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THE EMERGENCE OF LABOUR FORCE RESILIENCE. A CASE-STUDY: ROMANIA

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Abstract: This study aims at validating a new type of social resilience analysis focused on the interaction of each social and economic component within the social-economic system. We have decided to divide the two general components, namely social and economic, analyze them in their interaction, social resilience meaning social adaptation to the economic dynamics. How do decision-makers act within the system seems, at first glance, coherent and self-evident: the social component targeting a higher living standard and the economic component trying to maximize its profit. But the social-economic system is a complex one, involving underlying relationships between the two components, interactions being difficult to determine. In order to emphasize the links between the social and the economic component we shall resort to the Principal Component Analysis (PCA) and the Hierarchical Ascendent Classification (HAC). HAC starts from spatial units, from similarities in the profiles of regions (counties or development regions) seen *apriori* as groups of variables, while PCA considers each variable distribution and compares it to each other. The data used are grouped by 23 variables: 10 social variables - the resident population, urban population, settling of domicile, departures from the domicile, net settling of domicile, settling of residence, departures from the residence, net settling of residence, emigrants, immigrants; 12 economic variables - employment by national economic activities(agriculture, industry, construction, and trade), economically active population by national economic activities (agriculture, industry, construction, and trade) and the average monthly salary by national economic activities (agriculture, industry, construction, and trade); 1 independent variable - the unemployment rate. The analysis is focused on two territorial levels in Romania: county and development region, over the 1991-2012 period.

Key words: labour force, resilience, Romania

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INTRODUCTION

Adaptability and transformability are two key concepts analysing the resilience of social systems. The first one is the ability of a social-economic system to adjust its responses to the changing internal and external processes and, thus, helps development within the current stability domain by following the current trend (Folke et al., 2010). Transformability is the ability to create new stable domains for development, a new stability landscape and to cross the threshold towards a new dynamics trend (Folke et al., 2010). Deliberate transformation requires thinking based on resilience, firstly in assessing the relative advantages of the current domain versus alternative domains, potentially more favourable for stability and, secondly, to promote the resilience on a new evolution path, or a new basin of attraction.

Changes do not occur in a vacuum, but are approaching resilience in the light of many scales, making use of crises as opportunities and recombining experience and knowledge sources to direct social-economic transitions to another stability stage. Transformation involves novelty and innovation. Small-scale transformations enable resilience at broader scales. Thus, deliberate transformation implies interruption of the resilience of the old and construction of the resilience of the new (Folke et al., 2010).

Somewhat similar, the process of regional and local economic development is far from being smooth and up going, being subjected to all kind of disruptions and disturbances: periodical economic recession, unpredictable major competitors rising elsewhere, unscheduled closure of enterprises, the challenge of changing technology and the like. How regional and local economies respond and adapt to such disturbances and interruptions can exercise also a formative influence on how they develop and evolve (Simmie, Martin, 2010).

It is a problem whether resilience refers to the capacity of a regional or urban economy to preserve its structure and function, despite impact or disruption, or the ability of a region or urban system to change its structure and function quickly and successfully as a shock response (Simmie, Martin, 2010). The two meanings are often combined, as in Hill et al. (2008), suggesting that the resilience of a region refers to the extent to which the social structure of accumulation was stable, or the extent to which it has been able to make a rapid transition from one social structure of accumulation to another.

The ambiguity surrounding regional economic resilience is enhanced by the fact that two definitions of the concept can be found in the ecological literature, where this idea was most debated.

The first and most traditional definition, the so-called " technique resilience", focuses on the stability of a system close to a steady state, where disturbance resistance and speed of return to pre-existing equilibrium is used to define resilience (Holling, 1973; Pimm, 1984). This meaning seems closest to the concept of "elasticity," or the ability of a system to accommodate disturbance without experiencing a major structural transformation (McGlade et al., 2006). According to this definition regional economic resilience would involve maintaining the structure and function of the region previous to the shock. The implication is that the more resilient the regional economy, the less will it change over time, even in the face of various shocks. So, this point of view on

resilience would generate an evolutionary model based on maintaining the structure and stability (Simmie, Martin, 2010).

The second definition, the so-called "ecological resilience", focuses on the hypothesis of disruptions and shocks causing a system to move in another condition of behaviour (Simmie, Martin, 2010). In this case, resilience refers to the magnitude of the disturbance shock that can be absorbed before the system changes its structure and function and is shaped by a different set of processes (Holling, 1973). According to some authors, this definition opens space to connect resilience with adaptability and is, therefore, much richer in evolutionary purpose (McGlade et al., 2006).

Therefore, the system's response to change can be: a) transformation of the components' structure and functions; b) adaptation and resilience (keeping the components' structure and functions) by absorbing a large amount of change (Holling, 1973). This point of view direct us to observe that the adaptation is supplementary for resilience.

Inside of each social-economic system there is a closed connection between three basic components: spatial structure (spatial arrangement of enterprises), function (employment by economic activities) and resilience (Figure 1). Between function and resilience there is a mutual relationship: resilience aims at the preservation of the function and a diversified function ensures resilience. The same kind of relationship is identified between structure and resilience.

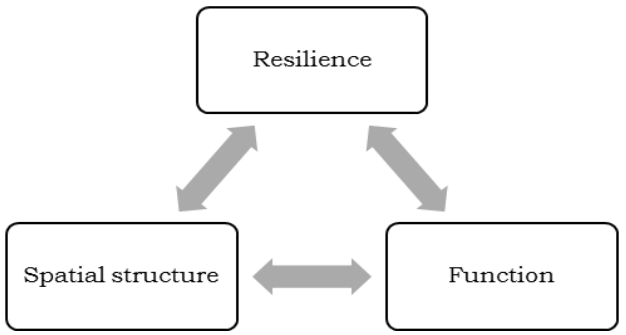


Figure 1. The interrelation between structure, function and resilience in social-economic systems

While adaptation in natural systems usually requires a genetic evolution, enterprises can anticipate change and respond faster. A form of structural resilience is dispersed geographical linked by telecommunications, the workforce being less vulnerable to catastrophic events than a concentrated workforce could disable. Functional resilience involves understanding the threats or strategic opportunities and developing creative and strong responses (eg. innovative products) (http://www.resiliencescale.com).

The literature describes community resilience as multi-dimensional and dynamic. Dimensions include the types of disruption in the system that triggers community resilience, community responses to disruptions, capacity development, the relationship between risk factors and resilience and renewal of the system and new trajectories (Smit, Wandel, 2006).

Wilbanks (2006) recommends using the multi-scale analysis. Different types of information can be obtained at different scales. Independently used information, could lead to a narrow and incomplete representation of the

situation. The combination of various information will result in a more complete representation and, in addition, show the interdependencies that are not visible at one single scale. We shall try to achieve such a representation of the system by analyzing the links of components at two different spatial levels in Romania: the county and the development region.

