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SOCIO-ECONOMIC DIMENSIONS IN LOCATIONS BY CLUSTERS IDENTIFIED FOR REGISTERED UNEMPLOYED PERSONS AT LAU2 /NUTS 5 LEVEL IN 2013 AND 2010

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Abstract
Identifying locations that are part of the LAU2 two types of clusters HH and LL which indicates similarities in the level of unemployment registered, with the same tendency level indicator in neighbourhood values is achieved by spatial statistical analysis method Local Indicators of Spatial Association LISA (Anselin 1995, 1996) and calculated in Geoda Software. Each location LAU2's type (national, HH or LL) is profiled as calculated in SPSS by the statistical mean of characteristics relevant indicators to the labour market: The number of registered unemployed, number of employees, average population density / km2, average number of people entering the LAU2 following the change of domicile by reference environment and national levels in 2010 and 2013 in Romania. Data source is provided by National Institute of Statistic INS – TEMPO online database, socio-economic indicators detailed level LAU2 / NUTS 5, with a selection for 2010 and 2013. These research results have been achieved in the Project NUCLEU PN - 420 118: Spatial distribution of market indicators cohesion policy, made in 2014 and in the project DYNAHU.

Key words:.*cluster, registered unemployment, LAU2/NUTS5, cohesion policy.*

JEL Classification: *R23; J64*

I. INTRODUCTION

Spatial imbalances in unemployment represent a subject for exploratory spatial data analyses applied in socio-economic studies which provide useful insights for policy makers.
Exploratory spatial data analysis (ESDA), spatial statistics, spatial econometrics as spatial analysis methodologies offers many tools and functions in specialised software's GIS, GEoDA ,et al allow to „ summarize and visualize large sets of georeferenced data" accumulated and provided by public statistics (Fischer & Getis 2010, 16) All these new opportunities provides statisticians and policy analysts and policy makers to create new integrated in terms of objectives and efforts "the growing tendency of "policy motivated micro-approach (bottom-up) to the local development" (Okrasa, 2014).

Unemployment rates clusters across Europe's regions and countries indicates between 1986 and 1996 an increase of polarisation, fact evidenced through nonparametric methods by Overman and Puga (2002). Also there are confirmed s*patial Interaction and Regional Unemployment in Europe* (Niebuhr, *2003, p.) Recently, also unemployment rates are included as a measure of material wellbeing in the conceptual framework to measure social progress at the local level* (Mguni, Cistor-Arendar, 2013)

Spatial variability and measurement of interregional disparity are subjects in regional growth and development theories. The welfare describes in space and time the regional development, in complex processes difficult to be measured which uses "Sometimes alternative or complementary measures are also used, such as per capita consumption, poverty rates, unemployment rates, labour force participation rates or access to public services (Capello & Nijkamp 2009, p.1). Webber, D.J., Pacheco, G., (2010, p.13) concludes that "spatial

considerations must be taken into account when using targeted policy to help lift areas out of unemployment". Evidences in Italian unemployment differences using spatial analysis is applied for 103 provinces in Italy in 2003 by Cracolici, Cuffaro, et.al. (2009, p.289). This study concludes that "in 2003 the Italian labour market is characterized by a polarization of unemployment and so the policy makers have to pay attention on it because a regional intervention will benefit neighbouring regions" (Cracolici, Cuffaro, et.al., 2009, p.289).

In Romania (Antonescu, 2012a) made an analysis of regional disparities from the convergence process perspective in relation with EU's structures and among conclusions emphasis the need for understanding efficiency and effectiveness of interventions of a regional (territorial) nature. Unemployment is mentioned as structural indicator and included in theoretical aspects among the indicators of social disparities used in the regional disparities evidence, but the variation coefficient is calculated at NUTS 2 level only for employed population. (Antonescu, 2012b p11, p13)

This article is a continuation of the author's preoccupation on the spatial analysis applying on unemployment spatial variation in Romania as a measure of territorial unbalances: the regional profile of unemployment (Lincaru, Pi, 2014b), *the territorial profile clustring tendency in monthly variation of registered unemployment (Lincaru,* Ciucă, *2014)*, detailed profile *at localities desegregation level as case study for South Muntenia Region – Romania*, (Lincaru, Ciucă, 2011). The ESDA of exploring opportunities offered by GIS technology in socio-economic and environment analysis (Lincaru, Pirciog, et.al., 2014b), periurban areas development identification (Lincaru, Atanasiu, 2014) and inequalities profile&periurban criteria dynamics (Lincaru, Atanasiu, 2015).

