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## THE QUESTION OF CLUSTERS IN LESS DEVELOPED AREAS. EMPIRICAL EVIDENCE FROM ROMANIA'S EASTERN REGIONS

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**THE QUESTION OF CLUSTERS IN LESS DEVELOPED REGIONS.  
EMPIRICAL EVIDENCE FROM ROMANIA'S EASTERN REGIONS<sup>#</sup>**

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**Abstract.** *Various research studies addressing the specific problems and difficulties in the underdeveloped regions in the transition countries from Central and Eastern Europe have identified possible reactions regarding appropriate economic and social policy measures. Some of them take into consideration the role of cluster initiatives as a response to poor competitiveness, low level of innovation, high levels of unemployment and out-migration of the highly-skilled labour force. Though, the simple presence of clusters in a less developed region does not automatically mean more competitiveness and prosperity. A series of policy measures meant to improve the frame conditions for business firms and overall regional development should accompany clusters formation, as a coherent package including economic, legal, institutional, infrastructure, cultural and socio-political elements. Starting from these overall considerations our paper brings into discussion the capacity of cluster policies to offer viable solutions to the Romania's Eastern regions, lagging behind the Western ones. First, an overall image of the clusters existing in the Eastern part of Romania is provided based on statistical methods, mainly location quotients, Gini and Herfindahl indexes of regional specialisation and industrial concentration and cluster analysis. Second, GIS techniques are employed in order to provide a spotlight on cluster identity, location and borders by means of spatial, thematic data at locality level. Performance indicators are also included, so as to get an image on clusters' contribution to the development of the corresponding local economies as well as the county and region economy. Third, based on these results, the interviews with business environment representatives and policy makers in the envisaged regions point out the clusters with the highest chances of success. Also, the best practices are discussed and connected with successful solutions from other Central and East European countries. They will be differentiated in accordance with the characteristics of the North-East and South-East regions, bearing in mind that, however, South-East region has a higher development level and different profile compared with North-East.*

**Keywords:** clusters, traditional industries, less developed regions, cluster policies, Eastern Romania

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## **1. Introduction**

In the last decades clusters have become a very attractive concept for the economic practice: they are approached as a key source of competitive advantage, mainly in relation with their capacity to be critical drivers of innovation, which is heavily concentrated from geographical viewpoint. As argued by the European Cluster Memorandum (European Cluster Alliance, 2007), clusters stimulate the emergence of new ideas in networks of cooperating business firms and institutions, lowering the barriers for transforming new ideas into businesses. In line with this overall orientation, the strong cluster support offered by the EU has been conceived in tight relation to those cohesion policy programmes aiming at fostering regional innovation and knowledge-based networks. Indeed, the last two decades have shown an enormous concern with science and innovation-based growth.

Nevertheless this “obsession with high-tech industries” has begun to encounter sharp criticism by several authors (e.g. Trippel, 2010, p.193), the idea that medium and low-tech industries can be also innovative and can provide substantial impulse to regional growth getting more attention. Even if systematic studies devoted to clusters in traditional, mid- and low-tech sectors and appropriate policies are much less numerous, empirical evidence about successful experiences is emerging in various countries. This issue has a specific significance to the less developed regions, usually confronted with economic structures dominated by mid- and low-tech industries. In our view it can become an interesting niche for the cluster-devoted research in the forthcoming years, the factors and the policies conducive to effective clusters in these regions requiring a deeper exploration.

This perspective is particularly important for the less developed regions in the transition and developing countries in Central and Eastern Europe. These countries have suffered a stressful and often painful process of economic restructuring and the initially lagging regions, where forced industrialization and urbanization in the communist period resulted in a more rapid development, have been the first affected by the transition process. At present they display big gaps in economic and social terms in comparison with both national, EU and other developed countries average. For instance, according to Eurostat, GDP per capita in 5 regions (NUTS 2) of Bulgaria, 4 of Hungary, 12 of Poland, 6 of Romania, etc. was below 50% of the EU average in 2007. Some of them, mainly from Romania and Bulgaria were even below one third of the EU average, their population being affected by a deep poverty. It is obvious that – at least in short and mid-term – such regions cannot become winners in the international regional competition. But, at least, rational economic and social policy can help to transform them into relative losers (instead of absolute ones) and, further on, in relative winners (Nijkamp, 1997).

Various research studies addressing the specific problems and difficulties in the lagging regions of the transition countries from Central and Eastern Europe have identified possible reactions regarding appropriate economic and social policy measures. Some of them take into consideration the role of cluster initiatives as a response to poor competitiveness, low level of innovation, high levels of unemployment and out-migration of the highly-skilled labour force. Their arguments mainly refer to the contribution of clusters to stimulating innovation and increasing competitiveness of local economies and individual businesses (Bojar et al., 2008; Bojar, 2007; Molnar, 2001). Small and medium enterprises (SMEs) are especially taken into consideration by cluster formation initiatives, considering their potential to create a significant number of new jobs, to improve industrial relations and to provide a superior working environment for employees, to create a diversified and flexible industrial base by creating a pool of entrepreneurs willing and able to take risks, to stimulate competition for small and large firms

alike, leading to an energetic enterprise culture, to stimulate innovation (Armstrong and Taylor, 2000). The capacity of clusters to attract foreign capital investment is also envisaged.

Though, the simple presence of clusters in a less developed region does not automatically mean more competitiveness and prosperity. A series of policy measures meant to improve the frame conditions for business firms and overall regional development should accompany clusters formation, as a coherent package including economic, legal, institutional, infrastructure, cultural and socio-political elements. The aim of such a package should be the definition of a “regional profile”, stressing and taking advantage of the specific feature of each local area (Funck and Kowalski, 1997). Moreover, the SMEs of a cluster should be integrated in a coherent network which creates links, relations, exchanges between them and other actors within the region (banks, universities, research institutes, training centres, consulting firms, chambers of commerce, associations of producers, local public administration) (Cappellin, 1998; Sohn and Lee, 2009). The creation of all these conditions can also contribute to attracting foreign investors, with all advantages entailed by this process: foreign partners do not contribute only to the diffusion of new technologies but also bring about new ways of behaviour, new business routines, new mentalities, which are essential for the success of new market economies (Constantin, 2006). In addition, a learning process for the establishment of local clusters and networks is still required for new market economies and transition countries (Steiner, 2002).

Based on the above overall considerations, this paper proposes as a case study the Eastern part of Romania, aiming at exploring to what extent and under which circumstances clusters can offer viable solutions to the regions located in this area. Why Eastern Romanian regions?

If the regional distribution of FDI in Romania is examined, it shows a major imbalance between Bucharest-Ilfov (60.6%) and the rest of the country, as well as between the East (less than 10%) and West (approx. 30%) regions. These facts mirror major disparities in regional development between the East and West parts of Romania, which represent an issue of a great concern for Romanian regional policy. The North-East region is the last but one among the least developed regions in Central and Eastern Europe and in the whole EU, with all consequences entailed in terms of poverty and potential social conflicts. On the other hand, this region, as well as South-East region present a significant development potential referring to natural resources, high share of young population, skilled labour force, a couple of cities with top universities and very good research centres, etc. Last, but not the least the South-East region has an important geo-strategic position as Romania’s gate to the Black Sea. Large debates are still in progress about how all these advantages can be turned to good account, so as to make the Eastern part of Romania recover the development gap. One the envisaged solutions is the encouraging of regional clusters development, including the attraction of foreign investors.

Hence, the research question our paper is focused on: Which are the main features of the clustering phenomenon in the Eastern part of Romania and, consequently, the most appropriate support policies?

Even if a cluster-oriented policy in the Eastern Romania might look too ambitious and even unrealistic, the development potential of the two Eastern regions as well as success stories from less developed regions in other Central and East European countries (Lublin region in Poland, Olomouc and Moravian-Silesian regions in Czech Republic, Western Transdanubian

region in Hungary, etc.) has encouraged us to reflect on the possibilities to make the Eastern part of Romania a future success story as well<sup>1</sup>.

With this aim in view, our research has combined specific tools for capturing the specific features of the basic cluster components - sectorial concentration, geographical proximity and competition and cooperation relations - in the East Romanian regions, being – for the best of our knowledge - the first complex, complete analysis of the clustering phenomenon in a Romanian geographical area.

Accordingly, the paper is organized as follows:

First, a literature survey concentrates on those cluster typologies and concepts able to offer a clear focus to our empirical investigation, accompanied by a brief review of the most relevant studies results regarding the cluster phenomenon in Romania, as a starting point for our own inquiry into this field.

Second, the data and the methodology employed are discussed, pointing out both the similarities with other studies carried out in the international context and the particular features resulted from the Romanian statistics and territorial organization.

Third, the empirical results obtained by means of classical statistical methods (location quotients, Gini and Herfindahl indexes of regional specialisation and industrial concentration, Lorenz curves and cluster analysis) are analysed so as to offer an overall image of the clusters existing in the Eastern part of Romania.

Fourth, the GIS tool is utilized in order to provide a spotlight on cluster identity, location and borders, based on spatial, thematic data at locality level. Further on, these data are processed for examining the economic results of the firms grouped in the best outlined clusters in comparison with the global results of each of the two regions.

Fifth, following and in accordance with the obtained results, the paper analyses the findings derived from a series of interviews conducted among business environment representatives and policy makers in the envisaged regions about the perception of the clustering phenomenon, barriers, prospects and suitable policies. They are combined with the comments regarding successful stories on like cases from Central and East European countries (Poland, Hungary, Czech Republic) that might be considered for the less developed regions of Eastern Romania as well. They are differentiated in accordance with the characteristics of the North-East and South-East regions, bearing in mind that, however, South-East region has a higher development level and different profile compared with North-East.

## **2. Brief literature survey**

Researchers' efforts to categorise regional clusters have revealed a large variety according to many criteria that can be used, resulting in a wide cluster typology (Bojar, E., 2007). Among them, the most frequently employed refer to the type of product and/or services the firms provide, the sector of activity (Ketels, Lindqvist, Sölvell, 2006), the number (and type) of horizontally connected sectors, the importance attributed to technology (Porter, 1990), size, the number of newly generated jobs (or retained ones), the territorial spreading of the participants in the cluster (Van der Linde, 2003), the evolution from the perspective of the life cycle, the development stage, etc. For this paper we have selected those criteria that have proved to be the most relevant

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<sup>1</sup> Additional support to this idea has come from the studies developed under the auspices of the World Bank which focus on cluster formation in underdeveloped and developing countries (e.g. Morocco, Rwanda, China, etc.).

for conducting our empirical research, i.e. criteria that can be adapted for the study of clusters' distribution and development in Romania.

In this register, McCann (2001) proposes a cluster typology which distinguishes between pure agglomeration, industrial district and social network, taking into consideration a series of characteristics such as firm size, relations between firms, membership, access to cluster, space outcomes, notion of space, analytical approaches, etc.

From another perspective, Porter (2003), quoted by Ketels (2003) and European Cluster Observatory-ECO (which has operationalised Porter's types of industries in its own methodology), points out various dimensions clusters may differ in: "the type of products and services they produce, the locational dynamics they are subject to, their stage of development, the business environment that surrounds them" (p. 4), etc. For example, if the locational dynamics of the cluster constituent industries is considered, one can distinguish between "local" industries, which serve only local markets and their spatial distribution mainly depends on population, "natural resource-dependent industries", which serve global markets and their spatial concentration depends on the location of natural resources and "traded" industries, which serve markets in many regions and countries and their presence in a given location is clearly determined by the attractiveness of that location (Ketels, 2003, p.5).

In addition, Sölvell et al. (2003) distinguish between static clusters, characterised by firms' isolation and lack of competition, lack of advanced suppliers, basic human capital, lack of trust and networks and few supporting institutions and dynamic clusters, where the main attributes are the manifestation of local rivalry and international competition, the existence of specialised, local suppliers, an advanced training and scientific infrastructure, highly developed social capital and advanced institutions promoting collaboration and cluster initiatives.

Porter (1990) also discusses other two types of clusters, based on the links between firms, as follows: vertical clusters, where firms are linked through buyer-seller relationships and horizontal clusters, where firms might share a common market for products, use a common technology, labour force skills and similar resources (see also Isbasoiu, 2006, p.4).

According to the stage of development, Enright (1998, 2000, 2001) highlights three main categories of clusters, namely potential clusters, where some good opportunities and some key elements are already in place, latent clusters, which comprise a large number of firms but of a low level of interaction because of the lack of trust, low cooperation and high transaction costs, and working clusters, represented by well-developed industrial districts. They have been added to more categories, referring to "policy-driven", characterized by government support but lack of critical mass and "wishful thinking" clusters, also policy-driven, but without critical mass or any political advantage (see also LEED-OECD, 2004 and Teräs, 2009).