MATERIALS AND METHODS

Identifying the moments when the evolution of the social-economic system had undergone important changes, we analyzed the unemployment rate in the 1991-2012 period. Thus, we identified the years when the highest values of this variables were recorded in order to use them in our research. What we wished to know was how the variables of the social and economic components behaved with these temporal landmarks in order to restore the social-economic system's evolution.

Furthermore, to analyze the evolution and spatial links between them, we divided the social-economic system into the social and the economic component. The social variables we used: the resident population, urban population, settling of domicile, departures from the domicile, net settling of domicile, settling of residence, departures from the residence, net settling of residence, emigrants, immigrants. The economic variables are represented by: employment by the national economic activities (agriculture, industry, constructions, and trade), economically active population by the national economic activities (agriculture, industry, constructions, and trade), the average monthly salary by activities of the national economy (agriculture, industry, construction, trade). The last used variable was unemployment rate. The analysis is made over 1991-2011 interval and on two territorial levels: county and development region.

The methodology used was the Principal Components Analysis (PCA) and the Hierarchical Ascending Classification (HAC) for variables gathered by principal components and classes respectively, using specific analysis criteria which each method involves to highlight spatial, temporal, and causal connections among variables. PCA takes into account the principal components variances which are Eigen value and weights (coefficients of linear combinations) which are eigenvectors, to obtain uncorrelated groups of variables. Regarding these principal components, it is important to detach the highest loaded values of the variables (found in Rotated Component Matrix Table). By running HAC we achieved regional typologies based on the spatial distribution of the social and economic variables. It becomes easy to compare the evolutions of the variables of the two components by analyzing each regional type.

Determining how variables interact we assumed that must be reflected in the spatial distribution, concentration or dispersion of some variables is due to the spatial distribution of others (some variables showing causal links). This was the idea from which we started to assess social resilience, seen as correlation in the spatial distribution, by further comparing the evolution of the social and the economic variables.

RESULTS AND DISCUSSIONS

The first step is to identify the moments when the evolution trend of the socio-economic system has changed. To this end, we analyzed the evolution of the unemployment rate as an indicator located at the junction of the two system components, social and economic. In the case of the economic component

unemployment is seen as a decision to reduce the workforce during the crisis, as a result of a lower demand for products; for the social component, unemployment means job loss and a decision of whether to look or not for another job. So, we identified times when social resilience was manifest, because we believe that social resilience represents adaptation of the social component to economic changes. Therefore, the years 1995, 2000 and 2010 are actually moments of the onset of social resilience, and the unemployment rate has the maximum values. After the peak, registered one year before of the mentioned ones, the unemployment rate trend reversing, and the unemployed people started to be reintegrated into the labour market (Figure 2).

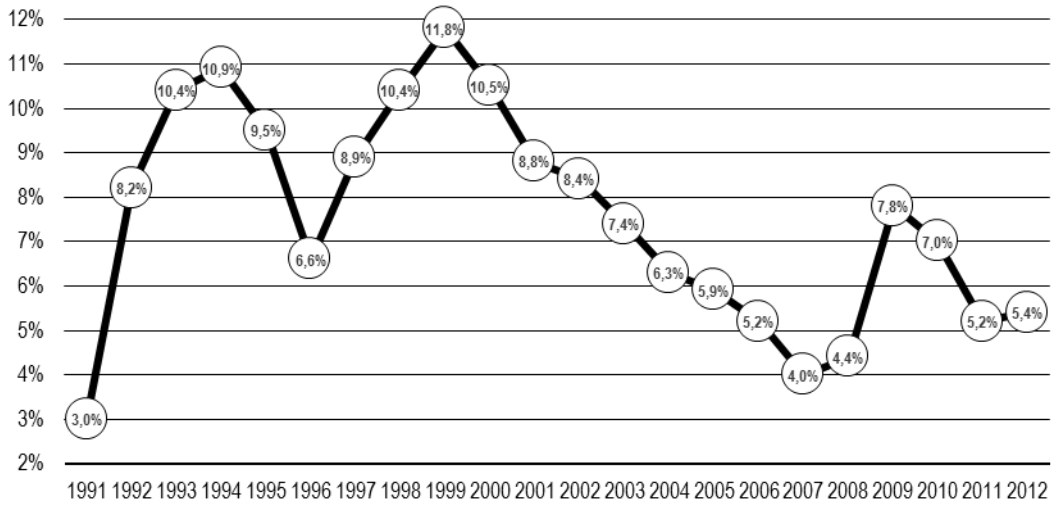


Figure 2. Evolution of the unemployment rate during the 1991-2012 period
(Data source: National Institute of Statistics, www.insse.ro)

The second step is to run the Principal Component Analysis (PCA) for the three reference years: 1995, 2000 and 2010. The values of the variables used in the analysis refer to the evolutions of variables in selected years (not raw data). Therefore, we calculated the difference between the value of the variable in the reference year and the value of the variable in the previous year. This calculation was applied to all the economic variables and to part of the social variables, except for those related to population movement in the territory that is data referring to population dynamics. This analysis was run both at county level and development region level in order to observe the spatial structure of relations between the social and the economic component at these spatial levels. We have in mind that social resilience (the correlation between the spatial distribution and/or evolution of the social and the economic component) is different from one social variable to another. To determine the number of the principal components extracted we used the information provided by Screen Plot and Rotated Component Matrix.

PCA results at **county** level are the followings:

- in 1995, variables were grouped around four principal components (loading 74% of the total variance): immigrants, evolution of employment in trade, net settling of residence, and

evolution of employees in agriculture. Situated within the same principal component, the next social and economic variables showed connections in matters of social variables evolution: immigrants, departures from domicile, settling of domicile, evolution of the urban population, emigrants, settling of residence, evolution of the resident population; and the economic variables: evolution of employees in construction, and industry, evolution of the economically active population in construction, and industry, evolution of salary in construction. Departures from residence were correlated with the evolution of the economically active population in trade and evolution of employees in trade. Net settling of domicile and net settling of residence were correlated with the evolution of the average monthly salary in trade. The last principal component comprises only economic variables: evolution of employees in agriculture, evolution of the economically active population in agriculture, evolution of the average monthly salary in agriculture, and evolution of the average monthly salary in industry. Therefore, social resilience was manifest only in these binomial social and economic variables.

