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INFLUENCE OF CLUSTER TYPE BUSINESS AGGLOMERATIONS FOR DEVELOPMENT OF ENTREPRENEURIAL ACTIVITIES STUDY ABOUT ROMANIA

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Abstract

Entrepreneurial activities relate each with the other, their features are usually, linked to the region. Many theoretical papers analyse the relationship between economic agglomerations and entrepreneurship. However, only few case studies exist, having the goal to prove the type relationship between cluster type business agglomerations and entrepreneurial activities, from the same geographical region. It seems that it is not such of analysis available for Romania, from our information.

This paper aims to analyse the influence of business agglomerations, of cluster type, on the entrepreneurship. The analysis talk about to the case of Romania, and is performed throughout all the country.

The originality of this paper consists in the development of analysis at the lowest level of aggregation of spatial data, namely *local administrative unit* (LAU) level: village, town, and city. This offers great flexibility to the analysis, because administrative grouping of LAU in: counties, regions or macro-regions, is not usually linked by the business decisions. To develop the research and to prove the nature of relationship between existing business environment and entrepreneurial activities, has been used a research methodology based on spatial statistics and Geographic Information System (GIS) analysis.

The methodology proposed in the paper is applied and validate in a case study. Research results proved that there is a positive correlation between the business environment, represented by cluster type economic agglomerations, from a region and entrepreneurial activities developed, in the same region.

Keywords: entrepreneurship, business agglomeration, spatial data analysis, economic geography.

JEL Classification: L26, R12

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Introduction

Business agglomerations of cluster type occur when a group of companies, operating in the same or connected business areas, are located in a geographic proximity. The companies from a business agglomeration could be or not, in a direct competition. A great number of various factors influences the entrepreneurial activities.

The presence of economic agglomeration, in a specific region, encourage entrepreneurship by decreasing the costs with starting new businesses, by improving opportunities for innovations, by accessing appropriate human resources, and by facilitating better access to a more diverse range of materials and complementary products. (Feldman, 2005; Glaeser, 2009; Onete, 2013; Kuechle, 2014)

There are some studies, like Feldman (2014), which conclude that business agglomerations of companies does not appear only because of natural resources available into a geographical region, but rather because of entrepreneurial activities.

The companies activating within a strong regional business environment share the same know-how, facilitating agglomeration across complementary and related business industries.

Because a considerable number of entrepreneurs where employed, previously, in companies acting in the same geographical location, the entrepreneurship could be considered a local phenomenon and should be studied by using the regional factors, too.

“Even the number of theoretical papers analysing the relationship between cluster type business agglomerations and entrepreneurial activities is considerable, the number of case studies which proving the relationship between cluster type business agglomerations, within a region, and entrepreneurial activities developed in the same region is very small.” (Reveiu, 2012a, p. 113) Moreover, most of the available studies are researched developed in social science fields, other than economics. “There are few studies, only, having the goal to analyse the local economic agglomerations or potential regional clusters, and their influence on entrepreneurial activities, available for Romania. Most of the studies available for Romania are qualitative studies, or analyse the economic agglomerations at higher level of aggregation of regional, economic data, and the regional approach it is not taken into account, anymore.” (Reveiu, 2012b, p. 2)

Economic activities, in general, and business in particular, are strongly influenced by specific local conditions, from inside the municipality, city and from the other localities, which administratively could belong to another county or region. Therefore, the influence of business environment on the entrepreneurship is more relevant at the local level. Even most of the existing analyses are developed at regional level, from our point of view, this kind of analysis is more relevant if it is developed at a lower level of aggregation, for economic and spatial data, namely county, or even at the towns and villages level (LAU level).

1. Literature Review About Entrepreneurial Activities and Cluster Based Economic Agglomerations

For many years, research papers from economic field analysed the entrepreneurial activities without taking into account the regional based factors. Nevertheless, in the last years, the importance of environmental factors, including spatial proximity and the characteristics of regional environment, is growing into consideration and is becoming more popular.