Based on the cluster typology mentioned above, especially Enright's criterion, various studies and research projects on clusters in Romania (e.g. CISA, 1998; VICLI 1999-2001; INCLUDE, 2003-2005 – all quoted in Pislaru and Aristide, 2004; LEED-OECD, 2004; CLOE; Isbasoiu, 2007; Mariotti, 2008; Europe INNOVA, 2007; Romanian Ministry of Economy, 2010) have pointed out a series of emerging, potential ("natural") clusters in textile, footwear, wood processing, machinery, ceramics, software, etc. .

These studies have also emphasized two key conclusions in policy terms: (1) in Romania the policy-driven clusters (industrial parks, scientific and technological parks, established by law) have been encouraged to a larger extent than the so-called "natural" clusters, which would have needed stronger market-based mechanisms; (2) successful results have been obtained via FDI, transnational cooperation networks of industrial clusters and SMEs internationalization.

Relevant examples of successful clusters are the Romanian automotive cluster, located in South-Muntenia region, and the footwear cluster in Timisoara, the largest city in the West region, which is ranked the second in the top of the most developed Romanian regions. In both cases the role of the foreign investors and international cooperation networks have played a crucial role<sup>2</sup>.

Though, as previously mentioned, clusters may appear and in some cases support the development of lagging regions and counties as well. Based on previous research results in this direction (Constantin et al., 2009, Goschin et al., 2009 a, b), our paper proposes as a case study the clustering phenomenon in the Eastern part of Romania. This part consists of two regions, namely North-East, the least developed NUTS-2 region in Romania and the last but one at EU level (26.6 % of the EU average in 2007, that is 6600 euro GDP per capita at PPP) and South-East, the sixth in the national ranking, among the eight NUTS-2 (33.8% of the EU average in 2007, that is 8400 euro GDP per capita at PPP).

### **3. Clustering phenomenon in the Eastern part of Romania. A statistical approach**

In this section the issue of economic agglomerations related to clusters in connection to the development level is explored, discussing both theoretical arguments and empirical evidence on this topic. The basic assumption is that the cluster approach is useful in the context of less developed areas due to the efficiency-boosting processes that come from the clustering of firms in a given sector – obviously, provided that a series of basic requirements are met. Consequently our analysis can shed important light on critical dilemmas of development specific to the Eastern Romania.

#### **3.1. Data and methodology**

Our research has used employment as the main variable for the statistical measurements: it is provided by the official statistics according to the labour force balance methodology, which combines information from several sources: demographic statistics, labour cost survey, households labour force survey and administrative sources. Employment has been the only choice we had since value, GDP-based indicators for NACE-4 level are not provided by the Romanian statistics.

The envisaged structure has been NACE-4 level – the lowest disaggregation level existing in the Romanian official statistics and considered the most relevant for the cluster profile. Thus, previous research carried out on regional specialisation and geographical concentration in Romania (Traistaru et al., 2002; Goschin et al., 2009a; Andrei et al., 2009) has revealed that after the collapse of communism this country has undergone a de-specialisation process, which requires a deeper disaggregation of sectorial data in order to capture the real, concrete profile of each cluster. More aggregate data might have generated the risk to identify agglomerations of firms which do not define real clusters.

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<sup>2</sup> The Romanian automotive cluster is mentioned by a study of Europe INNOVA (Europe Paper No.5/2007) as part of a network of 39 European automotive successful regional clusters that are linked by manufacturers' and suppliers' international strategies. (Europe INNOVA/ *PRO INNO* – “Europe Paper” No. 5, 2007). The footwear cluster in Timisoara is mainly the result of de-location of production activities from the Veneto region of Italy. It is based on vertical investments, triggered by the cross-border re-location of the value chain, determined especially by factor costs reasons (Majocchi, 2000, quoted by Isbasoiu, 2006). Thus, Italy has become the most important investor in Timisoara, with the largest number of firms (most of them SMEs), this area being currently surnamed “the eight province of Veneto”.

The NACE-4 employment option is in line with the one utilised by Europe INNOVA (2007) and European Cluster Observatory (ECO) – Methodology<sup>3</sup> as well: though, their studies mention that the 4-digit NACE – the deepest at which European data are available - is not granular enough to go beyond traditional sectors, unlike the US, where 5- and 6- digit NAICS levels are available (see also Kelton et al., 2008).

In terms of territorial structure, our study has employed data at both NUTS-2 and NUTS-3 level. The NUTS-2 level ensures the comparability of results with those provided by Europe INNOVA (2007) and ECO studies, which argue that the NUTS-2 level is the only available for all countries and explicitly mention that more relevant data, at higher granularity (NUTS-3), are not generally available. In Romania's case more in-depth data resulted from additional calculations by the National Institute of Statistics for the NUTS-3 level (counties – 6 in each of the two regions) have been also used, offering more accuracy to our results<sup>4</sup>.

The time span envisaged by our research is 2000-2007, representing a period of continuous economic growth. All data and results refer to the year 2007, making use of the most recent official statistics available when calculations were performed.

The methodology of investigation has started from simple statistical techniques based on specialisation ratios and localisation quotients (Appendix 1 – methodological note) that point out in which activities the main concentrations of firms are present, offering an orientation for the next research steps. Although these ratios are used mainly as a basis for many of the more complex and sophisticated measures of specialisation, they can by themselves offer valuable information by depicting the general image of the spatial distribution of activities and by detecting spatial irregularities. Owing to their simplicity, the location quotients are an easy to analyse<sup>5</sup> and a useful tool in the early explanatory stages of the research. The pattern of change in the quotients over time depends upon the degree of activity disaggregation. The location (specialisation) quotients are employed by the ECO as well, with regard to cluster evaluation at European level<sup>6</sup>.

The results offered by the localisation quotients are then combined with the calculation of Herfindahl index (an absolute measure of territorial specialization which is probably the most commonly used in this area<sup>7</sup>) and Gini coefficient, the configuration of Lorenz curves and cluster

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<sup>3</sup> [www.clusterobservatory.eu](http://www.clusterobservatory.eu)

<sup>4</sup> For example, the Herfindahl specialisation index is biased towards the larger regions, as the case of the Romanian development regions (NUTS 2). When computed at county level (NUTS 3), it has indicated a clear tendency to specialisation of some counties within the region.

<sup>5</sup> Values that surpass one unit indicate a level of regional/county concentration bigger than the average, while values under one are specific to regions/counties less concentrated compared to the national average.

<sup>6</sup> If a cluster category in a region has a specialisation quotient of two or more, it receives a star (see <http://www.clusterobservatory.eu/index.php?id=49&nid=>)

<sup>7</sup> Regional specialisation and geographic concentration of economic activities are addressed as “two sides of the same coin” (Aiginger and Davies, 2004), in an attempt to capture spatial irregularities indicating potential clustering processes. *Regional specialisation* expresses the territorial perspective and depicts the distribution of the shares of the economic activities in a certain region, usually compared to the rest of the country, while geographic concentration of a specific economic activity reflects the distribution of its regional shares. This topic is increasingly important to the regional policy from the perspective of competitiveness: while the exploitation of the scale economies and of the specific endowments of the regions increases productivity, a highly specialised region is more vulnerable to the economic shocks in its leading sector. Structural shifts in the economy should be of high policy concern for Romania as the transition to the market economy had already strongly reshaped its economic structure, and the ongoing evolution of the global economy is currently bringing about new challenges and the need to adapt more rapidly. Specialisation of a certain region expresses the distribution of the shares of economic activities in its overall economy, usually compared to the rest of the country. A region is considered to be highly specialised if a



analysis so as to observe whether the activities are relatively well-balanced in the county/region's economy or they induce a significant, important specialisation.

As the mainstream of regional economics literature has revealed, a high degree of regional specialisation is usually accompanied by a lower development level<sup>8</sup>. Our previous research (e.g. Goschin et al., 2009a; Goschin et al., 2009b) supports this correlation in the case of Romania.

It should be also mentioned that a higher degree of specialisation does not mean in all cases the existence of clusters: it is possible that the high specialisation is induced by one giant firm in a certain sector or, given the limits of the NACE-4 classification, the firms belong to NACE-5 or 6 activities which do not lead to the configuration of a real cluster. Therefore in the next phase of our research more in-depth analysis will be based on GIS application, which will provide a clearer image on cluster identity and location.

### 3.2. Main results from the empiric analysis

The proposed methodology has highlighted various spatial patterns of economic activities, some of them indicating agglomerations conducive to clusters in East Romania.

In all the counties of East Romania the structure of the economic activity is dominated by agriculture, reaching over 47% in Botosani and Vaslui, followed at a big distance by trade (9 up to 15%). Other activities owing significant shares in the economies of Eastern counties are construction, transport and storage, textile and textile products, food, beverages and tobacco.

Based on the computed values of the location quotients, we shape the overall image of the concentration of economic activities in East Romania and identify potential location of clusters. We have to take into account that the location quotient is a relative measure that indicates the position of a territorial unit (region/county) in a certain industry compared to the average. High values of location quotients (above 1.5) showing strong concentration of a certain industry have been found for the following activities at county level (Appendices 2 and 3):

- Agriculture: Botosani, Suceava, Vaslui, Vrancea;
- Sylviculture, forest exploitation and hunting: Bacau, Neamt, Suceava, Tulcea, Vrancea;
- Fishery and pisciculture: Botosani, Iasi, Vaslui Tulcea (an extremely high value of 34,05);
- Non-energy products mining and quarrying: Suceava, Constanta, Tulcea;
- Textile and textile products: Botosani, Vaslui, Braila, Buzau, Vrancea;
- Wood and wooden products manufacturing (except furniture) : Bacau, Neamt, Suceava;
- Crude oil processing, coal coking and nuclear fuel treatment: Bacau, Constanta, Galati;
- Metallurgy: Neamt, Constanta, Tulcea;
- Means of transport: Galati, Tulcea.

These economic concentrations indicate potential location of clusters, thus guiding our further local analysis.

In addition, a statistical cluster analysis has been undertaken for the whole country (using county level data) for the activities displaying above average concentrations in the Eastern Romania. The cluster analysis had been carried on for each economic activity (Appendix 4

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small number of industries have a large combined share in the economy of that region. *Geographic concentration* of a specific activity reflects the distribution of its shares by region. A highly concentrated economic activity will have a very large part located in a small number of regions.

<sup>8</sup> In some cases more in-depth analysis revealed a group of firms performing high added value activities as the main reason for a high specialization (see, for example, Europe INNOVA, 2007).

displays some of the dendograms, for selected activities) and the results confirmed the previous findings based on location quotients.

The Herfindahl Index has shown significant differences regarding the economic specialisation among the counties in Eastern Romania (Table 1). The overall degree of specialisation tends to be higher in the North-East Region, the least developed region in Romania, and the last but one in all European Union, compared to the South-East region. The highest degree of specialisation is to be found in Botosani county (agriculture alone gets 48.5% of its economy), followed by Vaslui and Suceava, while the lowest specialisation is characteristic to the best developed county in the region – Constanta. Other relatively diversified economies are Galati, Braila and Iasi counties. The values of the Gini Coefficient (Table 1) and the shape of the Lorenz Curves (Appendix 5) support these findings. Nevertheless we have to note, as a weakness of the Herfindahl index, that big regions, because of their larger shares, heavily influence the changes in the specialisation (the index is biased towards the larger regions). The results are also dependent on the fineness of the industrial classification employed.