- in 2000, five principal components (77.6% of total variance) were identified: immigrants, evolution of urban population, evolution of employees in industry, evolution of employees in agriculture, and departures from residence. The links between the social and the economic were manifest through the following social variables: immigrants, departures from domicile, settling of domicile, emigrants, settling of residence, and net settling of residence; and economic variables: evolution of employees in construction, evolution of the economically active population in construction, and trade, evolution of employees in trade, and evolution of the monthly salary in construction,. The evolution of urban population, the evolution of resident population and net settling of domicile were correlated with the evolution of monthly salary in trade. Departures from residence were correlated with the evolution of the economically active population in agriculture. The other two principal components grouped only economic variables: evolution of employees in industry, evolution of the economically active population in industry, evolution of the monthly salary in industry, evolution of employees in agriculture, and evolution of the monthly salary in agriculture.
- in 2010, three principal components (70% of total variance) were depicted: departures from domicile, evolution of the resident population, and evolution of the economically active population in construction. The links between the social and the economic components were manifest through next social variables: departures from domicile, settling of domicile, emigrants, immigrants, settling of residence, net settling of residence, departures from residence and economic variables: evolution of employees in construction and trade, evolution of the economically active population in trade, and industry, evolution of employees in industry, evolution of the average monthly salary in agriculture, and trade, evolution of employees in agriculture. The evolution of urban population, the evolution of resident population and the net settling of domicile were correlated

with the evolution of the average monthly salary in construction. The last principal component groups only economic variables: evolution of the economically active population in construction, in agriculture, and evolution of the average monthly salary in industry.

In the case of **development regions**, PCA results over the three study years were as follows:

- in 1995 we identified four principal components (92% of total variance):evolution of the average monthly salary in construction, settling of domicile, evolution of the average monthly salary in trade, and evolution of the urban population. The links between the social and the economic component were manifest through the following social variables: immigrants, departures from residence, net settling of residence and economic variables: evolution of the average monthly salary in construction, evolution of employees in construction, evolution of the economically active population in construction, industry, and trade, evolution of employees in industry, evolution of the economically active population in agriculture, evolution of employees in agricultural, and trade. The net settling of domicile was correlated with the evolution of average monthly salary in trade, evolution of the average monthly salary in agriculture, in industry. The other social variables were grouped by two principal components (lest economic variables): settling of domicile and departures from domicile in a component, and the evolution of the urban population, evolution of the resident population, settling of residence, and emigrants in the other principal component.
- in 2000 we identified five principal components (96% of total variance):evolution of the average monthly salary in construction, departures from domicile, settling of residence, evolution of the economically active population in industry, evolution of the urban population. The links between social and economic components were manifest through the following social variables: immigrants, net settling of domicile, and economic variables: evolution of the average monthly salary in construction, evolution of employees in construction, evolution of the economically active population in construction, evolution of employees in agriculture, and trade, evolution of the economically active population in trade, evolution of the average monthly salary in industry. Departures from domicile, setting of domicile, evolution of the resident population, departures from residence, and net settling of residence were correlated with evolution of the economically active population in agriculture, evolution of employees in industry. The settling of residence and emigrants was correlated with the evolution of employees in trade. The other variables, either economic (evolution of the economically active population in industry, evolution of the average monthly salary in agriculture),or social (evolution of the urban population) were grouped by different principal components.
- in 2010 we identified six principal components (98% of total variance):evolution of the average monthly salary in agriculture, departures from domicile, emigrants, evolution of the average

monthly salary in industry, evolution of the economically active population in construction, and agriculture. The links between the social and the economic components were manifest through the following social variables: evolution of the urban population, net settling of residence, net settling of domicile, and economic variables: evolution of the average monthly salary in agriculture, evolution of employees in agriculture, evolution of the average monthly salary in trade. Departure from domicile and settling of domicile were correlated with evolution of employees in industry, evolution of the economically active population in industry, and evolution of employees in trade. Emigrants, evolution of resident population, settling of residence, and immigrants were correlated with evolution of employees in construction. Departures from residence were correlated with evolution of the average monthly salary in industry and evolution of the economically active population in trade. The other economic variables were grouped by different principal components: evolution of the economically active population in construction and evolution of the average monthly salary in construction, that is, evolution of the economically active population in agriculture.

By running the PCA at the two territorial levels, a certain conformity was found in the number of components, namely, four in 1995 and five in 2000,principal components being extracted, both at county and development region level. The situation was different only in 2010, when three principal components were extracted at county level and six components at regional level. As regards the name and composition of the principal components significant differences occurred at the two levels both in 1995 and 2000, and especially in 2010. Differences in the evolution of variables are quite normal when we report at two territorial levels. By incorporating counties with different economic profiles, which during the transformation of the socio-economic system behaved differently, the development regions have distinct social and economic features.

Thus, models at different scales and in different periods of the socio-economic system were created by selecting the principal components. A dynamic model of a system organizes, clarifies and unifies knowledge. The model enables to better understand a system that previously had a puzzling or controversial behaviour. Generally speaking, influential projects of system dynamics are those that change the way people think the system (Forrester, 1986).

To create such a model we resorted to a data mining techniques: Principal Component Analysis (PCA) which aims to:

- reduce the number of variables (the principal components analysis is based on the reduction of two or more variables to one factor or component)
- identify the link structure between variables and classify the variables (to single out the most representative economic and social ones which decision-makers can act upon; in order to adjust undesirable developments in the socio-economic system it is necessary to determine the Eigen values of the correlation matrix of all variables selected for the study; the Eigen values reflect the amount of information that the principal components will recover, namely, the variance explained).

Using small models is based on the strategy often referred to as "Ockham's razor". In modern science, describing a system in terms of a small number of parameters, variables, equations, etc. was considered an ideal approach.

In the third stage we looked at the behaviour of each county and region when the trend of the Romanian socio-economic systems' evolution was changing. In view of it, we ran the Hierarchical Ascending Classification, a data-mining technique that helps us achieve regional typologies (be it county, or development region). In the above step, PCA results on how the behaviour of each variable is compared with that of other variables at the level of counties and development regions. Here we wished to get information on each county, or region seen as combinations of variables, grouping them according to the similarities/dissimilarities of size/evolution of the values of these variables.

