EXPLORING SMES DISTRIBUTION IN ROMANIA. A SPATIAL CLUSTERING PERSPECTIVE

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Abstract

Entrepreneurship plays a key role in regional development and competitiveness, but is far from achieving its true potential in Romania. This paper aims at outlining the regional patterns of Romanian entrepreneurship using various statistical methods. We found that SMEs spatial distribution is marked by significant inequalities and a clear divide exists between the Western and Eastern parts of Romania. Using the appropriate spatial investigation techniques, we identified several spatial clusters of low SMEs density, mostly in less developed zones, with little business opportunities, from the Eastern Romania.

Keywords: *SMEs density, spatial clustering, Moran's I, county.*

JEL Classification: L26, O11, R19

1. Introduction

Entrepreneurship and SMEs matter. The scientific recognition of the fact that entrepreneurship enhances economic growth has led to the formulation of a clear political mandate to promote private enterprise in EU. Moreover, current European policies include a clear and complete recognition of the fact that the independence and creativity of the entrepreneur is essential for sustainable economic development. The Lisbon Agenda (2000) stressed the need to create a favorable environment for the creation and development of small and medium enterprises and the emphasis on entrepreneurship and the role of SMEs was resumed by the Europe 2020 strategy, which is aimed at correctly opening up the single market for small businesses.

In the context of the collapse of the command economies in the late 80s, a unique and unprecedented historical evolution begun in Europe, Romania being also engaged in it. Among the processes that have occurred, the change of ownership is the most important through its role and consequences. One of the main features of structural transformation in Romania throughout the transition period is the emergence of entrepreneurship and SMEs. Unfortunately, in the past 25 years, entrepreneurship developed in Romania against an improper background, as follows: transfer of public property to "private owners" (corporations and entrepreneurs) was made in a disorderly manner by unprofessional public authorities, generating waves of unemployment and spoliation of the country's natural resources (oil, gas, timber, farmland, etc.); an excessively bureaucratic restructuring of the manufacturing industries and transfer of the industrial property to unsuitable investors that closed many big enterprises shortly after their privatization, with disastrous effects for skilled labor in some sectors of the economy, triggering high unemployment and massive migration to developed EU countries; the rise of bureaucracy to the detriment of productivity and efficiency; abandonment and decline of most rural areas.

In this context, the measures included in the Operational Programme "SMEs Initiative" Romania, supported by the Regional Development Fund (ERDF), aimed at enhancing the competitiveness of SMEs, by putting a special focus on their innovative

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capabilities.) Another important program meant to encourage SMEs creation and the development of entrepreneurial initiatives is the National Program for Rural Development, which has funded between 2007 and 2013 many projects run by women and population less than 40 in age, through the Measure 312 "Support the creation and development of new enterprises" and Measure 313 "Encouraging touristic activities". The current Operational Program "Human Capital" 2014-2020 aims, though one of its measures that provide micro grants, to support entrepreneurship within communities: the ultimate goal is self – employment, and consequently new jobs creation. The novelty of the program consists of the exclusion of Bucharest – Ilfov area from funding, its focus being mainly on less developed geographical regions.

Only a few Romanian studies approached the issues related to the regional distribution of SMEs, focusing on the spatial dynamics of SMEs, their contribution to the territorial development of Romania, access to funding, effects of the economic crisis, etc. (Cojanu, 2006; Isaic-Maniu, 2008; Platon 2009; Hunya, 2011; Dudian, 2014; Nicolae et al., 2016). Over the last 15 years, the White Cart of SMEs presented the annual situation of the Romanian SMEs, undertaking only a descriptive statics approach, aiming at a static radiography of the phenomenon, rather than statistical modeling meant to capture relations and dynamics.

We aim to add a new territorial perspective to previous research on SMEs by employing special methods of spatial analysis that help identify the regional patterns of Romanian entrepreneurship. Our endeavor brings new insights to the topic, allowing for a deeper understanding of SMEs spatial distribution and providing useful information for regional policy-makers.