In this paper we explore the spatio - temporal dynamics for registered unemployment persons in locations by HH and LL clusters types as a result of descriptive spatial analysis (ESDA) applied at LAU2 level, coupled with mean of the socio-economic indicators as attributes for locations.

II. PAPER AND TEXT FORMAT

The spatial profile of unemployment is dynamic in time. The association identified through LISA clusters (Anselin 2003, 2005) is applied at LAU2 / NUTS5 level for two years 2010 and 2013 emphasis not only different agglomeration tendencies but also some socio- characteristics changing in the identified clusters locations. Our research question in this paper is focused on sketching a territorial profile modification in 2 moments in time including the socio-economic characteristics variation by cluster type identified.

III. MODELS, VARIABLES AND DATA

Administrative and geographical data – area data it is also the statistical unit (and not the persons or households), (Anselin 1998):

a. Area data are provided by Romania ESRI shape polygons that reflects territorial description of LAU2 are regulated according Law 351/6th July 2001 regarding the National Territory Arrangement Plan - spatially geocoded using the polygons areas for LAU2 described by ESRI Romania using Arc GIS Software. The territorial administrative units LAU2 level are represented in SIRUTA (Romania's National Institute of Statistic (INS) – The National Interest Nomenclature Server – SENIN, Methodology SIRUTA –General Presentation) code by municipality, town, commune and County residence and are equivalent with NUTS5 (Nomenclature of Territorial Units for Statistics) level.

b. Attribute data:

Variable on which is made the LISA spatial analysis, on which we calculated "high-high" (H-H), "low-low" (L-L), "low-high" (L-H), and "high-low" (H-L)clusters in GeoDA (Anselin) are made for:

- Registered unemployed persons at the end of the month in 2010 at LAU2 level, SOM101E INS TEMPO
- Registered unemployed persons at the end of the month in 2013 at LAU2 level, INS TEMPO

Socio-economic indicators (Romania, provided by INS) as attribute information for each LAU2 the statistic unit by cluster type:

- Average number of employees in 2010 at LAU2 level, FOM104D INS TEMPO
- Average number of employees in 2012 at LAU2 level, FOM104D INS TEMPO
- Registered unemployed persons at the end of the month in 2010 at LAU2 level, SOM101E INS TEMPO
- Registered unemployed persons at the end of the month in 2013 at LAU2 level, INS TEMPO
- Total population in 2011, Census Data INS -ESRI

– Number of persons that entered in a locality 2009 (*)-Total population which who arrived and proved to have ensured a dwelling in a locality in 2009: Settling of domicile (including external migration) by counties POP307A - TEMPO INS -*Origin–destination flow*

Exploratory Spatial Data Analysis - ESDA

1. **Neighbourhood analysis / contiguity and spatial weighting** technique used. (Anselin 1998, 2002). Spatial relation conceptualization spatial LAG modelling is based on rook contiguity, first order type. Among the 3189 LAU2 with data there are 805 location with 5 neighbours, 799 locations with 6 neighbours, 577 locations with 7 neighbours, 408 with 4 neighbours and 282 with 8 neighbours, summing a cumulative percent of 90.1%. The maximum number of neighbours is 16 and minimum 1 in 4 locations;
2. **Analysis of global and local spatial autocorrelation** is realised through the Moran's I and *Local Indicators of Spatial Association* [LISA] Maps (L. Anselin, 1995), local clusters highlighting in 2013 for ***expenditures on projects funded by external grants at LAU2 level***. (Anselin, 2003, p.99)
3. **Selection of LAU2 units** included in HH and LL clusters types (Anselin 1995, 1996); See Appendix A: Table 11. LISA's clusters HH type for expenditures (RON) in 2013 on projects funded by external grants at LAU2 level in Romania and Table 12. LISA's clusters LL type for expenditures (RON) in 2013 on projects funded by external grants at LAU2 level in Romania.