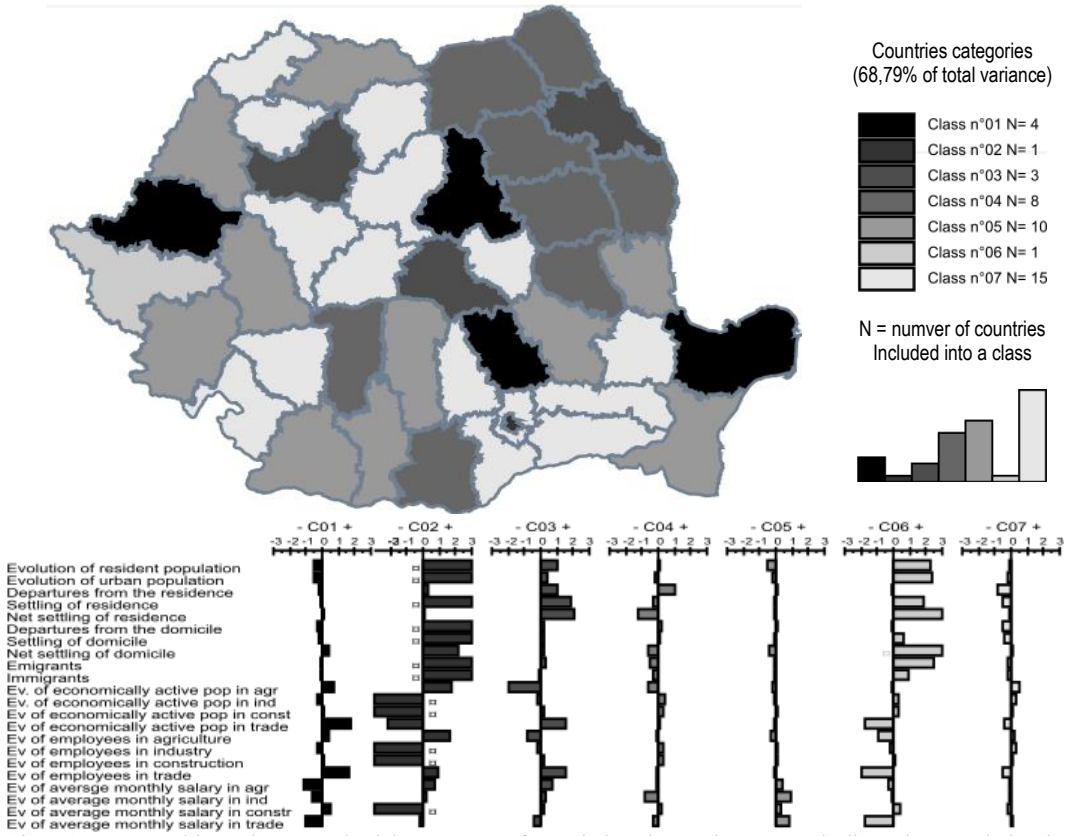
To analyze social resilience at regional level (county or development region) we compare the evolution of the economic and the social variables. Considering this correlation as due to social resilience, the economic transformations determine the population to act, by consequences. Before beginning this analysis we should specify that the data-mining techniques (HAC) employed variables averages and calculate the standard deviation numbers. HAC allows for a precise hierarchy over a vast set of data using a certain data aggregation strategy: minimum link, minimum diameter, average distance, and variance. This helps the rapid creation of partitions nested in a dataset (Bruynooghe, 1977). Unlike other data-mining techniques, HAC performed a hierarchy that does not depend on the threshold stratification sequence *apriori* chosen, or determined by a classification procedure.

We have to analyze the data set and especially the variable averages because there are cases where a positive departure of one standard deviation may entail a negative evolution of some variable included into a certain class (when the variable average has a significant negative value) and a negative departure of one standard deviation could mean a positive evolution for another variable (when the variable average has a significant positive value).

Across all of the 42 counties of Romania, significant economic transformations took place in 1995: the primary and secondary sectors dismissed many of their employees (an average of over 9,000 employees lost their jobs). Only some half of them (4,000) succeeded in finding employment in the tertiary sector. However, the situation was different from one county to another. In what follows counties are grouped by their capacity to cope with these changes, this capacity (social resilience) varying in terms of degrees , that is the extent to which how many of these actions (changing jobs within the same county, changing residence or domicile place to accept a job in another county) did combine or not.

By running HAC, 7 types of counties were obtained (Figure 3). Correlating them with the national average county values for each variable, in order to correct differences of positive or negative evolutions, revealed the following:

- evolution of the economically active population in the four economic activities (agriculture, industry, construction and trade) as a whole, was negative for most counties, except for one class that had a positive evolution (class 1).
- evolution of the salary (in US dollars) by economic activity was generally positive, not affecting the population's decision to change residence or place of domicile.



Class 1. County with moderate territorial movement of population, increasing economically active population in trade hence increasing economic activity population as a whole, small salary rise (below average) (very high social resilience); **Class 2**. County attractive for residence and domicile settling (significant territorial movement of population), but with shrinking economic activity and salary decrease in construction (very low social resilience); **Class 3**. Counties attractive for residence settling, increasing economically active population in trade which offset decreases of the economically active population in all the other economic activities, generally above-average salary rise (high social resilience); **Class 4**. Counties attractive for residence and domicile settling, evolution of the economically active population generally close to average (decreases) and salary evolution close to average (high social resilience); **Class 5**. Counties with moderate territorial movement of population (negative balance), evolution of the economically active population close to average (decrease) above average salary evolution (high social resilience); **Class 6**.County attractive for residence and domicile settling, above-average numerical decrease of the economically active population, salary evolution below average (very low social resilience); **Class 7**. Counties with low territorial movement of population due to a decreasing economically active population in all the economic activities, salary evolution below average (low social resilience).