Theories of economic agglomeration are frequently used to explain the differences between regions, regarding entrepreneurial activities. (Cooper, 2000; Glaeser, 2009)

There are many mechanisms linked with the decision of entrepreneurs to start-up new business, and to select the location for new businesses.

Entrepreneurial activities developed in one region can be the starting-point for the development of business agglomerations of cluster type, in the same region. "Entrepreneurial activities interact and their features are generally linked to the geographical region." (Bergmann, 2002, p.1) The existence of many start-up companies conduct to a spatial concentration of companies, which is the main requirement to generate a regional cluster business agglomeration.

The specific mechanisms by which the regional economic business environment influence entrepreneurship are various and very diverse. Some scientific papers (mostly qualitative studies) examine the relationship between entrepreneurship and economic performance of companies, from a specific region. For example, Saxenian (1996, p. 64) attributes the success of Silicon Valley to the "culture of entrepreneurship, and a decentralized organization of production".

A small number of research papers analyse the interactions between the internal organization of the companies and the agglomeration benefits, from the same geographical region. Some papers analyse the role of start-up companies in generating economies of agglomeration, and stimulating creation of new business (Henderson, 2003; Glaeser, 2009). In contrast, other researches emphasise the importance of so-called 'anchor' firms (multi-establishment and multinationals), that encourage setting up of new business entities, derived from existing ones, and other companies from connected industries (Klepper, 2007; Greenstone, 2008).

Further research papers and case studies are required to understand the relationship between business environment and entrepreneurship, and the contribution of existing business companies on the entrepreneurial activities from a particular region.

This paper propose an analysis and a case study, about the relationship between business agglomerations of cluster type and entrepreneurship, supported in some research papers like: (Delgado, 2010, p. 496), which stipulate that "existing cluster type business agglomerations have positive impacts on entrepreneurial activities".

To quantify the entrepreneurship, can be used various economic indicators like: new established companies, self-employment, or business ownership. In this paper, have been used information about new established companies, to evaluate the entrepreneurship, from the same geographic area.

Because "in Romania, there is no registered data available about inter-firm collaboration for companies acting in the same region, excepting some isolated samples, only" (Reveiu, 2012a, p. 117), has been used the list with all existing companies from a specific region, to evaluate the business environment from the same region.

2. Research Methodology

To develop the research and to prove the nature of relationship between existing business environment, represented by the cluster type agglomerations, and entrepreneurial activities developed in the same region of Romania, has been used a research methodology based on spatial statistics and GIS analysis.

2.1 Data

To analyse the relationship between business environment and entrepreneurship, at regional level in Romania, two data sets provided by the National Trade Register Office of Romania (Oficiul National al Registrului Comertului, 2014) have been used. The two data sets include information about all companies, working in Romania on 1 October 2013, and 1 April 2014 respectively.

The data was stored in a database and grouped according to process them. After the processing, has been created the data set with newly established companies, in Romania, between October 2013 and April 2014, grouped at LAU level.

Another data set used is the spatial data about Romania, data provided by Environmental Systems Research Institute (ESRI).

Both economic and spatial data have been integrated, and stored in a spatial database, a geodatabase, and are managed by using Geographic Information System (ArcGIS), from ESRI.

2.2 Data Analysis

For data analysis, has been proposed the following research methodology, defined in five steps.

Step 1 Based on the data set with information about companies, this step calculated and represented on a map, the spatial distribution of new start-up companies, between October 2013 and April 2014, in Romania.

Step2 Tested if it is a correlation between newly established companies and existing companies, in October 2013. A correlation plot has been created, between the two variables: the number of existing companies and newly established companies. The correlation analysis does not take into consideration the spatial issue. However, this feature is critical for the goal of our analysis.