IV. RESULTS AND DISCUSSIONS

Our results regarding the registered unemployed persons following the spatial analysis at LAU 2 level covers the following issues for 2010 and 2013: global spatial autocorrelation, local spatial autocorrelation and socio-economic characteristics of the locations by clusters type.

The number of registered unemployed persons presents a spatial dispersion global tendency at LAU 2 level, slightly decreasing from 2010 to 2013. The observed values of Moran I index of this indicator has negative values: of -0.00353 in 2010 and -0.000325 in 2013, both values are lower than the theoretical mean value E (I) of the Index Moran [(E(I) =-0.0003] indicating that there **is not asignificant correlation** (Anselin, 2005, p.135; Anselin, 2003, p.91). Please note that we opted for determining inference Moran I index 999 permutations for number of registered unemployed at UAT2 for the empirical distribution is obtained for a level of p = 0.419 pseudo significance in 2010 and p=0.362 respectively in 2013; In 2010 I obtained a Z score of -0.34 Moran I with a standard deviation for the reference distribution (Sd), Sd=0.086> Sd 1.65, which leads us to accept the null hypothesis, respective the identified pattern is completely randomized; In 2013 we obtained a Z score of 0.0405 Moran I with Sd =0.078<1.65 Sd, which entitles us to accept again the null hypothesis, and therefore ***identified pattern is the result of chance***.

With GeoDA software (Anselin, 1995) we made the two types of spatial synchronized maps which illustrates the local autocorrelation LISA tendencies for the number of registered unemployed persons at LAU2 level: the Cluster Maps (Maps 1 and 3) and the Significance map clusters at a minimum p = 0.05 for 999 permutations inference by convention we consider reasonable enough (Maps 2 and 4). In this model there are 5 types of spatial autocorrelation: High-High (H-H), Low-Low (LL) called spatial clusters registring positive spatial autocorrelation with agglomeration tendency (local Moran I>0), HL and LH called spatial outliers registring negative spatial autocoerrelation or dispersion tendency and NS locations - not significant spatial autocorrelation.

Next to the LISA result clustering tendency (for HH and LL location) by number of registered unemployed persons at LAU2 level we add supplementary information rgarding the dimensions of the attributes described by socio economic indicators in these locations types. (Table 1)

It is visible the tendency **to increase the spreading of locations** with high level of unemployed persons, surrounded with locations with high level of unemployed persons: in 2010 there were 56 locations HH type and in 2013 increased at 77 locations LAU2. Considering the increase of the mean of the unemployed persons / LAU2 HH type as a measure of increasing the intensity of unemployment then it is visible no intensity variation 330 unemployed person /LAU2 HH type both in 2010 and in 2013. At national level the mean of the number of persons that entered in a HH location decreased from 222 persons in 2009 (in HH location identified in 2010) at 183 persons in 2009 (in HH location identified in 2010) associated with the tendency of population density decreasing from 202 persons /km^2 in 2011 (in HH location identified in 2010) to 153 persons /km^2 in 2011 (in HH location identified in 2013) and in terms of employed population there is also registered an decreasing tendency from 1872 salaried persons / LAU2 HH type in 2010 (in HH location identified in 2010) to 1693 employed persons / LAU2 HH type in 2012 (in HH location identified in 2013) .

Also in HH clusters but **by residence area** there is an accentuated heterogeneity both in terms of spreading and intensity.

- In ***rural area*** is visible the spreading of unemployment from 41 LAU2 in 2010 to 60 LAU2 in 2013 – location that are nucleus of unemployment associated with an intensity decreasing in terms of registered unemployed person / HH LAU2 type from 277 persons in 2010 to 266 persons in 2013. In these locations is visible the tendency of decreasing the number of persons that enters in location from 190 persons / year in 2009 (in HH rural location identified in 2010) to 139 persons / year in 2009 (in HH rural location identified in 2013), is decreasing the population density from 159 persons / km^2 in 2011(in HH rural location identified in 2010) to 113 persons / km^2 in 2011 (in HH rural location identified in 2013) and also the number of salaried persons decreased from 890 salaried persons in 2010 (in HH rural location identified in 2010) to 611 salaried persons in 2012 (in HH rural location identified in 2013).

