusters existing today according to statistical mapping of regional clusters in the EU 27 countries.

3. European regional clusters. Over the last decade, there has been an increasing interest in regional cluster development in the EU, as regional clusters are considered to be the instrument that might foster innovation and competitiveness of enterprises. More specifically, research showed that enterprises within a cluster are among the most competitive in the national economy and also quite efficient in creating new employment. The great interest in regional clusters and initiatives for cluster development in the EU arises from experiences and studies of industrial districts in Italy. These areas are characterized by high concentration of very small (mainly traditional) companies in the processing industry, by a well-developed division of labour among local companies, and a high level of entrepreneurship (Dragicevic, Obadic, 2009, 4).

In particular, many industries of Northern Italy are mentioned as role models for regional clusters. Well-known clusters in Northern Italy are furniture and shoemaking in the Veneto region and ceramics in Emilia-Romagna. The second cluster stronghold is Austria. In the regions of Styria and Upper Austria regional economic development is entirely cluster-based. A particularly strong cluster in both regions is the automobile sector (European Commission, 2002, 13). Solvell, Ketels and Lindqvist have analyzed regional clusters within 10 European Union member states. Regions were defined according to the NUTS2 classification with a total of 41 regions. They identified 19 "three-star"³ regional clusters, 92 "two-star" regional clusters and 313 "one-star" regional clusters. The largest regional clusters in the EU10 included Warszawa (Poland) Financial Services with 74,000 jobs and Warszawa transportation and logistics cluster with 60,000 jobs. Budapest (Hungary) transportation and logistics cluster was also identified as large. Ostrava (Czech Republic) included over 50,000 jobs in metal manufacturing cluster. Metal manufacturing cluster was identified as the largest cluster in Slovakia and Slovenia, heavy construction services cluster in Lithuania, transportation and logistics cluster in Estonia and Latvia, and hospitality and tourism cluster in Cyprus and Malta (Solvell, Ketels and Lindqvist, 2008, 104-105).

The data for this part of the analysis are mainly taken from the European Cluster Observatory⁴. The statistical mapping of regional clusters has identified regional clusters in the EU's 27 countries, Bosnia and Herzegovina, Croatia, Iceland, Norway, Russia, Serbia, Switzerland, Turkey and Ukraine. The cluster mapping approach used involves measuring the effects that linkages and spill-overs have on a company's choice of location. Beyond cluster mapping, the European Cluster Observatory⁵ provides information on policies and programmes relating to clusters.

³ The largest and most specialized clusters receive 3 stars (Solvell, Ketels and Lindqvist, 2008, 104).

⁴ The European Cluster Observatory database is based on the regions and cluster sectors in Europe. The data is divided into 404 regions; mostly NUTS2 regions, NUTS1 regions in Ireland, Slovenia, Bosnia and Herzegovina and Croatia because of data availability, three of German regions and one Italian region are NUTS1 regions because the NUTS definitions have been changing over time, Russia and Ukraine are not covered by the NUTS classification and therefore for these countries the classification of local statistical offices is used. <http://www.clusterobservatory.eu/index.html> Accessed 28 March 2012.

⁵ <http://www.clusterobservatory.eu> Accessed 28 March 2012.

With the growing recognition that cluster-form organisations could help enhance the competitiveness and innovation capabilities of SMEs, the countries are more eager to support the creation and/or development of clusters, especially innovative ones. Innovation activity is mainly concentrated in the very core of Europe, a cluster of regions which includes Western Germany and most regions of Austria. There are also some other hot spots of innovation in the North and East of France, the South-East part of the United Kingdom, the Netherlands and in some Scandinavian countries, mostly Sweden. None or modest technological activity is documented in most regions of the South of Europe: Spain, Greece, Portugal and South of Italy. Innovative backwardness is also documented for some northern countries such as Norway and Ireland (Moreno et al., 2005, 720). Moreno and others conclude that more regions are obtaining output in the innovative activity at the beginning of 2000s than at the beginning of the 1980s. Their empirical investigation also suggests that innovation tends to cluster more in the sectors in which the neighbouring regions are also technologically specialised (Moreno et al., 2005, 734).

The EU Mediterranean region (Cyprus, Greece, Croatia, Italy, Mediterranean Spain, Mediterranean France, Mediterranean Portugal and Slovenia) was chosen to analyse the data of the European Cluster Observatory. It was analysed by the number of employees for 5 selected clusters in 2009: the agricultural products cluster, the construction cluster, the IT cluster, the tourism and hospitality cluster and the transportation and logistics cluster. The analysis has shown that in the agricultural products cluster the highest number of employees is in the region of the Mediterranean Spain, and in the construction cluster, the IT cluster, the tourism and hospitality cluster and the transportation and logistics cluster it is in Italy.