Step 3 Identified the existence of a territorial distribution model, for the newly established companies, between October 2013 and April 2014. To accomplish this step, the global spatial autocorrelation has been used.

Spatial autocorrelation occurs when the number of new companies, identified at close locations, are more similar comparing with those observed at locations that are more distant.

There are two kinds of spatial autocorrelations: positive and negative.

“Positive spatial autocorrelation occurs when high or low values of a variable tend to group together, in space, and negative spatial autocorrelation appear when high values are surrounded by low values or vice-versa.” (Dominicis, 2007, p. 15) From available statistics, index designed to measure spatial autocorrelation, the Moran's statistics has been chosen.

Moran statistics are one class of measures of spatial autocorrelation. Based on global Moran's I, the geographical distribution of newly established companies, can be tested for whether it is random or not.

The literal meaning of spatial autocorrelation is self-correlation (autocorrelation) of observed values of a single attribute, according to the geographical (spatial) ordering of the values. Some variants of Moran's index to measure spatial correlation between data sets are available. “Moran's index require creating a weights matrix, which defines a local neighbourhood around each geographic unit.” (Anselin, 2005, p. 193) The value at each unit is compared with the weighted average of the values of its neighbours.

Global autocorrelation statistics provide a single measure of spatial autocorrelation for an attribute in a region as a whole. (Anselin, 1995, p. 99):

$$I = \frac{N}{\sum_i \sum_j w_{ij}} \cdot \frac{\sum_i w_{ij} (y_i - \bar{y})(y_j - \bar{y})}{\sum_i (y_i - \bar{y})^2} \quad (1)$$

where:

N- number of regions; LAU in our case study (3180),

y_i – the attribute value for each region (LAU); number of companies, in our case study,

w_{ij} - the weight (or connectivity with neighboring areas) for units i and j .

$$w_{ij} = \begin{cases} 1 & \text{if } i, j \text{ are neighbourhoods} \\ 0 & \text{otherwise} \end{cases}$$

“Global Moran index uses negative/ positive values to indicate negative / positive spatial autocorrelation. The values could be between -1 (indicating perfect dispersion) and 1 (indicating perfect correlation). A zero value indicates a random spatial pattern.” (Anselin, 1995, p. 111).

Step 4 of research methodology focused on the analysis at territorial level, of the entrepreneurship. Data about newly established companies, between October 2013 and April 2014, in Romania have been used for this purpose.

Local spatial autocorrelation statistics has been used, to accomplish this step.

Local spatial autocorrelation statistics provide, for each administrative unit from a region, a measure of predisposition to have the value of an attribute (number of new companies, in our case study), that is correlated with values from nearby areas.

Local Moran's index has been used, in order to detect the local cluster type business agglomerations, of newly established companies for all Romania's regions (Anselin, 1995).

$$I_i = z_i \sum_j W_{ij} z_j \quad (2)$$

Where:

- z_i and z_j are standardized scores of attribute values for administrative unit i and j ,
- j is among the identified neighbourhood of i , according with the weights matrix w_{ij} .

“The local spatial autocorrelation analysis is based on LISA (Local Indicators of Spatial Autocorrelation) statistics” (Anselin, 1995, p. 94). This computed a measure of spatial association for each individual location. The significance map has been created, allowing identifying the locations with significant local Moran’s index value.

Step 5 aimed to identify cluster type business agglomeration, in business environment, for existing companies, in October 2013.

After this, has been identified the relationship between existing companies and the newly established companies, from the same UAT.

Finally, the features of local regions, where there is a spatial correlation between the two data sets could be identified.

To identify spatial clusters of existing companies, a map of cluster agglomerations for existing companies has been created.

The map of agglomerations has been generated based on LISA indicators, presented above.

Significant clusters are identified in the map by using different colour codes, function on the spatial autocorrelation type identified. So, there are identified and presented on the map four categories of significant clusters corresponding to the four quadrants of the correlation diagram.