Table 1. Means for socio economic characteristics in locations by cluster type (HH, LL and national) for identified for unemployed registered persons at LAU 2 and by residence area (rural, urban, national) in 2010 and 2013

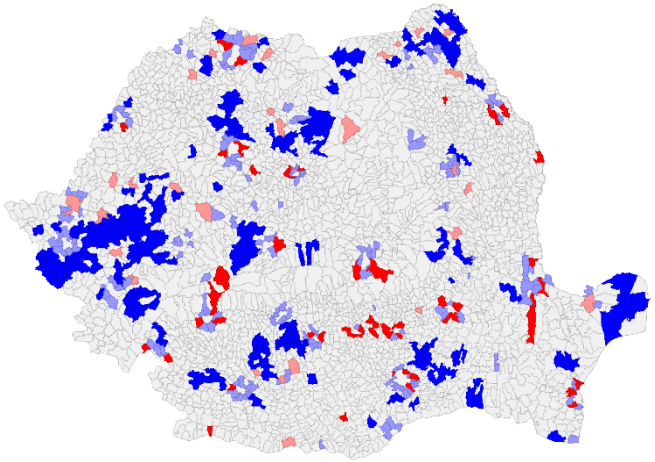
lisasi2010		**Nsi_2010**	*Pind_2009*	*denPTkm2*	*Nsal_2010*	**Nr UAT2 2010**	LISA_Si_13		**Nsi_2013**	*Pind_2009*	*denPTkm2*	*Nsal_2012*	**Nr UAT2 2013**
HH	Rural	**277**	*190*	*159*	*890*	**41**	**HH**	Rural	**266**	*139*	*113*	*611*	**60**
	Urban	**476**	*312*	*319*	*4558*	**15**		Urban	**562**	*336*	*301*	*5514*	**17**
	Nat.	**330**	*222*	*202*	*1872*	**56**		Nat.	**331**	*183*	*154*	*1693*	**77**
LL	Rural	**59**	*40*	*37*	*177*	**268**	**LL**	Rural	**45**	*41*	*39*	*206*	**299**
	Urban	**120**	*81*	*60*	*1020*	**14**		Urban	**93**	*115*	*100*	*1690*	**20**
	Nat.	**62**	*42*	*38*	*218*	**283**		Nat.	**48**	*46*	*43*	*298*	**320**
Total	Rural	**123**	*53*	*63*	*235*	**2867**	**Total**	Rural	**111**	*53*	*63*	*245*	**2867**
	Urban	**871**	*587*	*418*	*11794*	**314**		Urban	**615**	*587*	*418*	*11909*	**314**
	Nat.	**197**	*105*	*98*	*1372*	**3189**		Nat.	**161**	*105*	*98*	*1393*	**3189**

Randomization with 999 permutations, significant at p = 0.05 minimum weighted spatial contiguity Rook scheme of 1st order
Means are calculated for the locations by types of clusters identified by LISA method and illustrated in the maps, for the 4 socio economic indicators:
Map 1 . LISA clusters in 2010
Map 2 . LISA clustrs significance in 2010
Map 3. LISA clusters in 2013
Map 4. LISA clustrs significance in 2013
Where we used the notations for the socio-economic indicators best values available:
Pin - Number of persons with changes of domicile (including external migration) POP307A - TEMPO INS
Nsi - Registered unemployed persons at the end of the month annual means
Nsal – Annual average number of employees
denPTkm2 – number or habitants / km2, indicator calculated for 2011 INS Census geovectorised by ESRI
Nr. UAT2 – number of territorial administrative units by cluster type, represents the statistical unit;
Source: Calculated by the authors in GeoDA and SPSS.