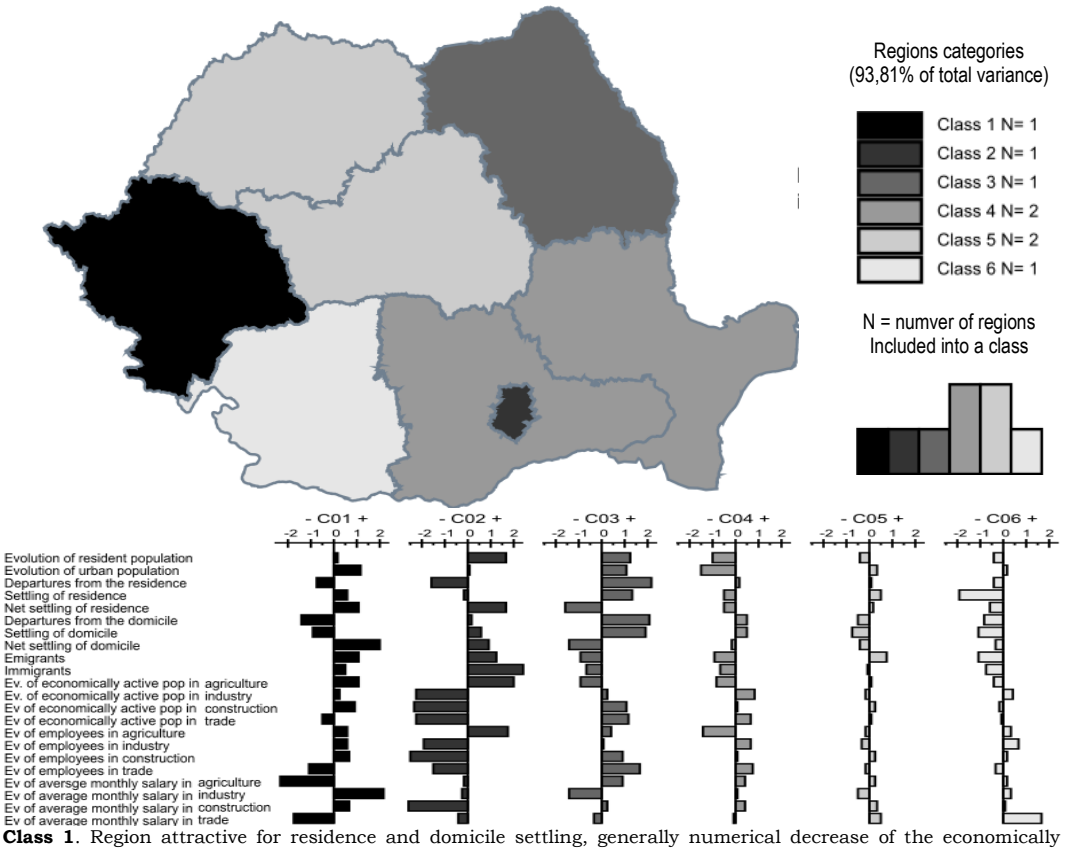
Figure 3. Typology of counties by economically active population, number of unemployed and average profile of classes (1995)
(Data source: National Institute of Statistics, www.insse.ro)

In 1995, an average of some 50,000 people lost their job in the primary and secondary sectors of each development region. Only 30,000 people managed to find a work-place in the tertiary sector. In these conditions changing the place of residence or domicile was an option for nearly 50,000 people that are 35,000 people, (on average) in the development regions.

In the development regions the situation locked as follows (Figure 4):

- evolution of the economically active population in the four economic activities (agriculture, industry, construction and trade) as a whole, was negative in most development regions, except for one class where evolution was close to zero (class 3).

- salary evolution (in US dollars) in all economic activities was positive, not affecting the population's decision to change residence or place of domicile.

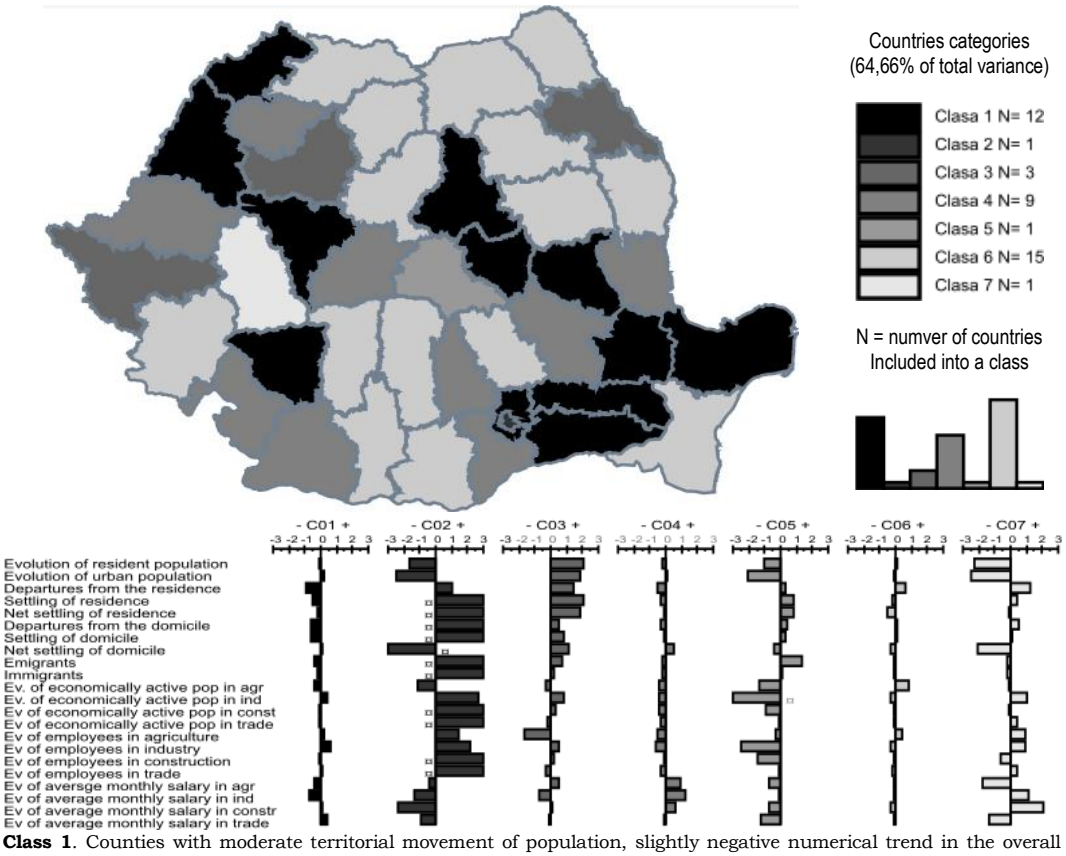


Class 1. Region attractive for residence and domicile settling, generally numerical decrease of the economically active population, salary evolution close to average, except for industry, where it grew significantly (very low social resilience); **Class 2**. Region attractive for residence and domicile settling, significant decreases in the number of economically active population except for agriculture, moderate decreases of salary except for construction which fell significantly (very low social resilience); **Class 3**. Region unattractive for residence and domicile settling, the numerical increase of the economically active population in trade and construction of setting the decline of the economically active population in industry and agriculture, overall salary evolution close to average except for industry where it decreased significantly (high social resilience); **Class 4**. Regions with moderate territorial movement of population, significant decrease of the economically active population in agriculture, overall salary evolution close to average (high social resilience); **Class 5**. Regions attractive for residence settling and unattractive for domicile settling, numerical evolution of the overall economically active population close to average (decreases), salary evolution slightly above the average in construction and trade (low social resilience); **Class 6**. Region unattractive for residence and domicile settling, evolution of overall economically active population close to average(decrease), salary increase in trade above average (high social resilience).

Figure 4. Types of development regions by economically active population and the number of unemployed and average profile of classes (1995)
(Data source: National Institute of Statistics, www.insse.ro)

By comparing the results at county and development region level one may notice space differences of social resilience. The counties with the highest social resilience are dispersed in all development regions. But, looking at the highest resilience region one finds it located in northeast of Romania. Also, the counties belonging to one and the same development region are assigned to two or more types of classes, sometimes antagonistic in regard of the magnitude of social

resilience. Moreover, the differences between counties and development regions in terms of high-resilience population distribution, reveals that values are referred to a different average. By calculating the standard deviation referred to different averages we obtained different results. Therefore it is necessary for economic development decisions to be made at every territorial level, and higher-level decisions should not be made by amassing the data provided by the lower levels, because simply summing up the data is not relevant to higher level decision-makers.