3. Results and discussions

Newly established companies are mainly in the large cities. From this point of view, there is no difference between the counties of Romania, excepting Ilfov County, located close to the Capital City of Romania, concentrating a significant number of newly established companies.

The map from figure no. 1 includes the spatial distribution of newly established company, from all LAU of Romania, between October 2013 and April 2014.

Top 50 of localities with a higher number of *start-ups*, includes the seats of the most of counties; Volunari, Popești Leordeni and Bragadiru towns, localities from the proximity of Bucharest; Florești a village near the municipality of Cluj Napoca, and towns like: Onesti Dej, Turda.

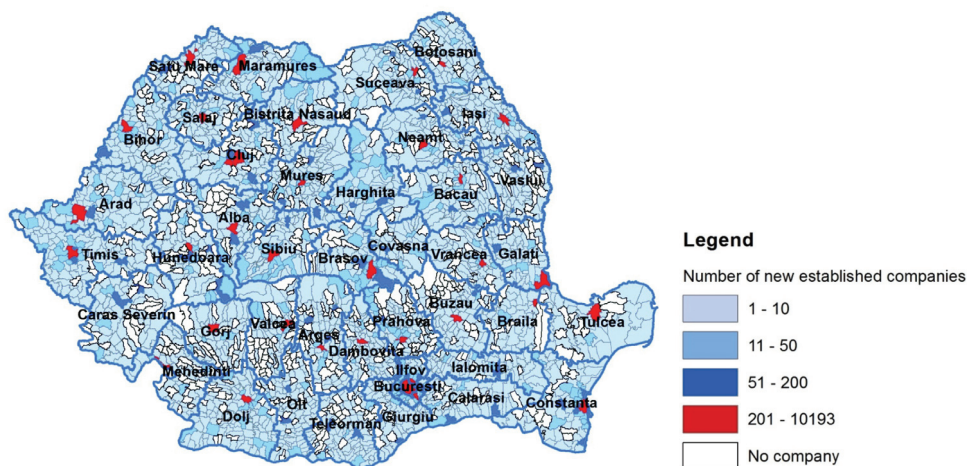


Figure no. 1: Spatial distribution of new companies established in Romania, between October 2013 and April 2014

Source: our own construction, created by using ArcGis software

Table no. 1 presents top 30 of UAT with greater numbers of newly established companies, between October 2013 and April 2014.

Table no. 1: Top 30 LAU with newly established companies, between October 2013 and April 2014

Name of LAU	Number of newly established companies
Bucharest	10193
Cluj-Napoca	1973
Timisoara	1521
Iasi	1202
Oradea	1162
Brasov	1139
Constanta	1129
Craiova	1020
Galati	815
Ploiesti	796
Arad	752
Sibiu	653
Braila	632
Baia Mare	629
Pitesti	610
Bacau	516
Targu Mures	508
Satu Mare	381
Buzau	373
Bistrita	329
Ramnicu Valcea	327
Zalau	313

Name of LAU	Number of newly established companies
Suceava	307
Targu Jiu	307
Alba Iulia	304
Drobeta-Turnu Severin	279
Floresti	277
Oras Voluntari	271
Targoviste	269

Source: our own construction, by processing data from our own database containing data about newly founded companies, between October 2013 and April 2014

To achieve the next processing steps of our analysis, GeoDa software has been used (Anselin, 2006).

In the 2nd step of our analysis determined the correlation between the number of existing companies, and the number of newly established ones, between October 2013 and April 2014.

The correlation plot is presented in figure no. 2. In the correlation plot, the regression slope corresponds to the correlation between the two variables. The variables on both axes are scaled to standard deviational units, so any observations beyond the value of two limits can be considered as outliers. The plot is divided into four quadrants, to allow a qualitative assessment of the association by type: high-high and low-low (relative to the mean value), as positive correlation, and high-low and low-high as negative correlation.