The remainder of this paper proceeds as follows. Next section provides a brief overview of previous research on the territorial distribution of SMEs. Section 3 introduces the methods employed in the analysis, together with the variables and data. Section 4 presents the results of the empirical analysis on SMEs density, focusing on the spatial clustering and discussing the policy implications of our findings, while section 5 concludes.

2. Literature review

Entrepreneurs contribute through their actions to the changes in the rate, shape and location of economic development. That is, the number and quality of available entrepreneurs is an important determinant of economic growth and development in any region. Entrepreneurs tend to migrate from one region to another in search of more profits or less effort to achieve their goals (Grigore and Dragan, 2015).

In international literature, there are several studies which link economic growth and entrepreneurship (Ács et al., 2013; Szirmai et al., 2011; Caree and Thurik, 2010; Walzer, 2009; Audretsch et al. 2006; Dejardin, 2000, Klepper, 1996). Furthermore, international organizations, governments and policymakers have shown greater attention to the functions carried out by entrepreneurship and its role in generating economic growth. Local literature, dedicated to SMEs and entrepreneurial phenomenon, focused largely on descriptive and qualitative analysis (Marchiş, 2011; Pîslaru şi Modreanu, 2012; Nicolescu, 2016), as well as quantitative (Armeanu et al. 2014, Grigore and Dragan, 2014), reveals that the difficulties that SMEs faced did not allow them to develop to their true potential, limiting the contribution of this sector to GDP.

Nicolae et al. (2016) reinforced the idea that entrepreneurship is not only a national phenomenon, but also a regional one. Investigating three regions (Bucuresti-Ilfov, Centre and North-East), they stated that "despite the increasing importance of the territorial dimension in supporting economic growth at policy and declarative levels, in practice, in

Romania, the territorial structure and spatial organization of the economy contributes little to the national added value*" (*Nicolae et al., 2016, p.394).

Another author that related entrepreneurship with territorial development and competitiveness was Cojanu (2006); he identified three areas of development: counties that lack entrepreneurial capability, those that expose a high potential and counties that fare remarkably well in this area. His study (as others: Isaic-Maniu, 2008, Nicolae and Ion, 2016, The White Paper of SME`s in Romania from 2007 until 2016) has shown that entrepreneurship is unevenly developed across Romanian counties.

Dudian (2014) trying to capture the economic situation used four indicators (turnover, net income, profit margin, and labor productivity) for assessing performance for SMEs in Romania during 2004 – 2013 and the result was also that the regions are different. The most performant region in Romania in terms of the analyzed indicators was the West region, and the lowest performant region was the South-West Oltenia.

3. Method and Data

In this paper we undertake a county-level research on SMEs density in Romania, using both descriptive statistics and specific methods of spatial analysis.

Firstly, we are going to analyze the territorial patterns of different groups of SMEs based on county shares in total, as well as on individual county rankings, focusing on the extreme (high/low) values. We will also measure the territorial dispersion of SMEs density by size of the enterprises, as follows:

$$\sigma = \frac{\sqrt{\frac{\sum_{i=1}^{n}(D_{ik} - \overline{D}_k)^2}{n}}}{\overline{D}_k}, \quad (1)$$

where σ is the coefficient of variation across counties, D_{ik} is the density of the SMEs in county *i* and size group *k*, and *n* is the number of counties.

Theory and empiric research in regional economics revealed that neighbor regions often tend to share common characteristics, therefore we will test for spatial dependence in SMEs density by employing the traditional Moran's *I* indicator (Anselin and Rey, 1991) that compares the SMEs density in each county *i* with the weighted average of the values of its neighbors *j*:

$$MI = \frac{n\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(D_i - \overline{D})(D_j - \overline{D})}{(\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij})\sum_{i=1}^{n}(D_i - \overline{D})^2}, \quad (2)$$

where D_i and D_j represent the values of the SMEs density in the counties *i* and *j* respectivelly, $\overline{D}$ is the average (national) SMEs density, and w_{ij} represent spatial weights capturing the "spatial influence" between county *j* and county *i*. Moran's *I* requires that the local neighborhood around each geographic unit is defined based on a weights matrix. In this paper we use a first-order queen contiguity matrix, i.e. w_{ij} = 1 if regions *i* and *j* are

neighbours and $w_{ij} = 0$ otherwise. Moreover, we apply a permutation test to check if the computed value of Moran's I is statistically significant (Anselin and Rey, 1991).