**Table 1. Statistical indicators of specialisation and development for Eastern Romania, 2007**

	<b>Herfindahl Index</b>	<b>Gini Coefficient</b>	<b>CDI*</b>
<b>North-East</b>	<b>0.192851</b>	<b>0.711123</b>	<b>0.259296</b>
Bacau	0.131292	0.652276	0.314137
Botosani	0.277776	0.791568	0.200203
Iasi	0.146691	0.697626	0.369709
Neamt	0.215499	0.730167	0.26486
Suceava	0.230969	0.739464	0.288155
Vaslui	0.263466	0.777591	0.118712
<b>South-East</b>	<b>0.140055</b>	<b>0.669898</b>	<b>0.305923</b>
Braila	0.134957	0.695931	0.302739
Buzau	0.202563	0.711119	0.260105
Constanta	0.107179	0.679055	0.422238
Galati	0.127856	0.673967	0.300600
Tulcea	0.149798	0.670316	0.265761
Vrancea	0.229566	0.755253	0.284095

\*A Composite Development Index from our previous research (Mitrut et al., 2010)

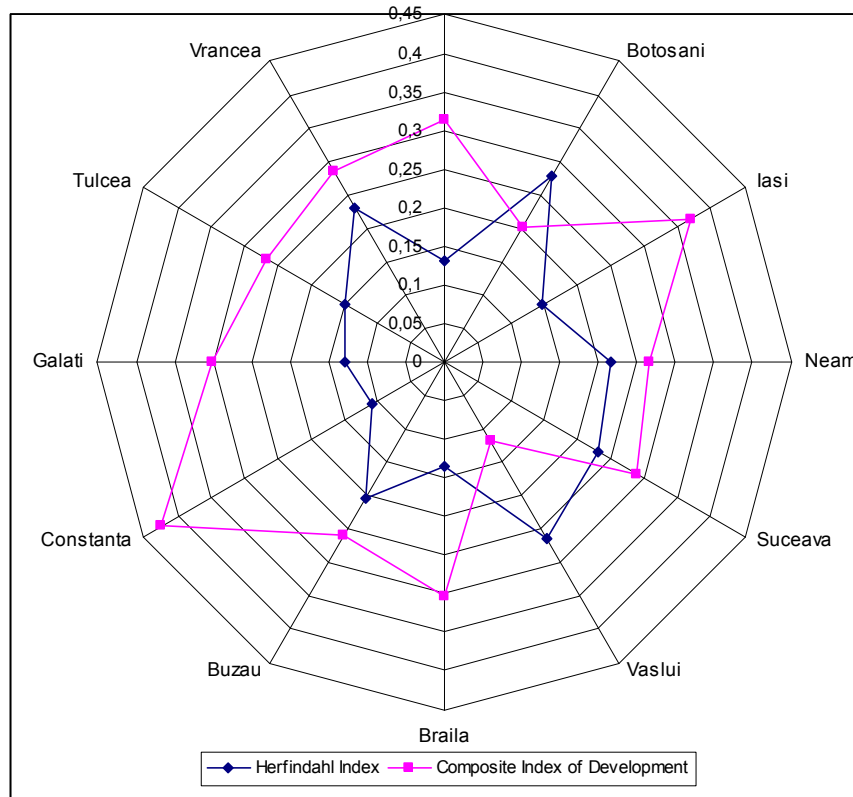
**Source:** authors' calculations based on data issued by NIS

One should have strong expectations about finding a negative relationship between the concentration of economic activities and the development level of a certain county. This is a two-way relationship: more diversified economic environment supports economic growth and reduces the impact of economic shocks, while a higher development level of a region provides various business opportunities that broaden the range of economic activities thus reducing the economic specialisation in that region.

This assumption was tested for Eastern Romania, at county level, based on the degree of specialisation measured by Herfindahl Index and the economic and social development of the counties estimated by means of a composite territorial index. We computed this index as an weighted average of 16 indicators grouped in the following blocks: economy, health, education, infrastructure and standard of living (Mitrut et al, 2010). The values of the index may range from 0, for a county having the lowest performance for all variables included in the index, to 1, for the county on top position. The computations undertaken for the year 2007 showed that the values of the composite index of development range from 0.930 for the capital city Bucharest to 0.119 for the least developed county – Vaslui, but most of the counties belong to the 0.2-0.4 interval. We found a negative relationship between the degree of economic specialisation in a county and its development level (a high negative correlation coefficient of  $-0,78734$  between the values of the Herfindahl Index and the ones of the Composite Index of Development), with Constanta and Vaslui at the extremes: Constanta is the top county in the Eastern Romania and has the lowest degree of specialisation (the value of Herfindahl Index is 0.107), while Vaslui, the least developed county for this region (and for Romania as well) has a high degree of specialisation (0.263) second only to Botosani (0.278), another underdeveloped county (Figure 1).

The statistical indicators employed so far in our empirical analysis were able to convey an overview on the spatial patterns of economic activities, indicating possible agglomerations conducive to clusters (mainly in Agriculture; Non-energy products mining and quarrying; Textile and textile products; Wood and wooden products manufacturing; Crude oil processing, coal coking and nuclear fuel treatment and Metallurgy) but this is just a first step in the investigation of this complex and challenging topic. More in-depth analysis will be based on GIS application, which will provide a clear image on cluster identity and location, combined with some hints on clusters' contribution to the development of the corresponding local economies as well as the county and region economy.

**Figure 1. The relation between specialisation and development in Eastern Romania**



**Source:** authors' processing based on data issued by NIS

#### 4. A GIS-based exploration

The measurements we have employed till now have generated considerable useful information but, as mentioned before, they display some important limitations. Data at county level may be viewed as counts of discrete location decisions, i.e. aggregation of individual firms characteristics at specific locations – in our case, employment by county. The use of such spatially aggregated data “necessarily sacrifices much of the rich spatial information present in a point pattern of enterprise location” (Feser and Sweeney, 2002, p. 235).

As a response to these limitations we have applied a point data approach, based on GIS technology, which is acknowledged as a major advance in point process modelling. More precisely, we have used the ArcGIS 9.3.1. for Windows. Data by county and by region have been provided by FIN MEDIA for the top 19 000 firms in Romania based on their economic performance in terms of employment, turnover, social capital, profit etc.. The geographical coordinates have been introduced following the digitisation of the cartographic documents technique. For the sake of unity in our research the firms have been plotted based on their size in terms of employment, but their turnover has been also considered in subsequent data processing. The firms have been grouped according to the type of their economic activity, on the NACE-4 classification basis so as to get a first evaluation of their spatial concentration.

Our modest goal at this stage of research has been to look for general and consistent patterns in clustering across cities and surrounding areas. The spatial samples of firms for the cities of the two regions considered have been defined by rectangular study areas drawn to enclose the largest mass of firms established in a given location (inspired by Feser and Sweeney, 2002)<sup>9</sup>.

The cluster mapping exercise resulted in the maps drawn for all 32 NACE-4 activities in all counties of the two Eastern regions<sup>10</sup>. Aware of the limitations of our application, we might say that these maps indicate a series of “economic agglomerations” that could be mostly considered of a static cluster-type. The most relevant ones point at the following – let us name them –“reliable” clusters:

- in the North-East region: textile industry in Iasi and Botosani and food and beverage industry in Iasi, Bacau, Suceava;
- in the South-East region: transports and storage in Constanta, tourism in Constanta Neighbourhood, metallurgical industry in Buzau, Galati and Tulcea, food industry in Braila, Constanta and Galati.

For illustration, Figure 2 shows some of these clusters.

According to Porter’s (1990, 2003) and Enright’s (1998, 2000, 2001) cluster typologies, most of the envisaged economic activities in the clusters outlined in the Eastern part of Romania may be viewed as local and natural resource-dependent rather than traded industries (e.g. wood, textiles, tourism, etc.), based on horizontal relations (e.g. apparel, wood, metallurgy, etc.) rather than vertical ones and as latent or potential, rather than working clusters.

A brief description of the most significant potential clusters can be provided as follows.

With reference to the North-East region, we believe that the two clusters identified in Iasi and Botosani in textile sector are feasible. The textile industry has a tradition in the area and - in addition to that and in accordance to the general cluster description - it also includes a unit for research and development, namely the specialised Faculty of Textile within the Polytechnic University of Iasi. Also, the food and beverages industry is well represented in the area, with centres for research and development within the University of Agriculture and Veterinary Medicine, the special Centre for Fruit Research, as well as the Wine Research Centre – all of them located in Iasi.

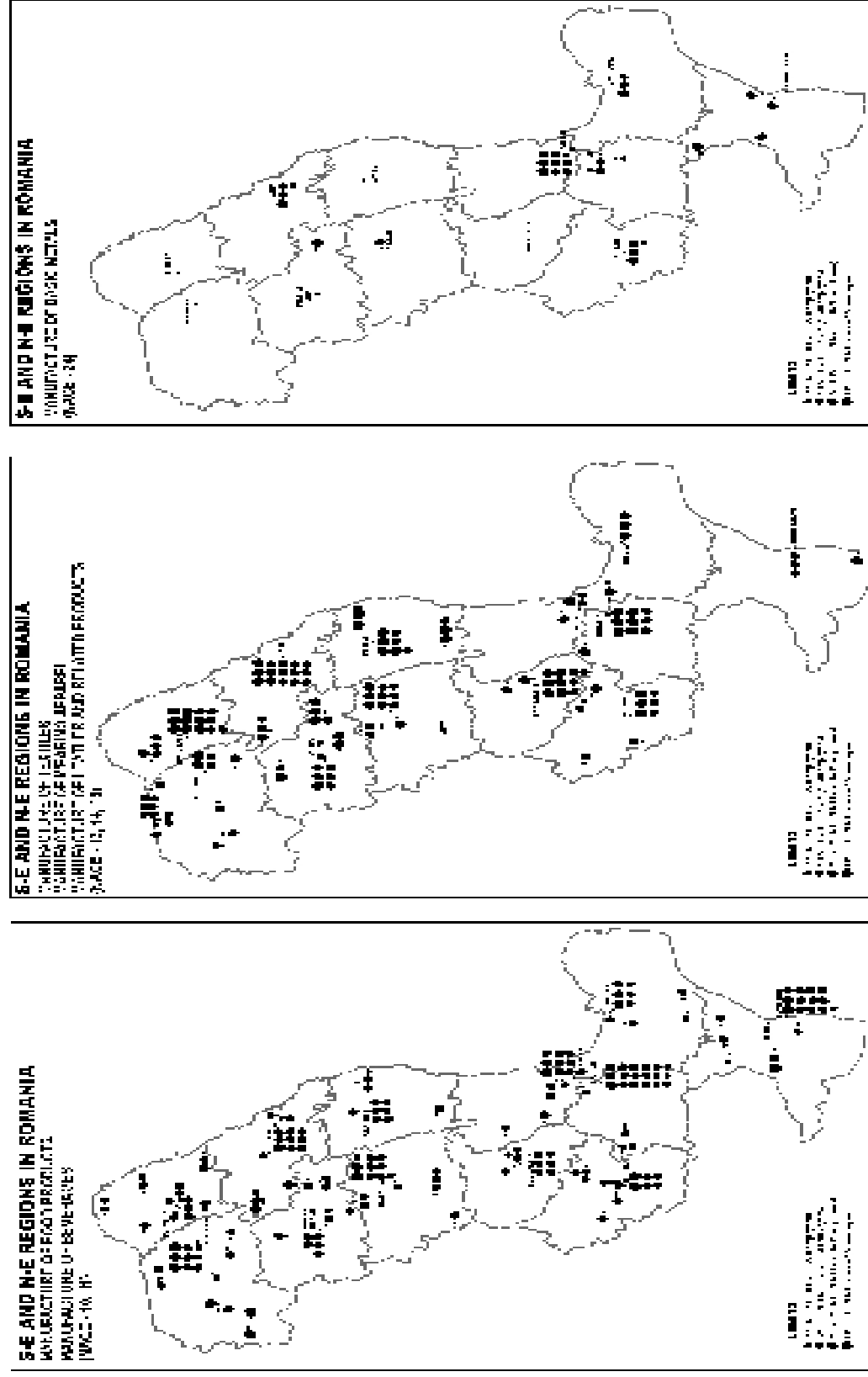
The South-East region benefits from a much better economic situation, as compared to the North-East region, which, as mentioned from the very beginning is placed the last but one in the EU NUTS 2 ranking. More precisely, due to the pan-European corridors crossing it, the South-East region presents an exceptional opening for the East European and Asian markets. Constanta, the largest port to the Black Sea is located here, as well as a series of fluvial-maritime ports (e.g. Braila, Galati, Tulcea, Sulina). Large and fertile agricultural lands provide proper conditions for ecological agriculture. In addition to that, the attractions of the Black Sea resorts have made the tourist accommodation capacity represent 40% of the whole Romania.

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<sup>9</sup> This choice is also in line with a recently published study on agglomeration economies and FDI in Romania by Hilber and Voicu (2010): in their view “While the surface area of the average Romanian county might seem large for the Marshallian notion of agglomeration (which traditionally has been associated with the notion of industrial district), the vast majority of counties in the sample consist of one (or a few – our note) dominant city/district with a clearly identifiable agglomeration of industrial activity” (p. 369).

<sup>10</sup> The authors express their thanks to dr. Oana Popescu from the “Urbanproiect” Institute of Bucharest for the kind assistance to drawing the maps.

Figure 2. Some relevant clusters in North-East and South-East Regions in Romania



Source: authors' processing based on data issued by FIN MEDIA

The SMEs sector is very well developed, being ranked the third among the eight NUTS 2 Romanian regions. The manufacturing activities have reached a good degree of diversity, as indicated by the statistical calculations. Given the described context, our analysis reveals feasible clusters in the following fields: a strong core in land transport and transport via pipelines, in water transport, as well as in the related field of warehousing and support activities for transportation. To base the statement, we need to add that activities pertaining to the manufacture of motor vehicles, trailers and semi-trailers and manufacture of other transport equipment are well represented in Constanta city and in the neighbouring town of Mangalia. Based on the geographical resources, favourable climate, long tradition and appropriate infrastructure, there is an efficient association between hotels and tourist agents, tour operators and other reservation services and related activity companies. All these factors support the idea of strengthening the tourism cluster developed in the proximity of Constanta city. The cluster feature relating to the collaboration of operational units with research centres is fully met in the area, due to the Ovidius University of Constanta, a university centre of long tradition in Romania. The South-East region owes its better ranking among the Romanian regions to other universities and research centres as well, such as the Lower Danube University of Galati, the Danube Delta Research Institute in Tulcea and the Administration of the Danube Delta Reservation. Therefore, a strong platform was created so as to support the development of tourism in counties nearby Constanta, such as Galati and Tulcea counties – tributary to the natural wonders offered by the Danube Delta. There is a notable tradition in the food industry in Constanta as well as in the metallurgic industry in Buzau, Galati and Tulcea.