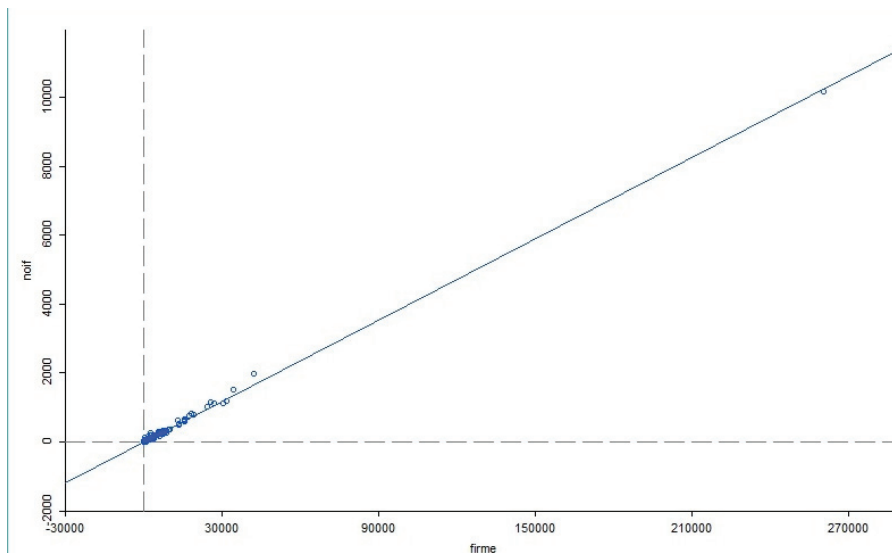


Figure no. 2: The correlation plot between the number of existing companies and new established companies

Source: Our own construction, using GeoDa software

As expected, it can be identified a positive spatial correlation between the number of existing companies from a region and the newly established companies from the same region, between October 2013 and April 2014.

Thus, it can be identified the existence of a positive dependence relationship between entrepreneurial activities and business environment.

The 3rd step of our analysis consisted in spatial autocorrelation analysis, by using Moran's index. The gained value of Moran's index is 0.03.

In the figure no. 3, the Moran's autocorrelation plot is presented. This value is positive, but the amplitude is very low. In this condition, can be concluded that the pattern indicates a positive spatial autocorrelation of newly established companies, but the value of Moran's index being very small, the spatial autocorrelation it is not present in all the country.

Positive autocorrelation suggests a spatial grouping of areas (LAU) in which entrepreneurial activities are present.

Therefore, the areas where the spatial autocorrelation is presented should be identified, and the local conditions from that area should be check.

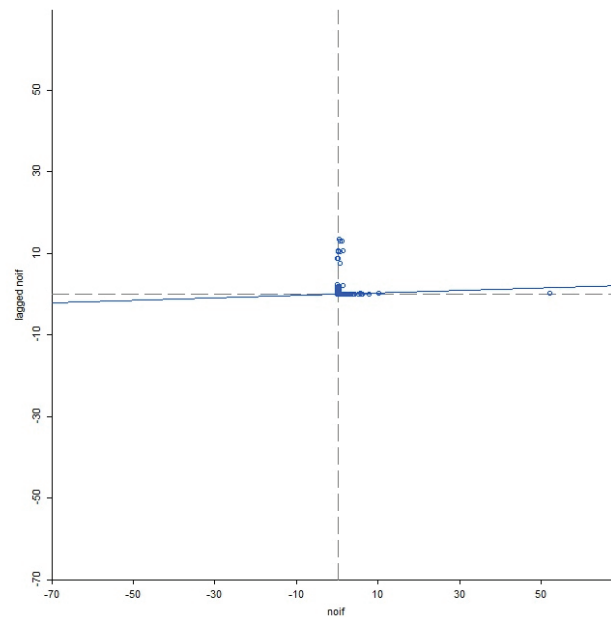


Figure no. 3: Global spatial autocorrelation plot of start-up companies

Source: Our own construction, by using GeoDa software

The 4th step aimed to shift the analysis to local spatial analysis, by using a significance map, as in figure no. 4. The significance map shows the locations with a significant value of local Moran, by using different shades of green, function on the degree of significance.