Since Moran's I is a global indicator of spatial autocorrelation, it is useful to measure the spatial association for each individual location i as well. To this end we use the LISA (Local Indicators of Spatial Autocorrelation) indicator, defined as follows (Anselin, 2005; LeSage and Pace, 2009):

$$\boldsymbol{LISA_i = Z_i \sum_{j=1}^{m} w_{ij} Z_j}, \qquad (3)$$

where z_i and z_j are the standardized scores of SMEs density in the counties i and j respectivelly, j representing only the neighbors of county i (as defined by the weights w_{ij}). The Cluster Map associated to the Local Indicators of Spatial Autocorrelation in Geoda points to significant cases of local spatial dependence by type of spatial correlation (positive-similar or negative-dissimilar).

In this research we are going to use data on the number of SMEs by company size, according to the number of employees, as follows: microenterprises (less than nine employees), small enterprises (between 10 and 49 persons), and medium-sized enterprises (more than 50, but fewer than 250 employees). Data on SMEs, as well as the number of population and GDP at county (NUTS) level, come from the Romanian Institute of National Statistics TEMPO database. Own computations were undertaken to determine SMEs density by size and county and GDP per capita.

4.Results and discussion

SMEs density is an appropriate indicator to capture the true entrepreneurial spirit in a region, as it reflects the degree of entrepreneurial initiative of the population, the local economic environment, the investment attractiveness, the business climate, etc.

Statistical data for 2014 show that the higher is the development level of a county the higher its SMEs density. The values of the coefficient of correlation between GDP/capita and the SMEs density are very high for all three groups of SMEs, the strengths of the correlation increasing with the size of the enterprise: 0.885677 for the microenterprises, 0.896199 for small enterprises and 0.899061 for medium-sized enterprises. In 2014 most SMEs (21.49%) were located in Bucharest Municipality, the best developed aria in Romania, while the fewest (0.65%) belonged to a rather poor county - Mehedinti.

In each Romanian county, microenterprises represent the overwhelming majority of the total number of enterprises, ranging from a minimum of 86.13% in Satu Mare to a maximum of 90.44% in Teleorman. The share of small enterprises is much more modest, ranging from 7.62% in Teleorman to 11.76% in Covasna, while the medium-sized enterprises are quite few, their share varying from 1.06 in Mehedinti to 2.27% in Sibiu.

The coefficient of SMEs density variation among counties is very high for each group of enterprises when the number of companies is analysed (Table 1, column 1).

Table 1. The territorial coefficient of variation for SMEs

Company size (number of employees)	Coefficient of variation for:	
	Number of SMEs	SMEs density
0	*1*	*2*
Micro (up to 9)	1.3367	0.4357
Small (10-49)	1.3505	0.4383
Medium-sized (50- 250)	1.1952	0.4128
Total	1.3605	0.5126

Source: own processing

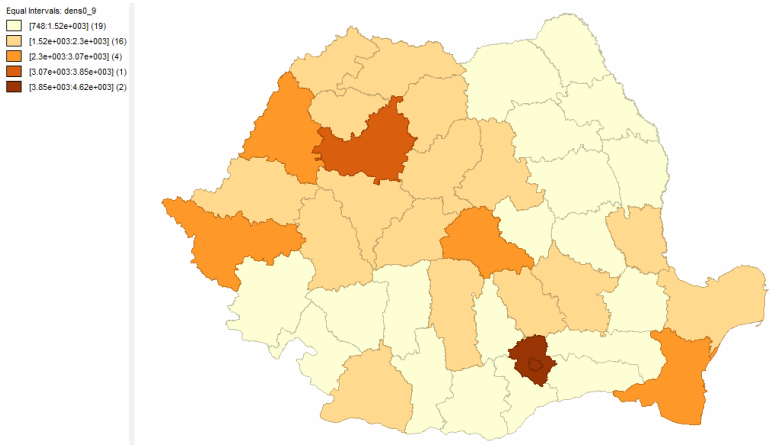
Since Romanian counties differ in size, population, development level, etc., statistical comparability requires that we consider the number of enterprises in relation to a relevant variable of reference. Consequently, we used for comparisons the SMEs density, computed for each county as number of enterprises per 100000 inhabitants, and the new coefficients of variation, although still significant, diminished considerably (Table 1, column 2). The highest territorial variation among the SMEs groups is for small enterprises (10 to 49 employees).