However, despite these encouraging general remarks, the ultimate test of clusters is “whether they make a difference in performance” (Hendrey and Brown, 2006, p. 710), whether the productivity is higher “in the areas characterized by highly concentrated economic activities” (Combes et al., p. 268). In order to respond this crucial question the weight of each of the revealed clusters in total employment and turnover by region has been calculated, accompanied by a comparison in terms of labour productivity. The number of foreign and mixed capital firms has been also provided. The results (Table 2 and Table 3) indicate as the most successful cluster from the viewpoint of labour productivity the food activity in Bacau, followed by the constructions in Iasi; both clusters have also a high share in region’s employment and turnover, indicating an important contribution to region’s economic performance. It can be noticed the contribution of foreign firms to these results. Thus, the clusters with higher performance indicators display a higher number of foreign or mixed capital firms as well. The results are more encouraging in the South-East region compared to the North-East region, based on the differences in the overall development level, business environment performance, support infrastructure, etc.

At the same time there are economic agglomerations with a labour productivity under the regional average, which have not turned to good account yet the efficiency increase potential. Most of them are present in the textile activity in Iasi and Bacau counties.

An important issue raising from these results refers to the survival rate of the relevant, higher performance clusters. In our specific case this issue has a particular meaning if the subsequent effects of the economic crisis are considered<sup>11</sup>, our available data referring to 2007. Nevertheless,

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<sup>11</sup> The studies performed on this topic have revealed that a higher vulnerability to the crisis is expected in the most developed counties, which are much closer to the world economy’s evolution and, thus, more exposed to crisis shocks. On the other hand, given the economic potential of the most developed counties, it is likely that they will

the views expressed by Romanian experts in the available readings as well as in public debates indicate that changes in rankings for the most successful firms are expected, rather than their removal from recordings. Or, our cluster-mapping exercise has taken into consideration the top firms in terms of their economic performance.

In another register we have also to admit that each cluster has a specific life cycle that might influence future results. According to life cycle theory, cluster evolution follows four well known stages: birth, growth, maturity and decline. Entrance in the maturity stage is marked by a declining number of companies in the cluster, often associated with high production and capital concentration. The length in time of this stage strongly depends on the sector of activity that a certain cluster operates in, being longer in traditional ones (Bojar, 2007).

Therefore, in line with the international practices we agree that the cluster-mapping exercise should be subject to certain amendments of results every 3-5 years, so as to capture the changes occurring in the meantime.

The ideal evaluation of some clusters also involves the identification of the intensity in the connections and cooperation relations between the companies in the same sector or related sectors, research institutes, universities, services suppliers and even local authorities. Our research has performed such an exercise in connection with the exploration of the policies able to support the regional clustering in the two regions by means of the interview instrument. They have been followed by the identification of successful practices in other Central and East European countries, which have recorded encouraging results with clusters in less developed regions as well.

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recover more easily after the highest crisis intensity would have passed (Goschin and Constantin, 2010; Amariei and Hritcu, 2009).



**Table 2. Clusters in North East Region**

County / Cluster's location	Economic* activity / NACE-4 Classification Rev. 2	No of firms in cluster	of which			No. of firms with foreign capital	Total employmen t of cluster	Total employment of Region's activity	% in employment of Region's activity	Total turnover cluster (Mill EURO)	Total turnover of Region's activity (Mill EURO)	% in total turnover of Region's activity	Labour productivity of cluster (Thousands EURO / employee)	Labour productivity of Region's activity (Thousands EURO / Employee)	Ratio producti vity
			big	med	small										
<b>Iasi</b>															
Iasi	Wood / 17, 18	9	5		4	558	7343	7.60	27.16	321.81	8.44	48.00	43.83	1.10	
Iasi	Textile / 13, 14, 15	15	5	9	1	4567	21252	21.49	62.54	419.95	14.89	13.69	19.76	0.69	
Iasi	Land transp / 49	9	4	5		2107	5422	38.86	44.38	235.33	18.86	21.06	43.40	0.49	
Iasi	Construction / 41	32	6	16	10	4539	15896	28.55	344.45	820.94	41.96	75.89	51.64	1.47	
Iasi	Civil engin / 42	16	5	9	2	3632	9467	38.36	140.93	670.51	21.02	38.80	70.83	0.55	
Iasi	Sp construct / 43	20	1	13	6	1859	4142	44.88	75.28	233.77	32.20	40.49	56.44	0.72	
Iasi	Food / 10	9	1	8		1086	14372	7.56	54.17	733.57	7.38	49.88	51.04	0.98	
Iasi	Equipment / 28	9	2	4	3	2665	5587	47.70	69.92	139.25	50.21	26.24	24.92	1.05	
<b>Bacau</b>															
Bacau	Textile / 13, 14, 15	9	5	3	1	3001	21252	14.12	40.80	419.95	9.72	13.60	19.76	0.69	
Bacau	Construction / 41	15	2	11	2	2357	15896	14.83	96.90	820.94	11.80	41.11	51.64	0.80	
Bacau	Sp construct / 43	10		8	2	825	4142	19.92	30.85	233.77	13.20	37.39	56.44	0.66	
Bacau	Food / 10, 11	10	2	8		1332	14372	9.27	153.54	733.57	20.93	115.27	51.04	2.26	
<b>Botosani</b>															
Botosani	Textile / 13, 14, 15	12	7	5		4427	21252	20.83	115.10	419.95	27.41	26.00	19.76	1.32	
Botosani	Construction / 41	14	2	10	2	1958	15896	12.32	103.47	820.94	12.60	52.84	51.64	1.02	
<b>Neamt</b>															
Piatra Neamt	Construction / 41	13		8	5	1195	15896	7.52	52.00	820.94	6.33	43.51	51.64	0.84	
<b>Suceava</b>															
Suceava	Construction / 41	13	1	9	3	2017	15896	12.69	69.97	820.94	8.52	34.69	51.64	0.67	
Suceava	Food / 10, 11	9	3	5	1	1966	14372	13.68	67.15	733.57	9.15	34.16	51.04	0.67	

**Table 3. Clusters in South East Region**

County / Cluster's location	Economic* activity / NACE-4 Classification Rev. 2	No of firms in cluster	of which			No. of firms with foreign capital	Total employ ment of cluster	Total employ ment of Region's activity	% in employ ment of Region's activity	Total turnover cluster (Mil EURO)	Total turnover of Region's activity (Mil EURO)	% in total turnover of Region's activity	Labour productivity of cluster (Thousands EURO / Employee)	Labour productivity of Region's activity (Thousands EURO / Employee)	Ratio productivity
			big	med	small										
<b>Braila County</b>															
Braila	Textile / 14	9	7	2		6325	19333	32.72	50.76	242.42	20.94	8.03	12.54	0.64	
Braila	Construction / 41	16	3	10	3	2527	14619	17.29	119.79	716.70	16.71	47.40	49.03	0.97	
Braila	Food / 10,11	18	1	13	4	2518	14104	17.85	174.45	1042.64	16.73	69.28	73.93	0.94	
<b>Buzau County</b>															
Buzau	Construction / 41	20	2	16	2	2248	14619	15.38	113.44	716.70	15.83	50.46	49.03	1.03	
Buzau	Metallurgy/24, 25	25	2	13	10	3858	29146	13.24	422.76	2942.42	14.37	109.58	100.95	1.09	
<b>Constanta County</b>															
Mangalia	Motor vehicles / 29, 30	9	2	5	2	5082	19747	25.74	373.77	928.52	40.25	73.55	47.02	1.56	
Constanta	Motor vehicles / 29, 30	6	2	4		3671	19747	18.59	179.63	928.52	19.35	48.93	47.02	1.04	
Constanta	Land transp / 49	18	1	6	11	1507	5456	27.62	77.43	222.77	34.76	51.38	40.83	1.26	
Constanta	Water transport/50	8	1	1	6	501	1259	39.79	126.29	210.56	59.98	252.08	167.24	1.51	
Constanta	Transport / 52	46	8	24	14	6998	10606	65.98	447.28	577.48	77.45	63.92	54.45	1.17	
Constanta and Neighbourhood	Tourism / 55,79	20	1	11	8	1848	2912	63.46	57.95	95.87	60.45	31.36	32.92	0.95	
Constanta	Agriculture / 01	9		2	7	224	7693	2.91	44.53	621.48	7.17	198.79	80.79	2.46	
Constanta	Construction / 41	29	2	16	11	3272	14619	22.38	201.33	716.70	28.09	61.53	49.03	1.26	
Constanta	Civil Engine / 42	18	5	9	4	3045	12062	25.24	129.04	661.93	19.49	42.38	54.88	0.77	
Constanta	Sp construct / 43	21	1	15	5	1727	7301	23.65	78.41	261.06	30.04	45.40	35.76	1.27	
Constanta	Food / 10,11	13	2	10	1	2400	14104	17.02	179.87	1042.64	17.25	74.95	73.93	1.01	
Constanta	Metallurgy/24, 25	17		12	5	1722	29146	5.91	69.26	2942.42	2.35	40.22	100.95	0.40	

<b>Galati County</b>																			
Galati	Construction /41	15	3	7	5	3	3513	14619	24.03	142.67	716.70	19.91	40.61	49.03	0.83				
Galati	Civil engine / 42	11		8	3		1467	12062	12.16	99.54	661.93	15.04	67.85	54.88	1.24				
Galati	Sp construct / 43	20	2	14	4		3490	7301	47.80	100.85	261.06	38.63	28.90	35.76	0.81				
Galati	Food / 10,11	11	2	9		3	1905	14104	13.51	159.67	1042.64	15.31	83.82	73.93	1.13				
Galati	Metallurgy/24, 25	27	5	16	6	5	17560	29146	60.25	2204.83	2942.42	74.93	125.56	100.95	1.24				
<b>Tulcea County</b>																			
Tulcea	Metallurgy /24, 25	9	1	7	1	1	1526	29146	5.24	41.53	2942.42	1.41	27.21	100.95	0.27				
<b>Vrancea County</b>																			
Focsani	Textile/13,14,15	10	7	3		1	6248	19333	32.32	77.81	242.42	32.10	0.01	12.54	0.99				

**Source:** Author's processing of data issued by NIS and illustrated by GIS analysis

\*

- 01 = Agriculture, forestry and fishing
- 10 = Manufacture of food products
- 11 = Manufacture of beverages
- 13 = Manufacture of textiles

- 14 = Manufacture of wearing apparel
- 15 = Manufacture of leather and related products
- 24 = Manufacture of basic metals
- 25 = Manufacture of fabricated metal products, except machinery and equipment
- 29 = Manufacture of motor vehicles, trailers and semitrailers
- 30 = Manufacture of other transport equipment
- 41 = Construction of buildings
- 42 = Civil engineering
- 43 = Specialised construction activities
- 49 = Land transport and transport via pipelines

- 50 = Water transport
- 52 = Ware housing and support activities for transportation
- 55 = Accommodation
- 79 = Travel agency, tour operator and other reservation service and related activities

- 17 = Manufacture of paper and paper products
- 18 = Printing and reproduction of recorded media
- 28 = Manufacture of machinery and equipment

## **5. Possible cluster policy responses**

### **5.1. An interview-based investigation in the Eastern part of Romania**

In Romania a clear, well-articulated cluster policy has not been established yet. Instead, various measures encouraged some so-called “policy-driven clusters”, like those emerged as a result of supporting the creation of industrial and technological parks. At present, in the context of the growing attention at the EU level, the Romanian Government has triggered a large campaign of studies, debates on the regional clusters and corresponding support policies. It has created a fertile soil and encouraging orientation for our research as well, with regard to the benefits of clustering process in less developed regions. As the previous section has demonstrated, the cluster-type agglomerations with potential of dynamic clusters proved to have had an important positive impact on the regional economies in the East Romania.

For a deeper understanding of the clustering processes, their success factors and specific needs in the two regions, a qualitative research has been subsequently carried out. More precisely, a series of interviews were held with business environment representatives and policy makers in these regions. They were based on a standardised interview guide, with 8 questions referring to the perception of the clustering phenomenon in the each region (development stage, network relationships, perceived benefits, success variables (including legal and institutional framework, FDI, etc.), barriers that still hinder local collaboration, effective methods and suitable policies to accelerate the process, trends, benchmarking with other East European countries). The responses received from 15 interviewees<sup>12</sup> have revealed a series of relevant, useful aspects for the potential applying of cluster policies.

The findings have confirmed that the clustering process has not reached yet a mature stage, still being in a “start-up” phase. Within the identified agglomerations there are generally weak bonds, limited knowledge and best practice transfers and a low concern for a common strategy<sup>13</sup>.