In the first category, with the highest concentration of newly established companies are included 144 LAUs, and in the 2nd category are 368 LAUs. For the rest of LAUs, the local Moran index is not significant.

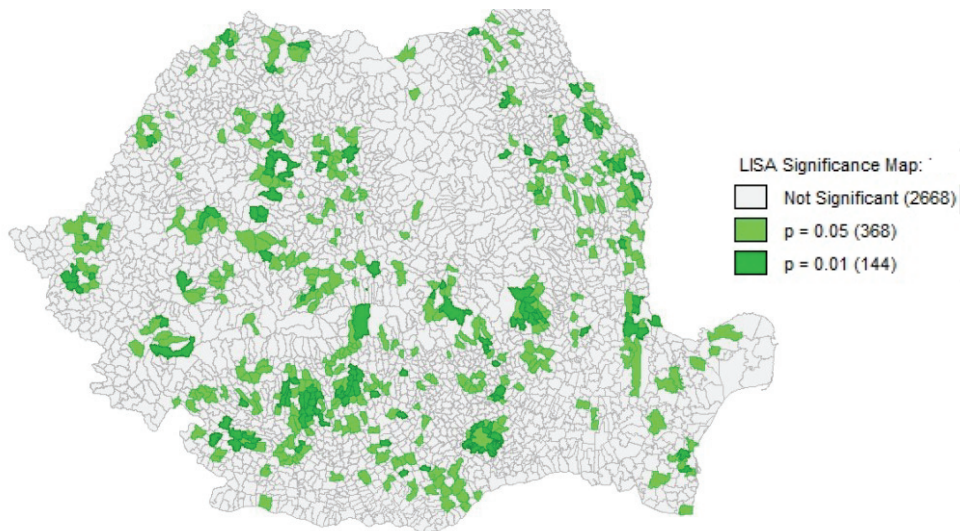


Figure no. 4: Map of significant areas built based on Moran local index

Source: Our own construction, by using GeoDa software

Step 5 a cluster map for the existing companies, in October 2013, has been created. It presents the significant locations, by type of association, as in figure no. 5. For this purpose, data about existing companies, in October 2013, in each administrative territorial unit of Romania has been used.

The four colour codes used for representing clusters are:

- dark red for representing LAUs with large number of companies, and surrounded by neighborhooring LAUs with large numbers of companies, also;
- dark blue for representing LAUs with a small number of companies and surrounded by neighboring LAUs with a small number of companies, also;
- pink colors for LAUs with a large number of companies, but surrounded by neighboring LAUSs with few companies; and
- light blue for LAUs where there are few companies, but their surroundings LAUs have a large number of companies.

For our analysis two types of regional cluster type business agglomerations are interested: “positive” and “negative”. Positive clusters are coloured in dark red, and “negative” clusters are coloured in dark blue.

Positive clusters are those for which it can be identified a good influence in the region, a good business environment, stimulating the entrepreneurship. Negative clusters are those for which the business environment has a negative effect on the entrepreneurship, the number of newly established companies being low.

“Positive” cluster regions could be identified, in the geographical areas of influences around large cities from the West and Central part of Romania, these are: Bucharest,

Brasov, Arad, Timis, Craiova, Oradea, Cluj Napoca, Targu Mures, and Sibiu. The exception is the area Certez, Negresti-Oas, Tauții Măgheruș, where a cluster type business agglomeration could be identified, but this is not located in the immediate vicinity of a city, with a significant number of companies.

Positive small clusters have been identified around large cities, in the Est part of Romania, around Iasi, Constanța, Bacău.