The three maps in Figure 1 show the spatial distribution of SMEs density by main size groups according to the number of employees: 0 to 9, 10 to 49 and 50 to 249.

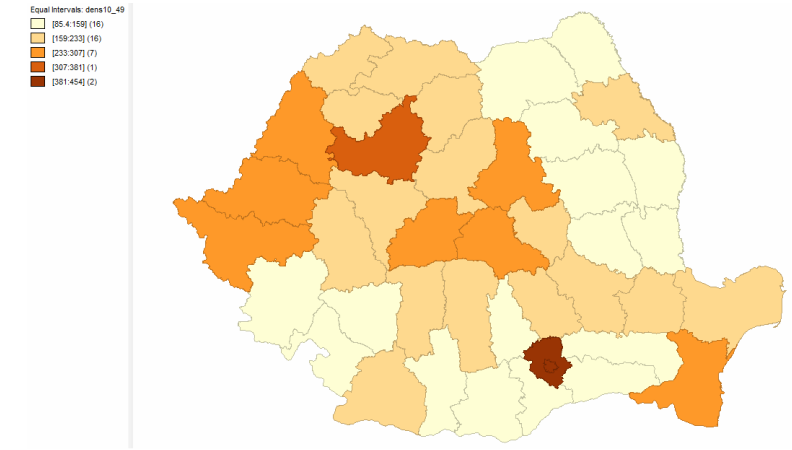
The maps suggest the existence of spatial clusters (i.e. neighbor counties tend to have similar levels of SMEs density) for all three groups of enterprises: microenterprises, small and medium-sized.

There is a clear delimitation of high/low SMEs density areas, the Bucharest-Ilfov region and the Western part of Romania displaying higher densities for all groups of enterprises (Figure 1, (a)-(c)), while the East and South (except for Bucharest-Ilfov region) belong to the lowest density group.

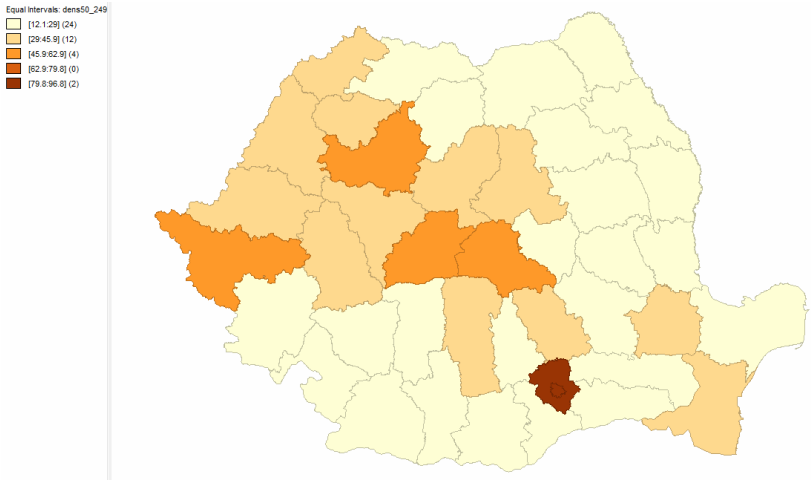
It is not by chance that Bucharest-Ilfov, the wealthiest and most investment-attractive region in Romania, has by far the highest density of SMEs. Bucharest-Ilfov concentrates over 60% of the FDI stock, over half of the national R&D potential, the most educated labor force and offers the best opportunities for business.



(a) Microenterprises



(b) Small enterprises



(c) Medium sized enterprises

Figure 1. SMEs density by company size, 2014
Source: own processing in Geoda

Table 2 displays the extremes (highest / lowest) SMEs density by company size, across Romanian counties, in the year 2014. The rankings show many similarities between SMEs groups, the microenterprises and the total being identical because the group of smallest SMEs owns a very large part (about 90%) of the total number of SMEs in Romania.