LISA Cluster Map for the registered number of unemployed persons at LAU2 level
(Significance 0.05, Number of permutation 999)

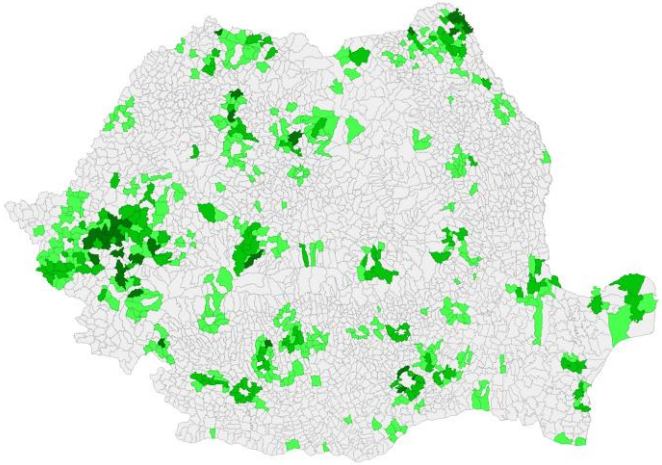
Map 1 . LISA clusters in 2010

NS		*2643*
HH		*56*
LL		*283*
LH		*178*
HL		*29*



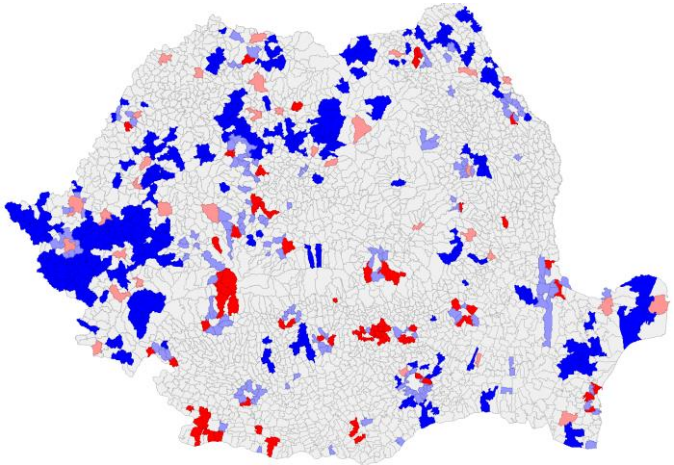
Map 2 . LISA clusters significance in 2010

p=0,05		*364*
p=0,01		*147*
p=0,001		*35*
p=0,0001		*0*



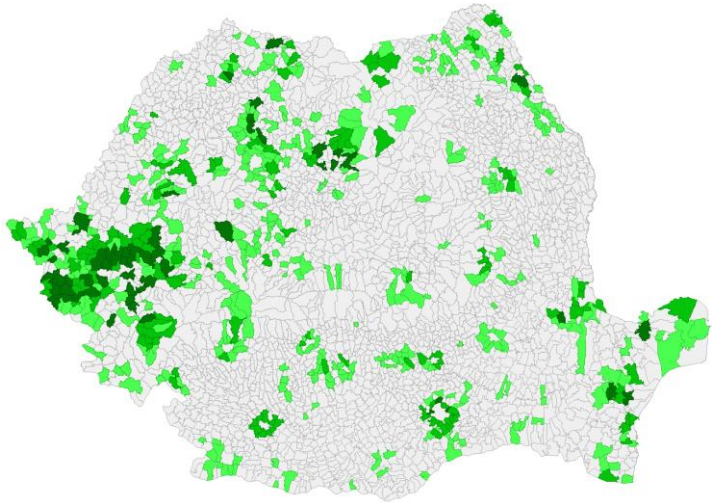
Map 3. LISA clusters in 2013

NS		*2591*
HH		*77*
LL		*320*
LH		*168*
HL		*33*



Map 4. LISA clusters significance in 2013

p=0,05		*387*
p=0,01		*151*
p=0,001		*60*
p=0,0001		*0*



Source: Shape file LAU2 polygons ESRI Romania 2014. Mapping data, FOM104D INS TEMPO, Map realised by authors in GeoDA,
HH = High-High and LL= Low-Low = **spatial clusters**&HL = High-Low and LH= Low-High = spatial outliers; Clusters calculated by authors in Geoda

- In ***urban area*** the unemployment phenomena is more complex both in terms of surface and intensity. The number of HH from urban area increased from 15 LAU2 in 17 in 2013 and in terms of intensity more acute, the mean of registered unemployed persons in 2010 increases from 476/LAU2 in urban area in 2010 to 562 persons in 2013. In these locations is visible the tendency of increasing the number of persons that enters in location from 312 persons / year in 2009 (in HH rural location identified in 2010) to 336 persons / year in 2009 (in HH rural location identified in 2013), is decreasing the population density from 319 persons / km^2 (in HH rural location identified in 2010) to 301 persons / km^2 (in HH rural location identified in 2013) and also the number of salaried persons increases from 4558 salaried persons in 2010 (in HH rural location identified in 2010) to 5514 salaried persons in 2012 (in HH rural location identified in 2013).