Class 1. Counties with moderate territorial movement of population, slightly negative numerical trend in the overall economically active population, overall salary evolution close to average (high social resilience); **Class 2**. County attractive for residence settling, but not attractive for domicile settling, significant numerical increase of the overall economically active population and significant salary decrease in all economic activities (high social resilience); **Class 3**. Counties attractive for residence and domicile settling, negative numerical evolution of the economically active population, especially in agriculture, salary evolution close to average (very low social resilience); **Class 4**. Counties with moderate territorial movement of population, numerical evolution of the economically active population generally slightly below average, above-average salary evolution in all the economic activities slightly (low social resilience); **Class 5**. Counties attractive for residence settling but with strong negative numerical evolution of the economically active population in all economic activities, significantly negative salary evolution (very low social resilience); **Class 6**. Counties with moderate territorial movement of population, numerical evolution of the economically active population generally close to average, also salary evolution close to average (low social resilience); **Class 7**. Counties unattractive for residence and domicile settling, generally positive numerical evolution of the economically active population, salary increases in industry and construction (very low social resilience).

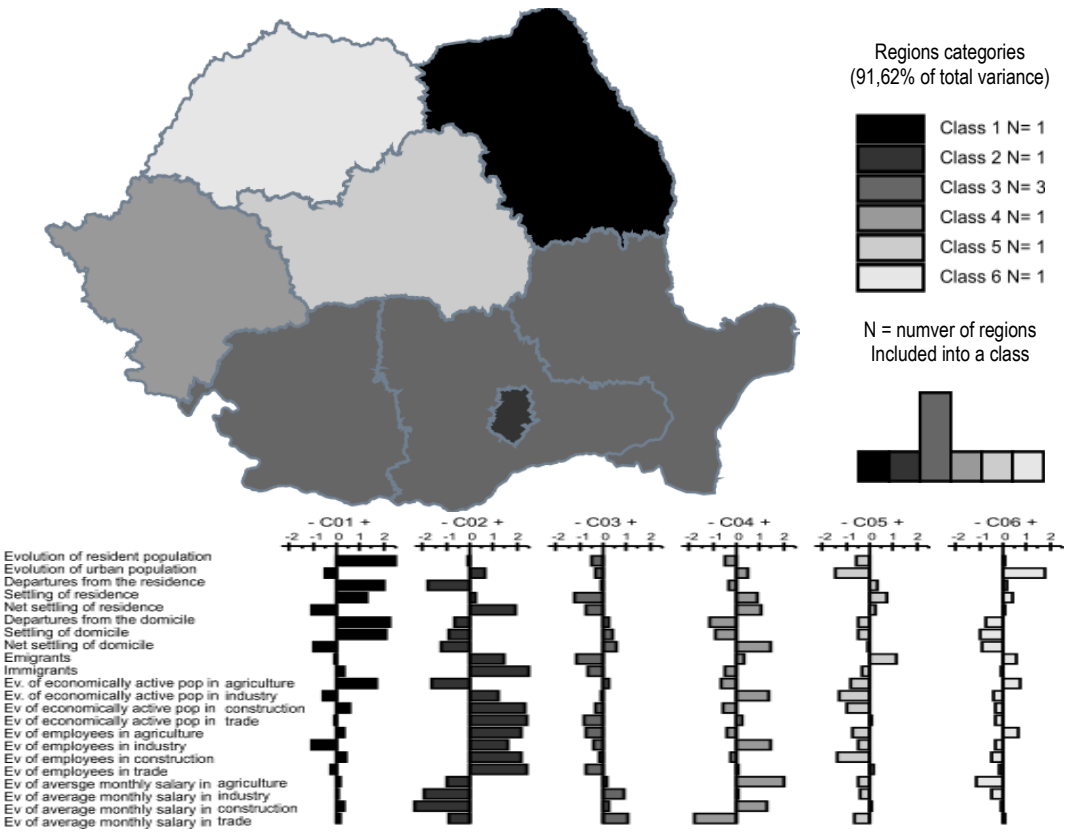
Figure 5. Typology of counties by economically active population, number of unemployed and average profile of classes, 2000
(Data source: National Institute of Statistics, www.insse.ro)

In 2000, the economic situation changed compared to 1995, the commercial activity ceased to develop, even falling, while construction activity

began increasing. The other two economic activities were slightly decreasing at national level, compared to 1995.

HAC running resulted in 7 types of counties (Figure 5) with the following characteristics:

- evolution of the economically active population in the four economic activities (agriculture, industry, construction and trade) as a whole, was negative in most counties, except for two classes where evolution was positive (class 2 and 7).
- salary evolution was negative overall, yet it did not create distortions in the population's decision to change residence or place of domicile.



Class 1. Region unattractive for residence and domicile settling, strongly negative evolution of the economically active population in industry, salary evolution close to the average (high social resilience); **Class 2**. Region attractive for residence settling and unattractive for domicile settling, generally significant numerical increase of the economically active population, and significant salary decreases (high social resilience); **Class 3**. Regions unattractive for residence settling, but attractive for domicile settling, numerical evolution of the economically active population generally below average, salary evolution above average (low social resilience); **Class 4**. Region attractive for residence and domicile settling, generally slight numerical decrease of the economically active population, salary decrease below average (low social resilience); **Class 5**. Region with moderate territorial movement of population, significant numerical decrease of the economically active population, significant salary decrease (very low social resilience); **Class 6**. Region unattractive for domicile settling, significant numerical decreases of the economically active population, significant salary decrease(low social resilience).

Figure 6. Typology of development regions by economically active population, number of unemployed and average profile of classes, 2000
(Data source: National Institute of Statistics, www.insse.ro)

In 2000, an average of some 20,000 people lost their job in agriculture, industry and trade in every development region. Only 1,000 persons succeeded to find employment in construction. Under these circumstances changing the place of residence or of domicile was an option for an average of some 40,000, and 30,000 people respectively in developing regions. Excepting industry, where the salary was almost constant, in the other economic activities it decreased.

HAC running at development regions revealed the following (Figure 6):

- negative numerical evolution of the economically active population in the four economic activities (agriculture, industry, construction and trade) as a whole, in most development regions, except for class 2, where evolution was positive; salary evolution generally negative, not population distortions in deciding on the change place of residence or domicile.