Table 2. Counties having the highest / lowest SMEs density by company size, 2014

Company size (no. of employees)	SMEs density (no. of enterprises per 100000 inhabitants)	
	top 5	bottom 5
Micro (up to 9)	Municipiul Bucuresti Ilfov Cluj Timis Brasov	Botosani Vaslui Mehedinti Dambovita Teleorman
Small (10-49)	Ilfov Municipiul Bucuresti Cluj Bihor Timis	Botosani Vaslui Teleorman Dambovita Mehedinti

Medium-sized (50-250)	Ilfov Municipiul Bucuresti Brasov Cluj Sibiu	Mehedinti Vaslui Botosani Dambovita Olt
Total	Municipiul Bucuresti Ilfov Cluj Timis Brasov	Botosani Vaslui Mehedinti Dambovita Teleorman

Source: own processing

A variety of local factors might foster/hinder the emergence of new enterprises in a region, as well as their economic success and sustainability. Among these determinant factors are the education and expertise of the entrepreneur and, equally important, the availability of qualified staff. Socio-political factors and especially geographic location are also important. Regional economics shows that neighbor regions often tend to share common characteristics and entrepreneurship is no exception.

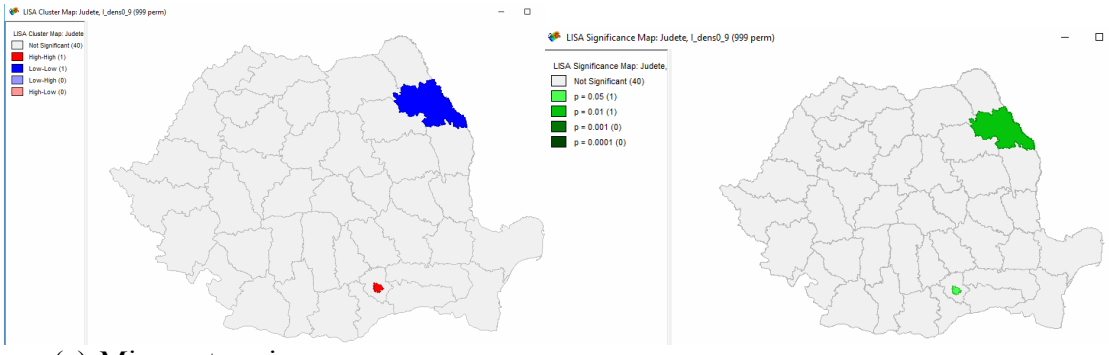
Table 3. Diagnostics for spatial dependence of SMEs density in Romania (Moran index)

Company size (number of employees)	**Moran's *I***			
	Index (pseudo p-value)	**Mean**	**S.D.**	**Z-Value**
Micro (up to 9)	0.3437 (0.0020)	-0.0182	0.0873	4.1476
Small (10-49)	0.3556 (0.0010)	-0.0239	0.0878	4.3233
Medium-sized (50- 250)	0.4189 (0.0010)	-0.0266	0.0879	5.0674