One possible explanation is that among business environment actors and public authorities there is low understanding of the complex and multi-dimensional content of regional clusters. Apparently, all interviewed persons seemed to be convinced by the clustering benefits. They considered that clusters could have a major positive impact on the areas they are operating in, as potential sources of innovation, competitiveness, growth and important new jobs generator. Cooperation between actors was mentioned by all interviewees as one of cluster important feature for future success. Though, the opinions were unanimous in placing the clustering phenomenon in its emerging stage.

All respondents from the North-East region indicated the textile emerging clusters in Iasi and Botosani counties and the food and beverage cluster-type agglomerations in Iasi, Bacau and Suceava counties as having relevant development potential. An IT agglomeration in Iasi was pointed out by the North-East representative of the Regional Development Agency (RDA), based on the highly qualified personnel in the area. The generous natural resources, combined with the available infrastructure, provided the basis for the tourism cluster formation in Constanta’s proximity, indicated by all respondents from South-East region. The other cluster-type

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<sup>12</sup> 7 interviewees in NE (out of which: 5 representatives of the business environment, one of the Iasi Chamber of Commerce and one from the NE -RDA) and 8 interviewees in SE (out of which 5 representatives of the business environment, one of the Constanta Chamber of Commerce and 2 from the SE-RDA)

<sup>13</sup> These conclusions are in the same register with the remarks formulated by Leick (2010) for regional clusters in traditional industries in East Germany.

agglomerations we identified in this region (transport and storage, metallurgy; food) were partly recognised by the interviewees.

None of the interviewees could mention a specific initiator in the clusters and complained about FDI's low levels in both regions. Though, they consider FDI as an important supporting factor and admit, as many studies revealed as well (e.g. Pusterla, 2002; Hilber and Voicu, 2010), that the foreign and mixed capital firms are usually attracted by the major cities of each region, suggesting the contribution of learning networks to this process<sup>14</sup>. It seems that the differences in profitability and, as a consequence, the capacity to attract FDI between regions have a lot to do with differences in market infrastructure and entrepreneurship, a special concern being required with the provision of public utility services, business services and on-the-job training for creating a pool of effective labour force.

The Romanian general legal and institutional framework is perceived by 12 (80%) respondents as neutral with regard to the clustering phenomenon. However, many of them outlined the lack of cluster based support policies and only one considered that clustering should be a natural process. "The will of a person or group cannot be a substitute for clear vision, accordingly adapted objectives, relevant cluster policies and strong cluster support programmes" was the opinion of the representative of the North-East RDA.

As for the type of effective policies that could lead to a stronger cluster development, opinions gravitated mainly around the following types of cluster policies: strengthening the framework for dialogue and cooperation between relevant stakeholders in the cluster; targeting at upgrading skills and competencies essential for effective clustering of SMEs; leading to more intense domestic and foreign actors interactions. All respondents pointed out the need for support activities of public authorities like: facilitating effective and transparent information flows, support for region/ cluster reputation improvement, enhancing networking with research institutions and administration, providing buildings or other infrastructure. It is obvious that the narrow approach is dominant among the interviewed persons and, accordingly, only public authorities are considered responsible for clustering support measures.

All interviewed persons displayed the same conviction that a differentiated approach, at strategic and operational levels is required. Policy makers should choose the most effective combination of measures overall. RDA representatives claimed that potentially successful clusters should benefit from dedicated financial support, suggesting that rigorous evaluation criteria should be set-up and mainly innovative clusters should be targeted. It is relevant to note the remark made by almost all respondents that policies' effectiveness is highly depending on a large variety of actors, beside firms and public authorities, proving high awareness in that sense.

Lack of information and relevant knowledge pertaining to clusters creation, evolution and positive outcomes were pointed as major obstacles to a higher dynamic of their development.

All respondents proved to be aware of the gap between the Romanian policies impacting clusters and those active at EU level or in some of the emerging economies (Poland and Czech Republic have been mentioned by most of the respondents). "Economic crisis might foster cooperation" was the prediction of the representative of the South East RDA representative.

To summarize, our qualitative research has pointed out some defining characteristics of the clustering phenomenon in the Eastern part of Romania, as follows: it is in an emerging, start-up stage in both analysed regions; clear vision, objectives and appropriate cluster policies should be set up by public authorities, in order to stimulate cluster development, attract FDIs and

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<sup>14</sup> See also Sohn and Lee, 2009.

enhance SMEs potential; differentiated approach is required to identify the right combination of measures.

Our conclusions seem to be in line with the aspects underlined by Borrás and Tsagdis (2008) in their recent comprehensive overview of Romanian cluster policies and institutions: clustering is a recent phenomenon in Romania, unevenly distributed with low coordination and association capacities; there are no cluster dedicated institutions or policies; cluster notion has been recently included in political agendas, suggesting a rising awareness among decision makers; the presence of cluster issue in several national strategic documents under the EU regional policy is a proof of public authorities' commitment to improve the framework conditions; the top-down approach, with policies imposed by the government at national and regional levels, is dominant; there is an explicit willingness to adapt and change political and administrative reforms to new EU requirements.

## **5.2. Successful experiences in less developed regions of East European countries**

As many comprehensive, comparative studies have demonstrated, cluster policies are still at an early stage in many countries (Europe INNOVA, 2008). Especially in Central and East European countries such policies started being applied after 1999, with significant variations in their outcomes. It seems that countries like Czech Republic, Hungary and Poland have encountered encouraging results and are of a particular interest to our inquiry considering several success stories in less developed or declining regions. Like in Romania's case, these countries have been/are confronted with problems specific to low-tech clusters in such regions: stagnating demand, high competition, 'lock in' into old technology paths. Old clusters in these regions have been characterised by fragmentation in terms of ties with the region and networks oriented towards old trajectories (Tödling and Trippel, 2004; Tödling and Trippel, 2008, Skokan, 2009).

The responses have been found in active policies able to revitalise the old clusters and to build new ones, three gradual types of renewal being envisaged, as follows: innovation-based adjustment of old clusters (incremental change), creation of clusters in traditional industries that are new for the region (diversification) and creation of new clusters based on knowledge-intensive industries (radical change) (Tödling and Trippel (2008), quoted by Skokan (2009)).

A relevant example is the Moravian-Silesian NUTS 2 region, situated in the North-West of the Czech Republic, which is a declining region with a GDP per capita of 16,800 euros at PPS in 2007 (67.5% of the EU-27 average, according to Eurostat) and an economic structure largely based on coal, steel and heavy engineering industry<sup>15</sup>.

Its cluster-based renewal policy has focused on a differentiated support in the three main directions mentioned before: the modification of the existing development paths for metal, engineering, wood and construction clusters, the creation of new directions of development by widening the economic base for automotive, energy and tourism clusters and the management of a major shift in development trajectory for IT, envicrack and hydrogen clusters (Skokan, 2009, p.2009). Both knowledge-promotion institutions (universities, research centres) and foreign firms have played a crucial role in this cluster-renewal process, encouraged by well-driven national programmes.

Another example is the Dél Dunántúl region in the South-West of Hungary. It is ranked the 20<sup>th</sup> among the least developed NUTS 2 regions of the EU in terms of GDP per capita, with 10,600 euros at PPS, representing 42.7% of the EU average in 2007 (Eurostat data). Its economy

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<sup>15</sup> In a sense it can be compared to the situation of the South-East region of Romania.

is dominated by the agricultural sector and agri-food industries, with meat and milk processing and production of beer, wine and sugar playing a major role. Tourism sector is also of an exceptional importance, given the surrounding location of the Balaton Lake<sup>16</sup>. At the same time, there is a high concentration of research institutes and universities: among them, the University of Pecs is the third largest and most diversified institution of higher education and research in Hungary. This profile has been turned to good account by a rational orientation of the support policies that have made processed food, leather products, sporting and recreation and health care very successful clusters, proving that innovation is a possible ingredient in low or mid tech industries too. Thus, two of these clusters – leather and processed food – are among the 50 most specialised clusters in the EU-10 (the 2004 New Member States) and the 50 most dominance-based on the share of total employment in the EU-10, respectively (Sölvell, Ketels, and Lindqvist, 2006).

The last (but not the least) example is that of the Lublin NUTS 2 region situated in the Eastern part of Poland, the 11<sup>th</sup> among the fifteen lowest regions of the EU, with a GDP per capita of 9200 euros at PPS in 2007, that is 36.9% of the EU average (Eurostat data). Given the agriculture-based economic profile the region proves a strong orientation towards fruit and vegetable production and processing, ecological food and agri-tourism clusters (Szimoniuk, 2003; Bojar et al., 2008), with visible benefits for participants: strengthening the farmers' position on the market, the reduction of operational costs, the increase in farming profitability, the improvement of quality through the encouragement of new technologies to be used in agri-food production, the improvement of planning and delivery timing and the adjustment of production to the market needs (Bojar, W., 2007). The implication of local government and region's universities in nationally conducted cluster support programmes has created a very stimulating environment, contribution to the attraction of foreign investors as well.

All these three examples have proven that clusters can flourish and bring substantial benefits to less developed regions too, provided the right choices are made in terms of geography, stage of development, resource constraints, special societal needs and cluster policies are oriented in line with rational priorities, local preferences, market imperfections, etc. According to Rosenfeld (2002) the measures for cluster support in less favoured regions should gravitate around key actions such as: understating and benchmarking regional economies, engaging employers and institutions, organising and delivering services, building a specialised labour pool, allocating and attracting resources for investments, stimulating innovation and entrepreneurship.

### **5.3. Suggested solutions for the Romanian Eastern border regions**

Our inquiry into cluster policies for less developed regions has revealed a basic idea, supported by the findings of other studies undertaken in the international arena in the same field: there is no single recipe for less developed regions to follow so as to meet the needs of all clusters; on the contrary, successful cluster policies need to take into account the specific regional context (Rosenfeld, 2002; Hospers and Beugelsdijk, 2002; Leick, 2010).

The results of our analysis regarding the clustering phenomenon in the two Eastern regions of Romania, correlated with the hints offered by the successful experiences in other Central and East European countries, make us conclude that these two regions should promote

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<sup>16</sup> This region can provide useful lessons for the Eastern part of Romania too, given the huge agricultural potential especially in North-East region and tourist attractions in both North-East and South-East.

cluster policies specific to local production systems/industrial districts (Belussi, 2001; Constantin, 2006), which seem to be the most appropriate organisational form considering their still incipient stage of development.

In this framework ‘soft’ measures should be applied in order to strengthen the local networks and to ensure cluster identity (Leick, 2010). In our view, a better coordination between existing public institutions, academic and business representatives may facilitate measures to foster identified cluster-type agglomeration development in both regions, such as: developing training programmes to raise awareness of clustering positive outcomes; organising cluster meetings, annual cluster strategy workshops to enhance cooperation and information flow; mentoring of new cluster members; developing a cluster webpage; issuing periodical newsletters; brokering technical facilities; organising collaborative master degrees in the required fields; organising regional fairs; active networking brokerage; cluster promoting activities. Such measures could contribute to building robust local production systems, implying a dense network of interdependences between enterprises (usually but not always specialised in a particular sector) as well as links, relations, exchanges between them and other agents acting in the region (like banks, higher education institutions, research institutions, training centres, consulting firms, sectoral associations of producers, chambers of commerce, local public administration, etc.).

A fundamental conclusion regarding the economic agglomerations in the Eastern part of Romania is that the local dynamism does not result from the action of separate firms but from their overall behaviour. This phenomenon is illustrated by the notion of milieu or local environment-based approach that is concerned with understanding the firms in their local and regional context (Aydalot and Keeble, 1988; Maillat, 1990; Funck and Kowalski, 1996; Kowalski and Rottengather, 1998). Accordingly, the cluster support measures should constitute a coherent ‘package’ including economic, legal, infrastructure, cultural and socio-political elements. “The aim of the package must be the definition of a ‘regional profile’, stressing and taking advantage of specific feature of each local area” (Funck and Kowalski, 1997).

As far as the national context is concerned, policies should be contextually oriented according to the trend to move away from direct intervention towards a focus on indirect incentive structures that remove obstacles and relax constraints (Borras and Tsagdis, 2008).

Clusters and networks do not represent only technical linkages between firms and development bodies within a region or institutions able to internalize external effects, but also require a certain institutional environment to function properly. Consequently, regional policy for the new market economies still requires “a learning process for the establishment of local clusters and networks” (Steiner, 2002, p. 220).

## **6. Conclusions**

The question of clusters in less developed regions, usually confronted with economic structures dominated by mid- and low-tech industries, can become an interesting niche for the cluster-devoted research in the forthcoming years, our study pointing out that the factors and the policies conducive to effective clusters in these regions require a deeper exploration.

As we aimed at a complex, multi-angle analysis of the clustering phenomenon in the Eastern part of Romania, able to capture its specific features in the two less developed regions, the basic cluster components - sectorial concentration, geographical proximity and competition and cooperation relations – have been investigated by means of the selected tools and indicators, which considered both the methodological requirements for such investigations and the available statistical data.