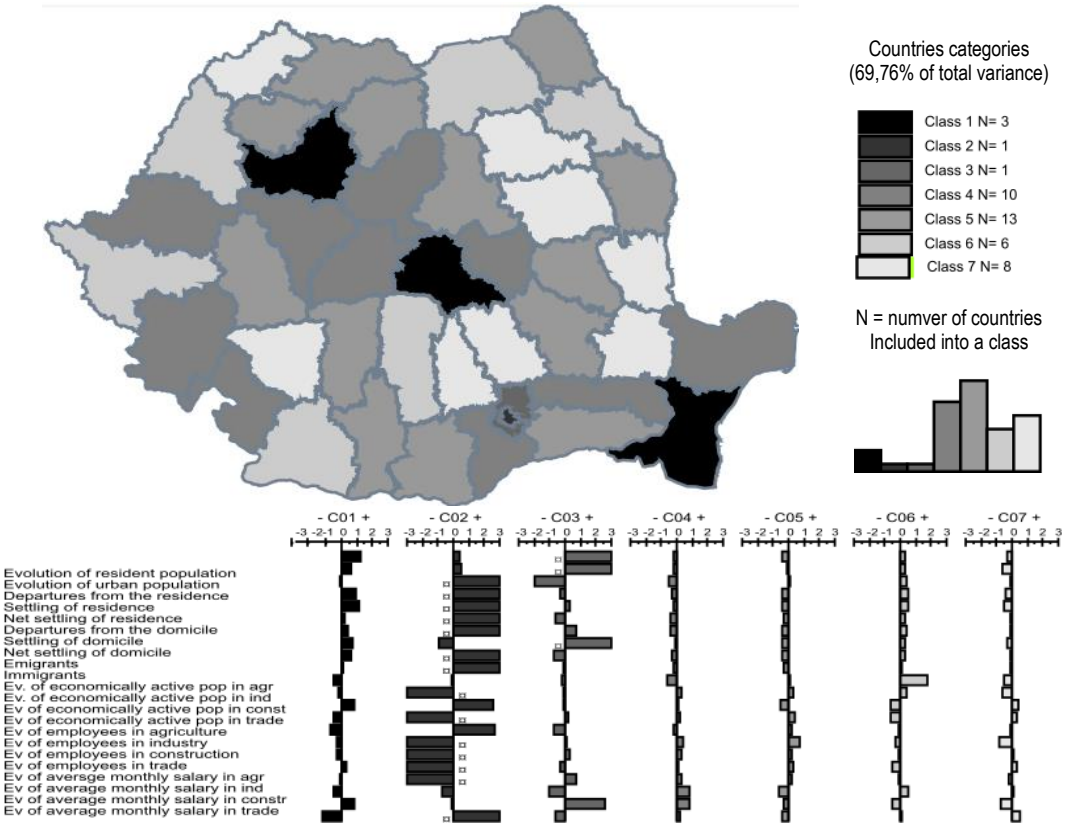
In 2000, the only exception in terms of social resilience dimension at county and regional level was Bucharest, a city of high economic growth, attracting labour from neighbouring counties or development regions. Otherwise, between the two spatial levels there were differences in the evolution of the economic variables, but also in the way people reacted to sudden economic changes. This is due to the local peculiarities of subsystems (in this case, the county level) that sometimes create path dependence. Therefore, every human community at county level follows a certain path of social and economic development based on its evolutionary history (Ianoş, 2000). There is, however, an extremely rare situation when local interactions are so strong that local path dependency induces path dependence at aggregate territorial level (in our case, the development region). When local ties are weak, urbanization externalities and international networks can be important. Diversified local economies have a high degree of adaptability and low propensity to path dependence. An economically attractive region enjoys the advantage of being selected for new locations (Martin et al., 2006).

Path dependence is a place-dependent process. Some regional economies became locked into certain ways of development and lose their dynamism, while other economies reinvent themselves by successive development paths. Path dependence is linked rather to "historical accidents" than to systematic forces. For Arthur (1994), driving forces in the evolution of the socio-economic systems are the economies of agglomeration (proximity to other companies' benefits, industry concentration - benefits that are not included in statistics). The formation of clusters, sometimes from one random location is explained by path dependence.

Path dependence, when asked to explain the history of industry, involving technology, patents, and specialization of labour, leads us to claim that it (dependence) does not apply universally, but locally, that we have more to do with place dependence (Cox, 1998). C. Castaldi and Dosi G., (2006) reached the same conclusion, when stating that path dependency on a small scale generates no path dependency on a wider scale, there are no isomorphism (structure similarity).

In 2010 the economic crisis was still ongoing in Romania. The number of employees was declining in all the economic activities, but more especially in industry. However, salaries kept rising in industry and construction. The population's reaction to this situation was change of place of residence (an average of some 5,000 people/county) and particularly of domicile (an average of 10,000 people/county). Running HAC at county level, the situation appeared as follows (Figure 7):

- in each of the seven classes, the number of employees in the four economic activities decreased (agriculture, industry, construction and trade).
- differences were found only in salary evolutions and population movement.