The analysis of European regional clusters shows that most European clusters are rather young. A large majority of them were created after 1970. Also most of the clusters are still growing. Many clusters have increased the number of employees over the last 10 years as well as a growing number over firms. The firms in the clusters can mainly be characterised as SMEs. In most cases SMEs are the dominating type of firms. Over the last 10 years this has been increasingly the case. Numerous activities in European clusters take place inside the geographic boundaries of the clusters. Most often applied R&D and supporting services are performed inside the clusters. Administrative and strategic activities (such as strategy formulation and logistics management) are also often carried out by firms in clusters. On the other hand, capital equipment production is carried out in very few clusters. Next part of our paper analyses the development of regional clusters in Croatia, which expansion mainly started after 2005.

4. Croatian regional clusters. To date, no systematic mapping of Croatian clusters has been done. The last survey on the clusters in Croatia, named "Clusters in Croatia in 2009.", was conducted by the entrepreneur incubator BIOS from Osijek and the agency for market research and public opinion "Audeo" at the end of 2009. So, the data used in this analysis are taken from this research.

Compared to European regional clusters, the nature of current cluster's form in Croatia (different structure of linked Croatian companies) is of recent date. The majority of clusters are established in the period between 2006 and 2009. More than a half of clusters that have participated in the BIOS study are established in 2006 and

2007 period in which the formation of clusters was strongly encouraged by the central government. Croatian clusters vary by the number of employees. The most numerous category is above 500 employees (40% of all). The minimum total number of employees in one cluster is 20, while the companies in the largest cluster employ 3 400 people. Average number of employees per cluster in Croatia is 260. Total number of employees is not highly correlated to the number of firm members. The largest clusters in the total number of employees have an average number of members, there are clusters that have a large number of members but do not employ large number of people. The largest number of clusters decided to organize in the form of association (52%).

As clusters vary by type of products and services they produce and business sector where they are performing, they also differ by main activities they perform. Inside a cluster different activities are present. The most common forms of joint activities within clusters in Croatia are:

- Exchange of information among members (all clusters);
- Joint promotion (84%);
- Lobbying (80%).

Joint procurement and distribution and opening of joint offices in the country and abroad are rarely present, but clusters are planning to start these activities in the future. The collaboration between clusters and other organizations should be still improved. The next table shows what activities are managers of single clusters planning to do in the near future and how industrial activities in the clusters are performed (Table 1).

Table 1. Cooperation with other clusters

Type of activity	YES	NO, but we are planning in the next several years	NO, and we are not planning
Conferences and seminars	48.0%	40.0%	12.0%
Information exchange	56.0%	40.0%	4.0%
Joint media appearance	16.0%	52.0%	32.0%
Lobbying	20.0%	72.0%	8.0%
Joint approach to new market	4.0%	76.0%	20.0%
Common market research	0.0%	80.0%	20.0%
Technology transfer	8.0%	72.0%	20.0%

Source: BIOS (2009).

The majority of managers are cooperating with other clusters in the field of information exchange (56,0%) and conferences and seminars (48,0%), but in the next several years they are planning to cooperate in common market research (80,0%) and joint approach to new market (76,0%). They are not planning to cooperate in joint media appearance (32,0%). Most clusters in Croatia are financed by membership (68%) and central government budget support (60%), but generally they are using different sources for their financing. For example, they use commercial projects and local government support and, in smallest proportion, the EU funds. As the majority of clusters in Croatia are rather young (5 or less years), they are still mainly operating at the domestic market. With their development and higher stage of clusters life-cycle they are planning to expand their production and selling to other regional, primarily European markets and not mainly Croatian one (72%).

If Croatia wants to catch up as soon as possible with the European Union, which strives to become the most competitive and innovative region in the world economy, policy makers at different levels must involve clusters in their thinking. In such way, Croatian clusters should use more of the EU funds and develop more competitive products and services for European market.

5. Concluding remarks. The growing interest in academic and professional literature on regional clustering inspired this paper. Nowadays, regional clusters are everywhere, appearing in most economies and most types of industries. They make an important contribution to the world economy and provide paths to developing national and regional economies. The analysis of European clusters shows that innovative activity is relatively concentrated in few areas in Europe (Western Germany and most regions of Austria, the North and East of France, the South-east part of United Kingdom, the Netherlands and in some Scandinavian countries, mostly in Sweden). The analysis of European regional clusters shows that most of European clusters are rather young. The majority of them were created after 1970 and the development of regional clusters in Croatia began even later (mainly after 2005).

Our research selected the most dominated clusters in the EU-27 and Croatia: the agricultural cluster, the construction cluster, the IT cluster, the tourism and hospitality cluster and the transportation and logistics cluster. The investigation confirms that in the agricultural cluster the highest number of employees is in the region of the Mediterranean Spain, and in the construction cluster, the IT cluster, the tourism and hospitality cluster and the transportation and logistics cluster it is in Italy. Many clusters have increased the number of employees over the last 10 years as well as a growing number of firms. The majority of clusters in Croatia functions in manufacturing and agriculture, have more than 500 employees (40% of all), mainly are financed by membership (68%), and produce for Croatian market (72%). For future research, the aim is to extend this study in several dimensions. By analyzing time series, it should be possible to study how regional clusters evolve over time, and see which ones are on the rise and which are on the fall. Another extension is to include performance in the study, such as measures for export activity, productivity, patents, and other output measures.

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