The measurements based on classical statistical methods (location quotients, Gini and Herfindahl indexes of regional specialisation and industrial concentration, Lorenz curves and cluster analysis) have generated considerable useful information but, as demonstrated, they displayed some important limitations: a higher degree of specialisation does not mean in all cases the existence of clusters; it is possible that the high specialisation is induced by one giant firm in a certain sector or, given the limits of the NACE-4 classification, the firms belong to NACE-5 or 6 activities which do not lead to the configuration of a real cluster.

Therefore more in-depth analysis has been based on GIS application, providing a clear image on cluster identity and location, combined with some hints on clusters' contribution to the development of the corresponding local economies as well as the county and region economy.

The results obtained are consistent with our main conceptual assumptions and provide an encouraging basis for further investigation which will be conducted mainly by means of one or more areal spatial autocorrelation measures, that is local indicators of spatial association.

Our cluster-mapping exercise has indicated a series of "economic agglomerations" that could be mostly considered of a static cluster-type (according to the classification provided by Sölvell et al. (2003)).

The comparison with the results previously obtained by means of the statistical measurements reveals an overlap of results only in two cases. Disregarding the sectors of construction, civil engineering and other special construction works, both analyses include: the textile industry in Braila, Focsani and Botosani (North-East region), metallurgy in Constanta and Tulcea (South-East region).

According to Porter's (1990, 2003) and Enright's (1998, 2000, 2001) cluster typologies, most of the envisaged economic activities in the clusters outlined in the Eastern part of Romania may be viewed as local and natural resource-dependent rather than traded industries (e.g. wood, textiles, tourism, etc.), based on horizontal relations (e.g. apparel, wood, metallurgy, etc.) rather than vertical ones and as latent or potential, rather than working clusters.

We have also tested to what extent the identified clusters make a difference in performance in terms of contribution to regional employment, turnover and higher productivity. Even if in most of cases such a difference has been noticed, confirming that successful clusters can develop in lagging regions, economic agglomerations with a labour productivity under the regional average, which have not turned to good account yet the efficiency increase potential, have been also revealed.

As regards the possible solutions for cluster support, the main findings resulted from our qualitative inquiry based on the interview technique refer to the following aspects: the concept of clustering is not fully understood, neither are its multiple dimensions, knowledge dissemination in that sense being required; clustering phenomenon is in its emerging stage in both analysed regions; hence, clear vision, objectives and appropriate cluster policies should be set-up by public authorities, in order to stimulate cluster development, attract FDIs and enhance SMEs potential; differentiated approach is required to identify the right combination of measures.

We fully agree that there is no single recipe for less developed regions to follow so as to meet the needs of all clusters; on the contrary, successful cluster policies need to take into account the specific regional context.

Considering their still incipient stage as well as successful experiences of other Central and East European countries, local production systems seem to be the most appropriate organisational form for clusters development in the two analysed regions, with a special emphasis on 'soft' measures, able to strengthen the local networks and to ensure cluster identity.

The EU's policy supportive to clusters, the European Cluster Observatory data base, European Cluster Policy Group developing recommendations as well as the diverse financial resources made available for the EU members can provide a robust basis for an effective cluster policy design in Romania too. Successful experiences in other CEE countries (Poland, Hungary, Czech Republic) also indicate that the overall measures aiming at horizontal economic development, which can be accomplished through involvement of competitive business environment, developing the areas of education, vocational training, innovation centres, improving physical infrastructure, etc. should be combined with a specific focus on cluster development, having as main objective the enhancement of cluster firms' competitiveness.

Attracting FDI as a potential cluster support factor has to remain a priority for decision makers. Even if over the past five years Romania has benefited from consistent FDI inflows, the economic crisis has a negative impact resulted in slowing down FDI flows. Under these circumstances factors such as the business environment, infrastructure and availability of skilled labour have become increasingly important in attracting FDI. As regards the two regions envisaged by our study, the support measures should be differentiated in accordance with the differences in the scope and the quality of these factors, significantly higher in South-East compared to North-East.

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## References

- Aydalot, P. and Keeble, D. (1988), *High Technology Industry and Innovative Environments*, Routledge, New York, London
- Aiginger, K., Davies, D. (2004), "Industrial specialisation and geographical concentration: Two sides of the same coin? Not for the EU", in *Journal of Applied Economics*, Vol. VII, No. 2, November 2004, pp. 231-248
- Amariei, R. and M. Hritcu (2009), "The map of vulnerability to crisis indicates "red" in 27 counties" (in Romanian), in *Capital*, March 25, available at: <http://www.capital.ro/articol/capital-117887.html>
- Andrei, T., Constantin, D.L., Mitrut, C. (2009), "Regional Specialisation and Industrial Concentration in Romania's Transition Period From the Election Cycles Perspective", in *Environment and Planning C: Government and Policy*, Vol. 27, Issue 4, pp. 713-731
- Armstrong, H. and Taylor, J. (2000), *Regional Economics and Policy*, third edition, Blackwell
- Belussi, F. (2001), "Local Local production systems/industrial districts as hyper-networks: a post-Marshallian interpretative frame", paper presented at the EAPE Conference, November, Sienna, Italy, available at <http://www.decon.unipd.it/info/sid/materiale3/bel-Siena-uk.pdf>
- Bojar, E., Bojar, M., Zminda, T. (2008), "The clusters as a factor attracting foreign direct investment in less developed regions", in *Romanian Journal of Regional Science*, 2 (1), pp.54-67
- Bojar, E. (2007), "Clusters – The Concepts and Types. Examples of Clusters in Poland", in E. Bojar, Z. Olesinski (Eds), *The Emergence and Development of Clusters in Poland*, Difin, Warsaw, pp. 11-30
- Bojar, W. (2007), "The Role of Groups of Agricultural Producers in the Process of Cluster-formation in the Lublin Region", in E. Bojar, Z. Olesinski (Eds), *The Emergence and Development of Clusters in Poland*, Difin, Warsaw, pp.149-157
- Borras, S., Tsagdis, D. (2008), *Cluster Policies in Europe – Firms, Institutions, and Governance*, Edward Elgar
- Cappellin, R. (1998), "The Transformation of Local Production Systems: International Networking and Territorial Competitiveness", in M. Steiner (Ed.), *Clusters and Regional Specialization*, Pion, London, pp. 57-80
- Combes, P.P., Mayer, T., Thisse, J.F. (2008), *Economic Geography. The Integration of Regions and Nations*, Princeton University Press
- Constantin, D.L. (2006), "SMEs and Territorial Networks: The Emerging Framework in Romania", in P.Nijkamp, R.L. Moomaw and I. Traistaru-Siedschlag (Eds), *Entrepreneurship, Investment and Spatial Dynamics*, Edward Elgar, pp. 165-181
- Constantin, D.L., Goschin, Z., Ileanu, B. (2009), "Clusters and Regional Policy. A Case Study in Romania", in E. Bojar (Ed.), *Clusters – Policy, Management, Good Clustering Practices in the World*, Dom Organizatora, Torun, pp. 241-261

Enright, M.J. (1998), "Regional Clusters and Firm Strategy", in A. Chandler, P.Hagstrom, O. Solvell (Eds), *The Dynamic Firm*, Oxford University Press, pp.315-342

Enright, M.J. (2000), "The Globalisation of Competition and the Localization of Competition: Policies Toward Regional Clustering," in N. Hood and S. Young (Eds), *The Globalisation of Multinational Enterprise Activity and Economic Development*, London, Macmillan, pp.303-331

Enright, M.J., (2001), "Local Partnerships, Clusters and SME Globalisation," in *Enhancing SME Competitiveness*, Paris, OECD, 2001, pp.115-150

Europe INNOVA (2007), "Innovation Clusters in Europe. A Statistical Analysis and Overview of Current Policy Support", DG Enterprise and Industry Report – *PRO INNO Europe paper*, No.5, Luxembourg

Europe INNOVA (2008), *Cluster Policy in Europe. A brief summary of cluster policies in 31 European countries*, Oxford Research AS, available at:  
[http://www.clusterobservatory.eu/upload/Synthesis\\_report\\_cluster\\_mapping.pdf](http://www.clusterobservatory.eu/upload/Synthesis_report_cluster_mapping.pdf)

European Cluster Alliance (2007), *The European Cluster Memorandum*, available at: [www.proinno-europe.eu/NWEV/uploaded.../Cluster\\_Memorandum.pdf](http://www.proinno-europe.eu/NWEV/uploaded.../Cluster_Memorandum.pdf)

Europe Cluster Observatory (ECO), "Methodology", available at <http://www.clusterobservatory.eu>

Eurostat, *General and Regional Statistics*, available at  
[http://epp.eurostat.ec.europa.eu/portal/page/portal/region\\_cities/regional\\_statistics/data/main\\_tables](http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/regional_statistics/data/main_tables)

Feser, E.J., Sweeney, S.H. (2002), "Theory, methods and cross-metropolitan comparison of business clustering", in McCann(Ed.), *Industrial Location Economics*, Edward Elgar

Funck, R.H. and Kowalski, J.S. (1996), "Management Policies for Central European Countries: How to Induce Research and Development Activities and Innovative Behaviour", in Chatterji, M., Domanski, R. (Eds), *Urban and Regional Management in Countries in Transition*, Polish Academy of Sciences, Committee for Space Economy and Regional Planning, Warsaw

Funck, R.H. and Kowalski, J.S. (1997), "Innovative Behaviour, R&D Development Activities and Technology Policies in Countries in Transition: The Case of Central Europe", in Bertuglia, C.S., Lombardo, S., Nijkamp, P. (eds), *Innovative Behaviour in Space and Time*, Springer-Verlag

Goschin, Z., Constantin, D.L. (2010), „The geography of the financial crisis and policy response in Romania”, in G. Gorzelak and Ch. Goh (editori), *Financial Crisis in Central and Eastern Europe - from Similarity to Diversity*, Wydawnictwo Naukowe Scholar Publishing House, Poland, 2010, pp. 161-191

Goschin, Z., Constantin, D.L., Roman, M., Ileanu, B. (2009a), "Regional Specialisation and Geographic Concentration of Industries in Romania", in *South-Eastern Europe Journal of Economics*, Vol.7, No.1/2009, pp. 61-76

Goschin, Z., Constantin, D.L., Roman, M., Ileanu, B. (2009b), "Specialisation and Concentration Patterns in the Romanian Economy", in *Journal of Applied Quantitative Methods*, Vol. 4, Issue 1, March 2009, pp. 95-111

HealthClusterNet (2010), Dél Dunántúl, available at  
<http://www.healthclusternet.org/page/partners/deldunantul.cfm>

- Hendry, C., Brown, J. (2006), "Dynamics of Clustering and Performance in the UK Opto-electronics Industry", in *Regional Studies*, Vol. 40, No.7, October, pp. 707-726
- Hilber, C.A.I., Voicu, I. (2010), "Agglomeration Economies and the Location of Foreign Direct Investment: Empirical Evidence from Romania", in *Regional Studies*, Vol. 44, No.3, April, pp. 355-372
- Hospers, G.J., Beugelsdijk, S. (2002), "Regional cluster policies: learning by comparing?", in *Kyklos*, Vol. 55, No. 3, pp. 381-402
- Hospers, G.J., Sautet, F., Desrochers, P. (2008), "Silicon Somewhere: A Critique of Cluster Policy", in C. Karlsson (Ed.), *Handbook of Research on Innovation and Clusters: Cases and Policies*, Edward Elgar, pp. 430-446
- Isbasoiu, G.M. (2006), "Industrial Clusters and Regional Development. The Case of Timisoara and Montebelluna", *MPRA Paper*, No. 5057, available at: <http://mpra.ub.uni-muenchen.de/5037/>
- Kelton, K.M.L., Pasquale, M.K., Rebelein, R.P. (2008), "Using North American Industry Classification System (NAICS) to Identify National Industry Cluster Templates for Applied Regional Analysis", in *Regional Studies*, Vol. 43, No.3, April, pp. 305-322
- Ketels, C., Lindqvist, G., Sölvell, Ö. (2006), *Cluster Initiatives in Developing and Transition Economies*, Centre for Strategy and Competitiveness, Stockholm
- Ketels, C. (2003), "The development of cluster concept – present experiences and further developments", Paper prepared for the NRW Conference on Clusters, Duisburg, Germany, December, available at: [http://www.isc.hbs.edu/pdf/Frontiers\\_of\\_Cluster\\_Research\\_2003.11.23.pdf](http://www.isc.hbs.edu/pdf/Frontiers_of_Cluster_Research_2003.11.23.pdf)
- Kowalski, J. and Rothengatter, W. (1998), "Introduction to Soft Factors in Spatial Dynamics", Scientific Seminar in Honour of Rolf Funck, University of Karlsruhe, Germany, February
- LEED (2004), "Clusters of enterprises and the internationalisation of SMEs: The case of the Romanian region of Timisoara", OECD – LEED seminar, Timisoara
- Leick, B. (2010), "Regional clusters in traditional industries and cluster policy: the case of East Germany "Musicon Valley", presentation at the Annual Conference of Regional Studies Association, May, Pecs, Hungary
- Maillat, D. (1990), "SMEs, innovation and territorial development", in Cappellin, R., Nijkamp, P. (eds), *The Spatial Context of Technological Development*, Avebury
- Majocchi, A. (2000), "Are Industrial Clusters Going International? The Case of Italian SMEs in Romania", *Working Paper* No.12, University of Insubria
- Mariotti, I. (2008), "Italian investments in the agglomeration of Timisoara in Romania: Threat of opportunity for economic development?", in *Romanian Journal of Regional Science*, 2 (2), pp.53-79
- McCann, P. (2001), *Regional and Urban Economics*, Oxford University Press
- Mitruț, C., Zaman, G., Goschin, Z., Constantin, D.L. (2010), "A Composite Index for R&D Absorption Capacity. Spatial Configuration in Romania", in *Economic Computation and Economic Cybernetics Studies and Research*, Vol. 44, No.1, pp. 5-20