It is visible the tendency **to increase the spreading of locations** with low level of unemployed persons, surrounded with locations with low level of unemployed persons: in 2010 there were 283 locations LL type and in 2013 increased at 320 locations LL, associated with an decreasing tendency in intensity of registered from 62 registered unemployed person /LAU2 LL type in 2010 to 48 registered unemployed person /LAU2 LL type in 2013. At national level the mean of the number of persons that entered in a LL location increased from 42 persons in 2009 (in LL location identified in 2010) at 46 persons in 2009 (in LL location identified in 2013) associated with the tendency of population density increasing from 38 persons /km^2 in 2011 (in LL location identified in 2010) to 43 persons /km^2 in 2011 (in LL location identified in 2013) and in terms of salaried population there is also registered an increasing tendency from 218 employed persons / LAU2 LL type in 2010 (in LL location identified in 2010) to 298 employed persons / LAU2 LL type in 2012 (in LL location identified in 2013) .

In LL clusters but **by residence area** there is an accentuated heterogeneity both in terms of spreading and intensity.

- In LL locations from ***rural area*** is visible the increasing of the number of LL locations by registered unemployment level from 368 LAU2 in 2010 to 299 LAU2 in 2013 associated with an intensity decreasing in terms of registered unemployed person / LL LAU2 type from 59 persons / LL location in 2010 to 45 persons/ LL location in 2013. In these locations is constant the level of the number of persons that enters in location around 40 persons / year in 2009 (in LL rural location identified in 2010 and in 2013), is slightly increasing the population density from 37 persons / km^2 in 2011 (in LL rural location identified in 2010) to 39 persons / km^2 in 2011 (in LL rural location identified in 2013) and also the number of salaried persons increased from 177 salaried persons in 2010 (in LL rural location identified in 2010) to 206 salaried persons in 2012 (in LL rural location identified in 2013).
- In ***urban area*** the unemployment phenomena is more complex both in terms of surface and intensity. The number of LL from urban area increased from 14 LAU2 in 20 in 2013 and in terms of intensity more acute, the mean of registered unemployed persons in 2010 decreases from 120/LAU2 in urban area in 2010 to 93 persons in 2013. In these locations is visible the tendency of increasing the number of persons that enters in location from 81 persons / year in 2009 (in LL rural location identified in 2010) to 115 persons / year in 2009 (in LL rural location identified in 2013), is increasing the population density from 60 persons / km^2 (in LL rural location identified in 2010) to 100 persons / km^2 (in LL rural location identified in 2013) and also the number of salaried persons increases from 1020 salaried persons in 2010 (in LL rural location identified in 2010) to 1690 salaried persons in 2012 (in LL rural location identified in 2013).

During 2010-2013 the number of registered unemployed has developed a trend of extending the spatial polarization UAT2 expressed by increasing the local spatial clusters are composed of type:

a) HH - an increase of 1.76% from 0,7pp in 2010 to 2.4 in 2013;

b) LL - 1,2pp an increase of 8.9% from 2010 to 10% in 2013.

In both types of clusters HH and LL has been an increase in the average number of registered unemployed in the cluster than the national average level UAT2, but more more pronounced in HH clusters. Whatever type of cluster is observed the tendency of decreasing the distance towards the national means at level UAT2 by residence area and total for some socio-economic indicators: the average number of employees, average density of populaţaiei, average number of persons entering in the location following the change of domicile.