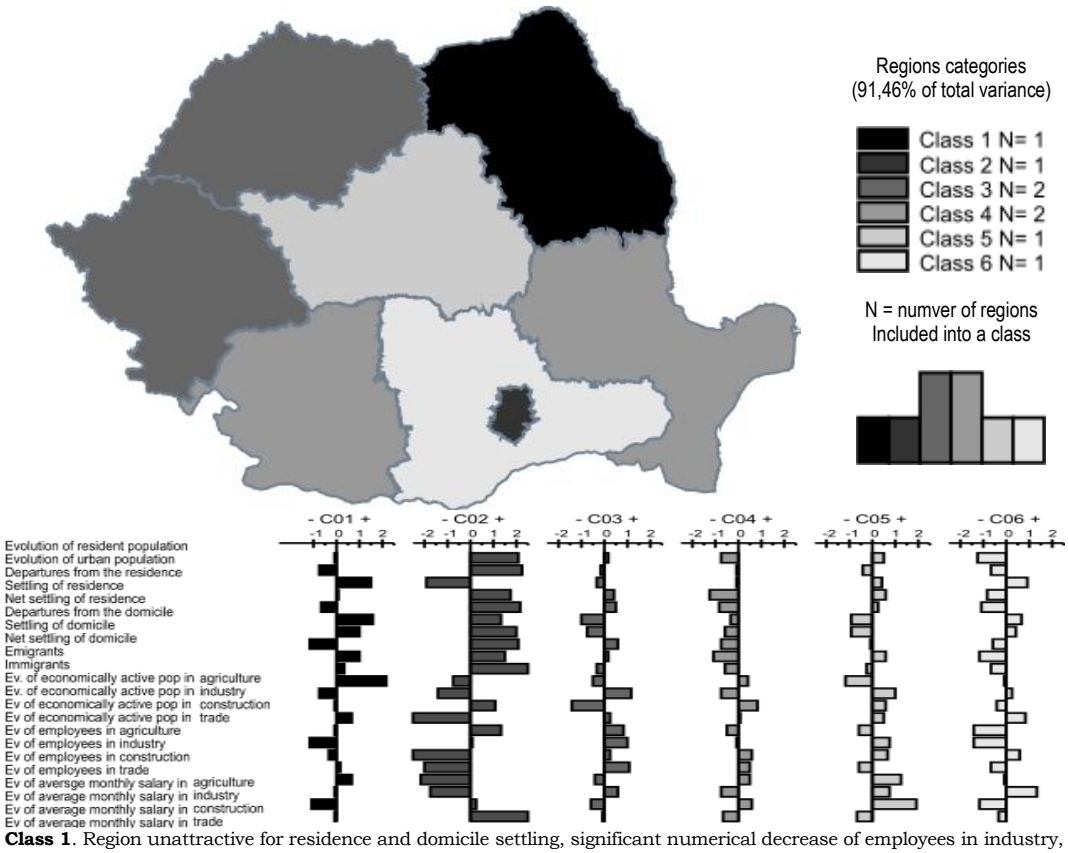
Class 1. County attractive for residence and domicile settling, generally with decreasing number of employees and above-average salary increases in construction and significant decreases in trade (very low social resilience); **Class 2**. Counties attractive for residence settling and unattractive for domicile settling, generally significant numerical decreases of employees and salary, significant increases in trade and significant decreases in agriculture (very low social resilience); **Class 3**. Counties attractive for domicile settling, above-average numerical decreases of employees in agriculture and significant salary increases in construction (very low social resilience); **Class 4**. Counties with moderate territorial movement of population, with generally close-to-average numerical evolution of employees and above-average salary increases in industry and construction (high social resilience); **Class 5**. Counties with moderate territorial movement of population, generally close-to-average numerical evolution of employees and slightly above average salary decreases (high social resilience); **Class 6**. Counties with moderate territorial movement of population, generally close-to-average numerical evolution of employees, above-average salary increases in industry and below-average in construction (low social resilience); **Class 7**. Counties with moderate territorial movement of population, generally close-to-average numerical evolution of employees, except for industry, where significant decrease and above-average salary increases in trade and above-average decreases in construction (high social resilience).

Figure 7. Typology of counties by economically active population, number of unemployed and average profile of classes, 2010
(Data source: National Institute of Statistics, www.insse.ro)

In 2010 an average of some 35,000 persons, lost their job in all the economic sectors of each development region. Under these circumstances, changing the place of residence or of domicile was an option for nearly 25,000

people and an average of 55,000 people, in each development region. Running HAC at development region level emphasized the following (Figure 8):

- the numerical evolution of employees in the four economic activities (agriculture, industry, construction and trade), as a whole, was negative in all development regions.
- salary evolution in all the economic activity was mixed, but it did not create distortions in people's decision of settling their residence or domicile.



Class 1. Region unattractive for residence and domicile settling, significant numerical decrease of employees in industry, significant salary decrease in construction and of salary increases in agriculture (high social resilience); **Class 2**. Region attractive for residence and domicile settling, significant numerical decreases of employees in construction and trade, significant salary increases in trade and significant salary decrease in agriculture and industry (very low social resilience); **Class 3**. Regions attractive for residence and domicile settling, generally below-average numerical decreases of employees, above-average salary increases in industry and above-average salary decreases in agriculture and construction (very low social resilience); **Class 4**. Regions unattractive for residence and domicile settling, above-average numerical decrease of employees in agriculture and below-average numerical decreases of employees in construction and trade, significant salary decrease in trade (high social resilience); **Class 5**. Region with moderate territorial movement of population, generally numerical decreases of employees, especially in agriculture and trade, significant salary increases in agriculture, industry and construction (low social resilience); **Class 6**. Region unattractive for residence and domicile settling, above-average numerical decreases of employees in agriculture, industry and trade, significant salary decreases in construction and significant salary increases in industry (high social resilience).

Figure 8. Typology of development regions by economically active population, number of unemployed and average profile of classes, 2010
(Data source: National Institute of Statistics, www.insse.ro)

Compared to the other analyzed years, social resilience in 2010 covered more extensive areas (over half of Romania), whether it was county or the

development region level we refer to. This situation depended on how the economic and financial crisis were manifest in Romania. The crisis did not hit all economic activities, but mainly industry and real estate. Romanian industry had already passed through a marked restructuring period, so that at the outset of the crisis the reduced number of employees in each sector was already low. In the second place, the population became more resilient in the wake of previous experiences it had gone through. The population had learned from the economic restructuring that period crisis may last and one had quickly look for a job if he had lost the previous one. However, differences in resilience at territorial level did exist.

This heterogeneity of resilience in county-level human communities should be seen as a positive aspect. The success achieved by some communities in the face of adverse economic situations was the way to follow by other low-resilient communities. Labour migration to areas that did successfully cope with economic change or train for a job in a more dynamic economic activity was a ways for social resilience to emerge.

CONCLUSIONS

The concept of resilience used by geographers along with other terms, such as vulnerability, mitigation and adaptation, is trying to find some ways for economic sustainable development. So, associate resilience with vulnerability (as an opposite) in socio-economic systems, at least as an extra test of the degree of their maturation (Trică & Papuc, 2013).

The close relationship between the economic and social components reminds us of the relationship between structure and function. This determines the transmission of the economic crisis to the social structure and, furthermore, to the economic structure, occurring economies deepening into the economic crisis by triggering a process of circular causality. The population's decision to relocate interrupts this process, leading to social resilience.

Our study is based on the analysis of social resilience on two spatial levels: county and development region. Actors and organizations that link the local scale by higher levels into social-ecological systems are often involved in such processes (Olsson et al., 2004).

For each spatial level we obtained different results, because economies have a different composition on different scales. The history of county or development region evolution (path dependency) plays a crucial role on how the population reacts to economic change. Therefore, inertia emerges in how people act, hoping that (economic) change does not occur. This explains the gaps in the evolution of the two components: social and economic. Even at development region level the differences between counties were levelled by social and economic differences. Social-economic complementarities between counties were a criterion for establishing development regions in 1998. EU pre-accession funds allocated to Romania starting with 1998 resulted in social-economic changes at development region level. In the 1995-2000 period, the Romanian economy experienced severe contraction, a positive economic trend being recorded in the years 2000-2010. Through 1995-2010, Romania's economy underwent a restructuring process that began with deindustrialization and continued with expanding the services and construction activities.

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