- Molnar, T. (2001), "Regional characteristics of social and economic structures in Western Transdanubia", in *Journal of Central European Agriculture*, 2 (1-2), pp. 17-26
- Nijkamp, P. (1997), "Northern Poland regional development initiative and project. Some theoretical and policy perspectives", Department of Spatial Economics, Free University of Amsterdam, mimeo
- Pislaru, D., Aristide, O. (2004), "Identifying emerging clusters in Romania", [www.gea.ro](http://www.gea.ro)
- Porter, M.E. (1990), "The Competitive Advantage of Nations", Free Press, New York
- Porter, M.E. (2003), "The Economic Performance of Regions", in *Regional Studies*, Vol. 37, No.6-7, pp.549-678
- Pusterla, F. (2002), "Foreign Direct Investment Profitability: EU Firms in Romania", in P.Nijkamp, R.L. Moomaw, I. Traistaru-Siedschlag (Eds), *Entrepreneurship, Investment and Spatial Dynamics*, Edward Elgar, pp. 68-86
- Romanian Ministry of Economy (2010), "Clusters and Potential Clusters in Romania - A Mapping Exercise", Bucharest, February
- Rosenfeld, S.A. (2002), "Creating Smart Systems. A guide to cluster strategies in less favoured regions", paper prepared for EC-DG Regio, available at [http://ec.europa.eu/regional\\_policy/innovation/pdf/guide\\_rosenfeld\\_final.pdf](http://ec.europa.eu/regional_policy/innovation/pdf/guide_rosenfeld_final.pdf)
- Skokan, K. (2009), "Regional Clusters and Transformation of Old Industrial Regions", Proceedings of the 3<sup>rd</sup> Central European Conference in Regional Science – CERS, Ostrava, October, pp. 770-783, available at [http://www.cers.tuke.sk/cers2009/PDF/02\\_55\\_Skokan.pdf](http://www.cers.tuke.sk/cers2009/PDF/02_55_Skokan.pdf)
- Sohn, D.W., Kim, H., Lee, J.H. (2009), "Policy-driven university-industry linkages and innovation networks in Korea", in *Environment and Planning C: Government and Policy*, Vol. 27, Issue 4, pp.647-664
- Sölvell, Ö., Lindqvist, G., Ketels, C. (2003), "The Cluster Initiative Greenbook", The Competitiveness Institute (TCI)/Vinnova: Gothenburg, [www.cluster-research.org](http://www.cluster-research.org)
- Sölvell, Ö., Ketels, C., Lindqvist, G. (2006), "Industrial Specialization and Regional Clusters in the Ten New EU Member States", paper presented at DRUID Summer Conference, Copenhagen, June, available at <http://www2.druid.dk/conferences/viewpaper.php?id=572&cf=8>
- Steiner, M. (2002), "Clusters and networks: institutional settings and strategic perspectives", in McCann (ed.), *Industrial Location Economics*, Edward Elgar, pp. 207-221
- Szimoniuk, B. (2003), "Rural Clusters in the Lublin Region – Good Solutions for a Young Democracy", paper presented at the 43<sup>rd</sup> Congress of the ERSA, Jyväskylä, Finland, August, available at <http://www-sre.wu-wien.ac.at/ersa/ersaconfs/ersa03/cdrom/papers/410.pdf>
- Van der Linde, C. (2003), "The Demography of Clusters – Findings from the Cluster Meta-Study", in Broucker, J., Dohse, D. and Doltwedel, R. (Eds), *Innovation Clusters and Interregional Competition*, Berlin, Heidelberg, New York, pp. 130-149

Teräs, J. (2009), "Non-metropolitan regional clusters: critical success factors", EPROCA General Assembly, Snowpolis Ltd, Vuokatti, Finland, available at [http://www.prodemic.fi/data/attachments/TerasJukka\\_2ndGA.pdf](http://www.prodemic.fi/data/attachments/TerasJukka_2ndGA.pdf)

Tödting, F., Trippl, M. (2004), "Like Phoenix from the Ashes? The Renewal of Clusters in Old Industrial Areas", in *Urban Studies*, No.41, pp. 1175-1195

Tödting, F., Trippl, M. (2008), "Cluster renewal in old industrial regions: continuity or radical change?", in Karlsson, Ch. (Ed.), *Handbook Of Research On Cluster Theory*. Edward Elgar Publishing, 2008. pp. 203-218

Traistaru I, Iara A., Pauna C. (2002), "Regional structural change and growth in Romania", paper presented at the 42nd Congress of the European Regional Science Association, Dortmund, August

Trippl, M. (2010), "Low-tech innovation in a high-tech environment: the case of the food industry in the Vienna metropolitan region", in *Regional Responses and Global Shifts: Actors, Institutions and Organisations*, Abstracts of the Annual Conference of the Regional Studies Association, Pecs, Hungary, May, pp. 193-194



## Appendix 1 – Methodological Note

*The specialisation ratios* are computed as follows:

$$g_{ij}^S = \frac{E_{ij}}{\sum_{j=1}^m E_{ij}} = \frac{E_{ij}}{E_i}, \text{ where:}$$

$g_{ij}^S$  - the specialisation ratio: the share of the activity j in the total employment of region/county i;

$E_{ij}$  - employment in activity j in the region/county i;

$E_i$  - total employment in the region/county i;

i – region/county; j- activity.

*The Location Quotient LQ*, is a simple measure of both concentration and specialisation of a region/county i in an activity j and can be computed based on either the concentration ratios  $g_{ij}^C$  or the specialisation ratios  $g_{ij}^S$ :

$$LQ_{ij} = \frac{E_{ij} / E_j}{E_i / E} = \frac{E_{ij} / E_i}{E_j / E} \Leftrightarrow LQ_{ij} = \frac{g_{ij}^C}{E_i / E} = \frac{g_{ij}^S}{E_j / E},$$

where  $E$  is the total country employment.

*The Herfindahl-Hirschman Index:*

$$H_i^S = \sum_{j=1}^m (g_{ij}^S)^2, \text{ where: } g_{ij}^S = \frac{E_{ij}}{\sum_{j=1}^m E_{ij}} = \frac{E_{ij}}{E_i}$$

is increasing with the degree of specialisation, reaching its upper limit of 1 when one region is specialised in only one activity.

*The Gini Coefficient (GC)*, first used for the analysis of income inequality between individuals, is also suitable for the study of spatial concentration of economic activities. The variant that we considered in this study is computed as:

$$GC_j = \frac{\sum_{i=1}^n (2i - n - 1) \cdot E_{ij}}{n \sum_{i=1}^n E_{ij}},$$

with the values of the variable ordered increasingly, and n is the number of regions/counties. The Gini Coefficient ranges between 0 and 1, rising with the degree of concentration.

**Appendix 2. Location quotients in North-East, by activity and by county, 2007**

	<b>North-East</b>	Bacau	Botosani	Iasi	Neamt	Suceava	Vaslui
<i>Agriculture</i>	<b>1.396</b>	1.050	1.746	1.135	1.489	1.558	1.696
<i>Sylviculture, forest exploitation and hunting</i>	<b>1.566</b>	1.605	0.628	0.567	3.191	2.375	0.991
<i>Fishery and pisciculture</i>	<b>1.296</b>	1.210	1.776	1.833	0.000	1.119	1.869
<i>Construction</i>	<b>0.849</b>	1.231	0.555	1.139	0.673	0.675	0.503
<i>Trade</i>	<b>0.870</b>	0.952	0.748	0.914	0.985	0.851	0.663
<i>Hotels and restaurants</i>	<b>0.822</b>	0.548	0.585	0.905	1.143	1.037	0.538
<i>Transport and storage</i>	<b>0.704</b>	0.743	0.582	0.788	0.602	0.788	0.597
<i>Post and communications</i>	<b>0.715</b>	0.935	0.588	0.809	0.613	0.618	0.619
<i>Financial intermediations</i>	<b>0.611</b>	0.749	0.471	0.729	0.532	0.561	0.496
<i>Real estate transactions and other services</i>	<b>0.620</b>	0.678	0.456	0.911	0.585	0.442	0.455
<i>Public administration and defense</i>	<b>0.881</b>	0.872	0.899	0.829	0.873	0.910	0.946
<i>Education</i>	<b>1.160</b>	1.183	1.034	1.429	0.922	1.111	1.116
<i>Health and social assistance</i>	<b>1.085</b>	1.100	1.038	1.398	0.845	0.863	1.168
<i>Other economic activities</i>	<b>0.832</b>	1.001	0.827	1.101	0.413	0.897	0.483
<i>Energy products mining and quarrying</i>	<b>0.509</b>	2.244	0.004	0.000	0.153	0.437	0.000
<i>Non-energy products mining and quarrying</i>	<b>0.758</b>	0.909	0.755	0.172	0.446	2.043	0.000
<i>Food, beverages and tobacco</i>	<b>0.863</b>	1.114	0.624	0.798	0.873	0.886	0.808
<i>Textile and textile products</i>	<b>1.188</b>	1.179	1.818	1.080	1.138	0.677	1.676
<i>Leather goods and footwear</i>	<b>0.652</b>	0.753	0.320	0.633	0.079	0.940	1.171
<i>Wood and wooden products manufacturing (except furniture)</i>	<b>1.269</b>	1.714	0.401	0.313	2.678	2.044	0.253
<i>Paper, pulp, paper products, publishing houses</i>	<b>0.654</b>	0.998	0.328	0.908	0.578	0.580	0.170
<i>Crude oil processing, coal coking and nuclear fuel treatment</i>	<b>1.527</b>	8.554	0.000	0.000	0.000	0.000	0.000
<i>Chemical substances and products</i>	<b>1.096</b>	2.576	0.015	1.582	1.500	0.099	0.075
<i>Rubber and plastic products</i>	<b>0.376</b>	0.192	0.550	0.369	0.486	0.415	0.280
<i>Construction materials and other products of non metallic minerals</i>	<b>0.593</b>	0.298	0.279	0.639	1.473	0.596	0.093
<i>Metallurgy</i>	<b>0.566</b>	0.115	0.086	1.134	1.599	0.066	0.051
<i>Metallic construction and metal products</i>	<b>0.526</b>	0.912	0.449	0.553	0.412	0.348	0.401
<i>Machinery and equipments</i>	<b>0.924</b>	1.029	0.265	0.870	0.736	0.480	2.557
<i>Electrical and optical equipment</i>	<b>0.314</b>	0.133	0.461	0.659	0.071	0.099	0.419
<i>Means of transport</i>	<b>0.258</b>	0.642	0.000	0.484	0.007	0.145	0.000
<i>Other industrial activities</i>	<b>0.709</b>	0.697	0.546	0.701	0.893	0.911	0.332
<i>Electric and thermal energy, gas and water</i>	<b>0.863</b>	1.172	0.642	1.026	0.619	0.779	0.755