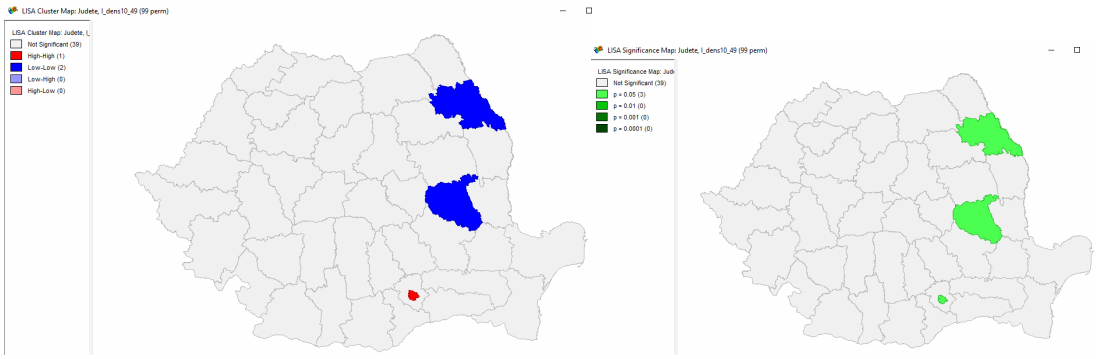
Source: own processing in Geoda

We tested the spatial dependence of SMEs density in Romania using a common indicator in spatial statistics, namely the Moran index. The results (Table 3 and Appendix) reveal moderate but highly significant spatial correlation of SMEs density between each county and its neighbors.

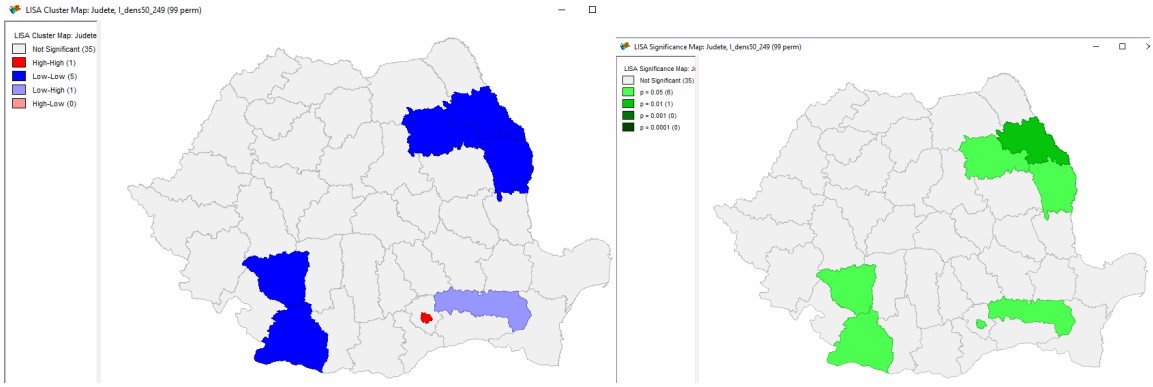
LISA cluster maps for 2014, illustrated in Figure 2, confirm the previous findings, revealing a few significant spatial clusters.



(a) Microenterprises



(b) Small enterprises



(c) Medium sized enterprises

Figure 2. LISA Cluster Maps and Significance Maps for SMEs density, 2014
Source: own processing in Geoda

The cluster maps point to significant cases of local spatial association by type of spatial correlation: bright red for the high-high association, bright blue for low-low, light blue for low-high, and light red for high-low. The high-high and low-low locations suggest clustering of similar values of SMEs density, whereas the high-low and low-high locations indicate spatial outliers. The associated significance maps identify the counties having significant local Moran statistics.

The number of spatial clusters increases with the size of the SMEs: 2 clusters for microenterprises, 3 for small enterprises and 4 (much larger) clusters for the medium-sized enterprises. In the case of microenterprises, there is a clustering of similar values of SMEs density: the high-high cluster identifies Bucharest Municipality as an area with big density of SMEs, being surrounded by another high density zone – Ilfov County, while the low-low cluster points to the opposite situation – Iasi county, belonging to the lowest density group, is surrounded by counties with similar small SMEs density (Botosani, Suceava, Neamt, Bacau, Vaslui).

In the case of small enterprises group, a new low-low cluster adds to the previous two: it displays Vrancea in the center, surrounded by Bacau, Vaslui, Galati, Braila, Buzau and Covasna. Actually, since the two low-low clusters are neighbors, it is one very big cluster covering a large part of the Eastern Romania. This is a less developed zone, having little business opportunities, less skilled labour and fewer investments.

The map for the medium-sized enterprises brings two new and larger clusters of the low-low type. The first one comprises Iasi, Neamt and Vaslui in center, together with their neighbors: Botosani, Suceava, Harghita, Covasna, Vrancea and Galati, while the second one is located in South-West and consists of Gorj and Dolj in the middle, surrounded by Mehedinti, Caras-Severin, Hunedoara, Valcea and Olt. Again, these are groups of less developed counties. Likewise the micro and small enterprise groups, Bucharest

Municipality and Ilfov County form another high-high cluster for the medium-sized enterprises. There is also a low-high outlier on the third cluster map: Ialomita County has a few medium-sized enterprises and is surrounded by high-density counties, but this is an exception bearing little relevance to our analysis.