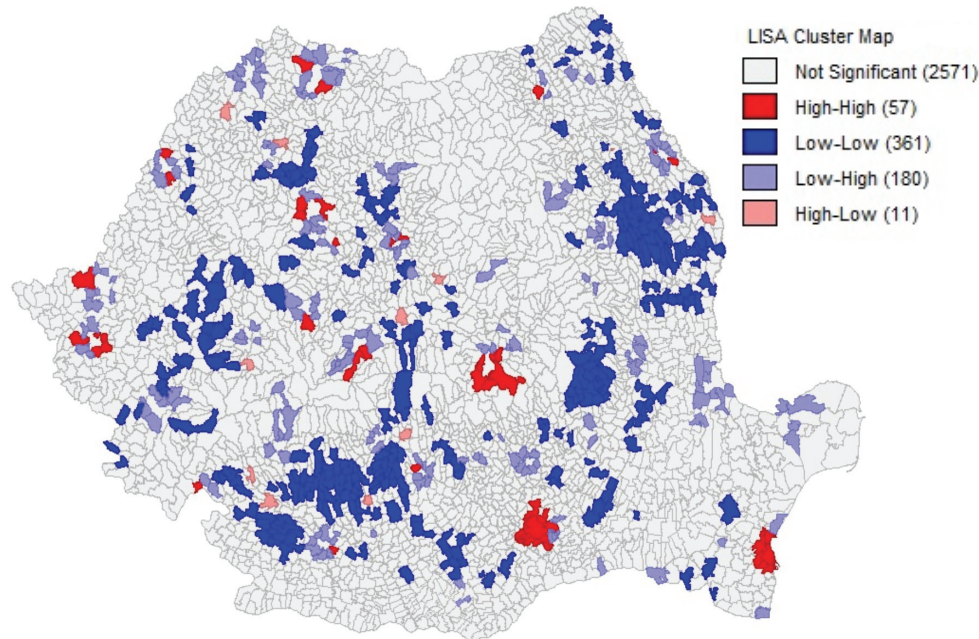


Figure no. 5: Significant clusters map build on the data about existing companies

Source: Our own construction, by using GeoDa software

The mostly important negative clusters are identified in less developed areas, in Gorj, Valcea, Vaslui County, Salaj and Covasna counties.

Conclusions

The paper proposed an original approach in understanding the relationship between a part of business environment, represented by economic agglomerations cluster and entrepreneurship.

Entrepreneurial activities relate each with the other, and their features are usually linked to the region.

Using data about the companies and the correlation with spatial data, allowed the identification of economic and entrepreneurial characteristics of each village, town or city, and capturing the connections, otherwise difficult to identify. Limiting the analysis to

administrative delimited counties and regions is not acceptable, for conducting business and entrepreneurial analysis.

Therefore, level of aggregation for the economic data is very important in analysing the relationship, between regional business environment and entrepreneurial activities, features impossible to be identified at county, regional or macro-regional based level of aggregation for economic data. Unfortunately, in Romania, very few economic data are collected and are available at LAU level.

It is desirable to develop entrepreneurial activities, in regions with intense economic activity. Even if the existence of competing companies could be a psychological barrier for the decision to start an entrepreneurial activity in a location, the results of this research claim that the economic developed of geographic areas foster entrepreneurship.

Research limitations are due, in particular, to the difficulty to access a consistent set of data, on the economic and entrepreneurial activities, geographically distributed, at LAU level.

Data about entrepreneurial activities used to develop the research refers to activities undertaken in a period of a few months only: between October 2013 and April 2014.

However, these limitations cannot significantly influence the results of the research, and cannot distort the results.

The research analysis should be extended by including other economic and social data related to UATs, as far as they are available.

Can be concluded that there is a positive correlation between the business environment of a region and entrepreneurial activities in the same region. However, this correlation and influence must be examined and investigated nuanced, in a broader context, taking account of multitude of economic and geographic factors.

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