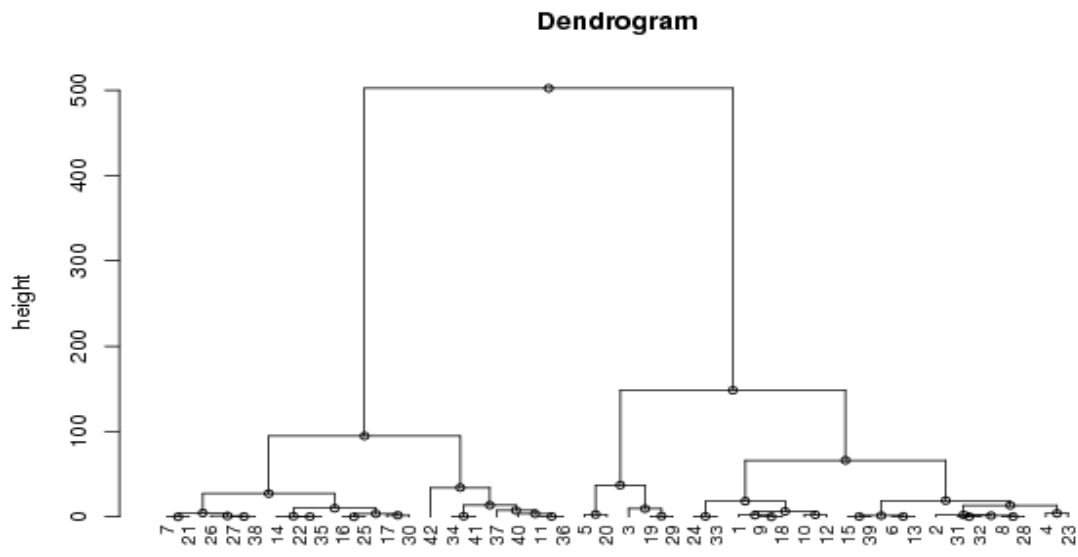
**Source:** authors' calculations based on data issued by NIS

**Appendix 3. Location quotients in South-East, by activity and by county, 2007**

	<b>South-East</b>	Braila	Buzau	Constanta	Galati	Tulcea	Vrancea
<i>Agriculture</i>	<b>1.120</b>	1.058	1.451	0.764	1.045	1.221	1.548
<i>Sylviculture, forest exploitation and hunting</i>	<b>0.821</b>	0.729	0.795	0.318	0.350	2.462	1.662
<i>Fishery and pisciculture</i>	<b>3.613</b>	0.000	1.499	0.901	1.321	34.047	0.000
<i>Construction</i>	<b>1.066</b>	1.099	0.775	1.449	1.201	0.783	0.577
<i>Trade</i>	<b>0.922</b>	0.946	0.843	1.105	0.933	0.660	0.757
<i>Hotels and restaurants</i>	<b>1.052</b>	0.722	0.617	1.612	0.870	1.019	1.006
<i>Transport and storage</i>	<b>1.236</b>	0.811	0.712	2.131	1.113	0.937	0.770
<i>Post and communications</i>	<b>0.750</b>	0.683	0.607	0.762	0.923	0.911	0.623
<i>Financial intermediations</i>	<b>0.707</b>	0.729	0.530	0.902	0.739	0.547	0.554
<i>Real estate transactions and other services</i>	<b>0.782</b>	0.747	0.484	1.127	0.887	0.632	0.409
<i>Public administration and defense</i>	<b>1.001</b>	1.012	0.965	0.870	0.992	1.471	1.038
<i>Education</i>	<b>0.920</b>	0.939	0.872	0.887	1.044	0.970	0.828
<i>Health and social assistance</i>	<b>0.970</b>	1.038	0.815	1.008	0.943	1.130	0.961
<i>Other economic activities</i>	<b>0.984</b>	0.693	0.639	1.385	0.870	1.360	0.778
<i>Energy products mining and quarrying</i>	<b>0.411</b>	0.707	1.005	0.316	0.276	0.000	0.034
<i>Non-energy products mining and quarrying</i>	<b>1.282</b>	0.186	0.305	2.175	0.427	4.906	0.661
<i>Food, beverages and tobacco</i>	<b>1.083</b>	1.599	1.098	0.801	1.077	1.238	1.097
<i>Textile and textile products</i>	<b>1.154</b>	2.734	1.523	0.272	0.255	1.386	2.234
<i>Leather goods and footwear</i>	<b>0.270</b>	0.595	0.778	0.054	0.106	0.251	0.034
<i>Wood and wooden products manufacturing (except furniture)</i>	<b>0.528</b>	0.152	1.396	0.128	0.229	0.426	1.102
<i>Paper, pulp, paper products, publishing houses</i>	<b>0.716</b>	1.045	0.514	0.678	0.470	0.115	1.465
<i>Crude oil processing, coal coking and nuclear fuel treatment</i>	<b>1.792</b>	0.000	0.000	3.294	4.282	0.127	0.000
<i>Chemical substances and products</i>	<b>0.462</b>	0.055	0.377	1.040	0.456	0.021	0.014
<i>Rubber and plastic products</i>	<b>0.761</b>	0.301	1.672	0.954	0.177	0.284	0.754
<i>Construction materials and other products of non metallic minerals</i>	<b>0.663</b>	0.169	1.054	1.016	0.233	0.675	0.491
<i>Metallurgy</i>	<b>2.486</b>	0.973	0.588	0.175	10.170	1.822	0.534
<i>Metallic construction and metal products</i>	<b>1.269</b>	0.986	2.190	0.724	1.897	1.176	0.674
<i>Machinery and equipments</i>	<b>0.519</b>	1.164	0.139	0.421	1.000	0.299	0.065
<i>Electrical and optical equipment</i>	<b>0.152</b>	0.119	0.304	0.114	0.199	0.042	0.073
<i>Means of transport</i>	<b>1.962</b>	1.863	0.327	3.331	2.016	3.593	0.176
<i>Other industrial activities</i>	<b>0.813</b>	0.543	1.100	0.652	1.251	0.447	0.632
<i>Electric and thermal energy, gas and water</i>	<b>1.125</b>	1.245	0.733	1.452	1.371	0.706	0.731

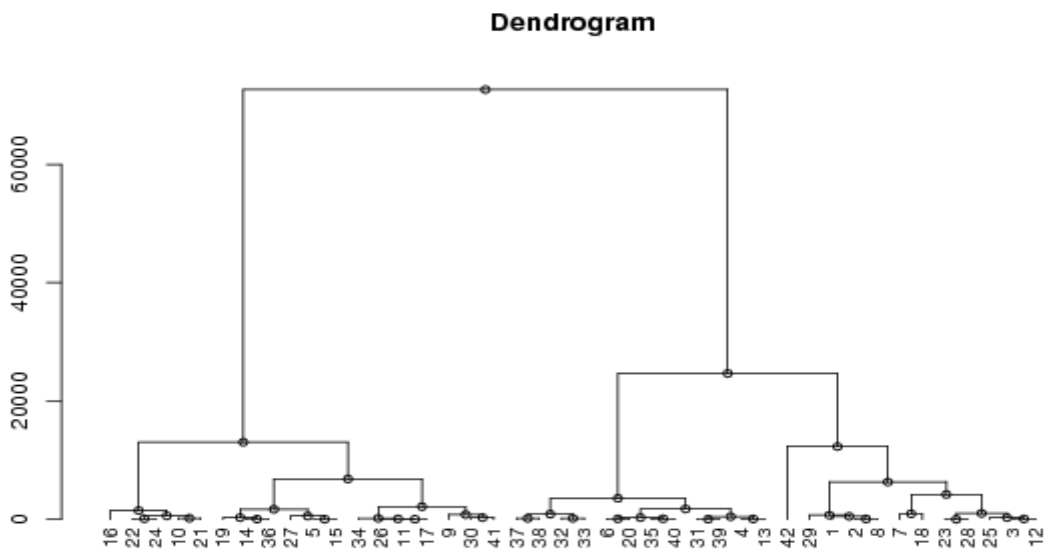
**Source:** authors' calculations based on data issued by NIS

**Appendix 4. Cluster analysis (dendrogram) for selected activities**



Agriculture  
Method: ward

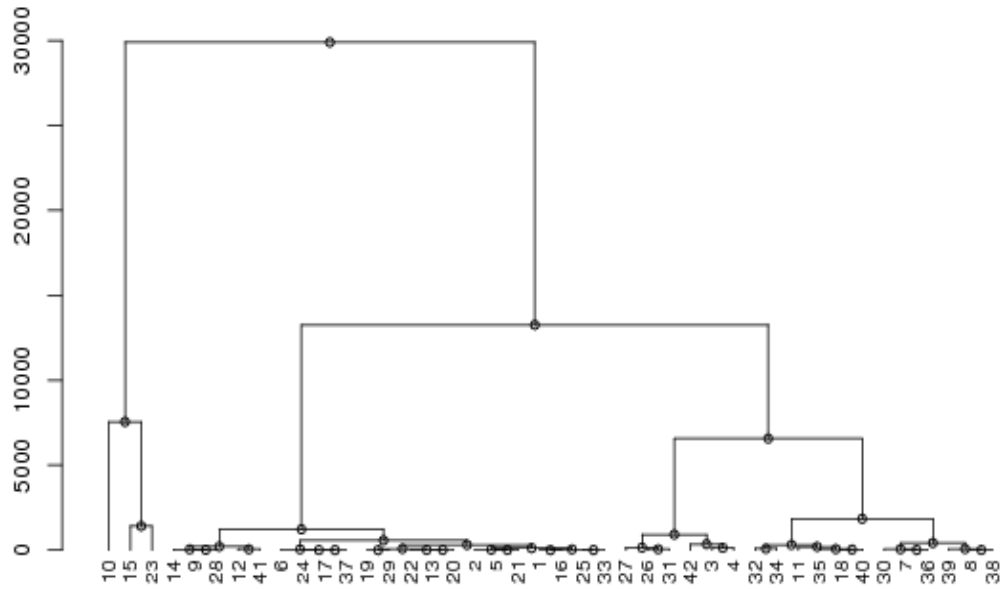
1Bacau 2Botosani 3Iasi 4Neamt 5Suceava 6Vaslui 7Braila 8Buzau 9Constanta 10Galati 11Tulcea 12Vrancea  
13Arges 14Calarasi 15Dambovita 16Giurgiu 17Ialomita 18Prahova 19Teleorman 20Dolj 21Gorj 22Mehedinti  
23Olt 24Valcea 25Arad 26Caras-Severin 27Hunedoara 28Timis 29Bihor 30Bistrita-Nasaud 31Cluj 32Maramures  
33Satu Mare 34Salaj 35Alba 36Brasov 37Covasna 38Harghita 39Mures 40Sibiu 41Ilfov 42Bucuresti



Textile and textile products  
Method: ward

1Bacau 2Botosani 3Iasi 4Neamt 5Suceava 6Vaslui 7Braila 8Buzau 9Constanta 10Galati 11Tulcea 12Vrancea  
13Arges 14Calarasi 15Dambovita 16Giurgiu 17Ialomita 18Prahova 19Teleorman 20Dolj 21Gorj 22Mehedinti  
23Olt 24Valcea 25Arad 26Caras-Severin 27Hunedoara 28Timis 29Bihor 30Bistrita-Nasaud 31Cluj 32Maramures  
33Satu Mare 34Salaj 35Alba 36Brasov 37Covasna 38Harghita 39Mures 40Sibiu 41Ilfov 42Bucuresti

### Dendrogram

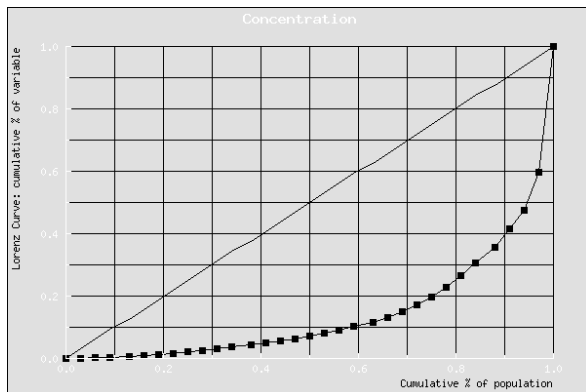


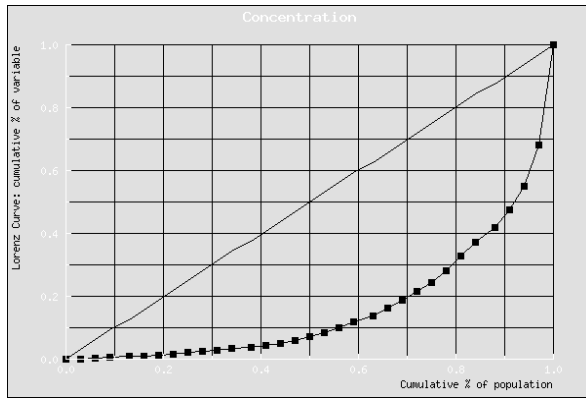
Metallurgy  
Method: ward

1Bacau 2Botosani 3Iasi 4Neamt 5Suceava 6Vaslui 7Braila 8Buzau 9Constanta 10Galati 11Tulcea 12Vrancea  
13Arges 14Calarasi 15Dambovita 16Giurgiu 17Ialomita 18Prahova 19Teleorman 20Dolj 21Gorj 22Mehedinti  
23Olt 24Valcea 25Arad 26Caras-Severin 27Hunedoara 28Timis 29Bihor 30Bistrita-Nasaud 31Cluj 32Maramures  
33Satu Mare 34Salaj 35Alba 36Brasov 37Covasna 38Harghita 39Mures 40Sibiu 41Ilfov 42Bucuresti

## Appendix 5. Lorenz Curves for the regions in East Romania

### North-East and South-East





**Source:** authors' calculations based on data issued by NIS