Different historical conditions across the country resulted, as expected, in different evolution in time of SMEs configuration. Our results point toward differences between areas that used to be under opposite cultural influences. In fact, our findings are in line with the idea of "existing significant development gaps between the historical regions of the country which allegedly exposed different regional economic traditions" (Cojanu, 2006, p. 176). An entrepreneur is, to a significant extent, a product of its regional culture. Besides the personal characteristics of an entrepreneur (gender, education, age, personality traits), entrepreneurship is highly influenced by local factors, (surrounding environment) as well as by more general, but still regional factors, like infrastructure, the level of economic development and some political influences. Of course, to the above we enlist the threats and opportunities that trespass the regional specifics: taxes, credit access, national economic strategy, et.al.

5. Conclusions and directions for future research

This paper addressed the topic of SMEs density in Romania based on special methods of spatial analysis. SMEs spatial distribution is marked by significant inequalities, with high coefficients of territorial variation among counties.We found a clear delimitation of high/low density areas, with Bucharest-Ilfov region and the Western part of Romania displaying much higher SMEs densities compared to the East and South. Another important finding is the strong positive link between the development level of a county and its SMEs density.

The entrepreneurial environment, through its organizational endogen and exogenous elements, impacts the entrepreneurial activities on various levels (Nicolescu, 2008). The results of our analyses highlight districts with an outstanding entrepreneurial spirit (Bucuresti-Ilfov, Cluj, Timis, Brasov), and others situated at the opposite (very poor entrepreneurial density) such as Botosani, Vaslui, Mehedinti, Dambovita, Teleorman. There is also a third category with a promising entrepreneurial effervescence, like Prahova, Arges or Dolj. A closer look on this cluster reveals however that these counties benefit from the involvement of strong investors: automotive industry (Dacia, Ford) or oil companies. It is not therefore the entrepreneurship that triggers this result, a fact that confirms once again that the value of any statistic investigation lies in its ability to explain the findings in strict relation to reality (Cojanu, 2006). The richer regions fail to induce a natural tendency toward capital concentration, and act as "economic vampires" against their poorer neighbors, by polarizing their most precious resource: the labor force. To advocate our statement, we refer to the schoolbook example of the Bucharest area against its neighbor counties Dambovita, Calarasi, Giurgiu, Ialomita, and Teleorman. Prahova county, though neighbor as well, is an exception because it is "on the right direction" Brasov-Sibiu-Timisoara.

There are many voices, equally among scholars, practitioners and mass – media, stressing the opinion that, without help in coherent action, the gap between regions will deepen, in line with the general law that "the rich will be richer and the poor will be poorer". There is no doubt that the measures considered by the European strategy of regional development had, and still have positive, quantifiable results, but in our opinion they are below a threshold of intervention able to reverse the current paradigm. Perhaps governments to follow will take a different approach and work to establish a consistent and sustainable development strategy toward reducing excessive bureaucracy, and choosing a

better resources allocation. A natural consequence may be, we dare to claim, the opportunity of rethinking the territorial administrative structure.

Our paper opens new avenues for future research. Firstly, given that the two clusters of low SMEs density that we have identified in the Eastern part of Romania are partially overlapping, in future research we aim to test new spatial weights matrices accounting for a larger neighbourhood. We are going to extend the order of contiguity by adding the second-order neighbours, i.e. the counties contiguous to the first-order neighbours of each county. This means that the density of SMEs in a county is not only affected by the immediately contiguous counties, but also the second order contiguous counties are taken into account, as potentially influencing the target county, while identifying the clusters. Secondly, since we found high spatial dependence in SMEs density, the analysis should be continued with spatial regression models able to account for it. Such models could asses the likely impact of SMEs density (as a proxy for the entrepreneurial initiative in a county) on GDP or FDIs, or might indicate its main determinants.

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