V. CONCLUSION

In this article, we realized a sketch of registered unemployment spatial distribution in time and intensity. We focused on cluster agglomeration HH and LL type as input hot spots for policy makers in different policies areas: development, employment, poverty decreasing, labour market competition and flexibility characteristics, etc. The value added of this article is provided by the results of applying of spatial analysis tools, in view to make a profile of some socio-economic indicators in locations LAU2/NUTS5 level used as statistical units but reflecting the smallest administrative unit. This multidimensional spatial heterogeneity profile offers an input for the policy dimension and budgetary effort better estimation, providing an practical background for implementing more

efficiently and more targeted actions and measures in the new strategic cycle under the new 1303/2013 Regulation of the European Parliament and of the Council laying down common provisions.

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VII. REFERENCES

Spatial analysis bibliography:

1. Anselin, L., (1995) *Local indicators of spatial association.* | LISA. *Geographical Analysis*;
2. Anselin, L., (2002) *Short Course Introduction to Spatial Data Analysis,* ICPSR-CSISS, University of California, Santa Barbara June 24-28;
3. Anselin, L., (2003) *GeoDa™ 0.9 User's Guide*,Spatial Analysis Laboratory, Department of Agricultural and Consumer Economics University of Illinois, Urbana-Champaign, Urbana, IL 61801, http://sal.agecon.uiuc.edu/ and Center for Spatially Integrated Social Science http://www.csiss.org/, Revised, June 15, 2003, Copyright © 2003 Luc Anselin, All Rights Reserved;
4. Anselin, L (2005) *Exploring Spatial Data with GeoDaTM : A Workbook*, Center for Spatially Integrated Social Science, Illinois, U.S.A;
5. Capello R., Nijkamp P., (2009), (ed). *Handbook of Regional Growth and Development Theories.* Edward Elgar. Cheltenham, UK
6. Fischer, M.M., and Wang, J., (2011), *Spatial Data Analysis, Models, Methods and Techniques*. Springer, pp.13;
7. Fischer, M.M., and Getis A., Ed. (2010), Handbook of Applied Spatial Analysis Software Tools, Methods and Applications, Springer;
8. Griffith, D. A., (1987), *Spatial Autocorrelation: A Primer*. Association of American Geographers, Washington, DC, 1987. Cited in Christopher D. Lloyd, local Models for Spatial Analysis, Second Edition, 2011, Taylor and Francis Group, LLC,
9. Lloyd C. D., (2011), *Local models for spatial analysis.* second edition, CRC Press, Taylor and Francis Group, pp.65 & pg.80;
10. Stewart,R. and Rogerson, P., (2005) *Spatial analysis and GIS*. Department of Geography, SUNY at Buffalo, Taylor and Francis, pp.1;
11. Stillwell, J., Clarke, G. (2004), Applied GIS and Spatial Analysis, *School of Geography, University of Leeds, Wiley 2004;*
12. **http://geodacenter.asu.edu/**

Applied spatial analysis on labour market analysis:

13. Antonescu, D., (2012a) *Identifying regional disparities in Romania: a convergence process perspective in relation to European Union's territorial structures*, Procedia Economics and Finance 3 (2012) p.1148 – 1155. Online at http://mpra.ub.uni-muenchen.de/56896/MPRA Paper No. 56896, posted 28. June 2014 06:06 UTC;
14. Antonescu, D., (2012b), *Identificarea disparităţilor şi convergenţei economice regionale în Uniunea Eeuropeană şi în România,* material elaborat în cadrul proiectului "Cercetarea ştiinţifică economică, suport al bunăstării şi dezvoltării umane în context european", confinanţat de UE şi Guvernul României din FSE pe POS DRU 2007-2013, contractul de finanţare nr. POSDRU /89/1.5/S/62988. Articolul a fost realizat sub îndrumarea dl.academician Aurel Iancu. http://www.studii-economice.ro/2012/seince120528.pdf
15. Cracolici, M. F., Cuffaro, M., Nijkamp P., (2009), *A spatial analysis on Italian unemployment differences*, Stat Methods Appl (2009), Springer. http://link.springer.com/article/10.1007%2Fs10260-007-0087-z#page-16;
16. Lincaru, C., Atanasiu, D., (2014 a), *Periurban areas and population density clustering model*, JRRSA – Romanian Journal of Regional Science Association, ISSN 1843-8520, No 2, Winter 2014, published in indexed BDI: EBSCO, REPEC/IDEAS, DOAJ/ Cabells, http://www.rrsa.ro/rjrs/V822.Lincaru.pd;
17. Lincaru, C., Atanasiu, D., (2014 b), *Perspective regionale ale şomajului in Romania*, publicată în lucrările Conferinţa Internaţională Ştiinţifico – Practică, Ediţia 1, „Abordări europene în cercetare şi inovare", 9-12 octombrie, 2014, UNIVERSITATEA DE STUDII EUROPENE DIN MOLDOVA, Ministerul Educaţiei a Moldovei Academia de Ştiinţe a Moldovei. " ISBN 978-9975-75-716-4. Competitivitatea şi inovarea în economia cunoaşterii, Conferinţa Ştiinţifică Internaţională (2014 ; Chişinău). Culegere de articole ştiinţifice, (26-27 sept., 2014)
18. Lincaru, C., Atanasiu, D., (2015), *The Townsend Deprivation Index variation as indicator of periurban areas development*, Journal of Social and Economic Statistics, accepted to be published in trim I 2015, ISSN(s): 2285-388X, Date added to DOAJ;
19. Lincaru, C., Ciucă, V., Atanasiu, D., (2014), *The tendency identification of overall clustering of registered unemployment at territorial administrative unit level - UAT2 in Romania*, article presented in Conference "CONFERINŢA INTERNAŢIONALĂ PERSPECTIVE EUROPENE ALE PIEŢEI MUNCII INOVARE, COMPETENŢE, PERFORMANŢĂ ", organized by: INSTITUTE FOR ECONOMIC FORECASTING - IPE in network INCE-Institutul National de Cercetări Economice "Costin C. Kiritescu" a Academiei Române, in collaboration with the Scoala Natională de Studii Politice si Administrative – Facultatea de Administratie Publică, Fundazione Giacomo Brodolini, Institutul National de Cercetări Stiintifice în Domeniul Muncii si Protectiei Sociale, Universitatea Româno-Americană, Bucureşti, 20 - 21.11. 2014. Accepted to be published into Institute for Economic Forecasting Conference Proceedings,
20. Lincaru, C., Ciucă, V., (2011) *The geographical distribution of unemployment at localities desegregation level case study for South Muntenia Region – Romania*, Publisher: Romanian Regional Science Association, Date of publication: 2011, Date added to DOAJ: 2012-12-02, December, Published in: Romanian Journal of Regional Science, Vol 5, Iss 2, Pp 76-91 (2011), ISSN(s): 1843-8520, Full text: http://www.rrsa.ro/rjrs/V526.LINCARU.PDF, ,published in indexed BDI: EBSCO, REPEC/IDEAS, DOAJ/ Cabells, GetInfo TIB German National Library of Science and Technology
21. Lincaru, C., Pirciog, S., Ciucă, V., Atanasiu, D., Chiriac B., (2015 a) *A territorial profile of public expenditures at LAU 2 level, for 2007-2013 period in Romania*, article to be published (abstract accepted at the 10th International Conference of the Romanian Association of Regional Science, which will be held at the Stefan cel Mare University during 8 to 9 May 2015 in Suceava);
22. Lincaru, C., Pirciog, S., Ciucă, V., Atanasiu, D., Chiriac B., (2014 b*), Oportunităţi oferite de tehnologia GIS în analiza socio-economică şi de mediu, articol in curs de publicare in cadrul volumului* DEZVOLTĂRI ASIMETRICE ALE PIEŢEI MUNCII - Sesiune Ştiinţifică Naţională a Institutului Naţional de Cercetarte Ştiinţifică în domeniul Muncii şi Protecţiei Sociale – INCSMPS, Bucureşti, 04 Decembrie 2014", Editura AGIR, ISBN 978-973-720-554-4;
23. Mguni, N., and Cistor-Arendar, L., (2013), *Report on conceptual framework to measure social progress at the local level and case studies,* Deliverable 9.1, Dissemination level: PU, "European Framework for Measuring Progress" e-Frame, SP1-Cooperation Coordination and support actions (Coordinating actions) FP7 SSH-2011-3 Grant Agreement Number 290520 SSH.2011.6.2-1
24. Niebuhr, A., *(2003), Spatial Interaction and Regional Unemployment in Europe, European Journal of Spatial Development,* http://www.nordregio.se/EJSD/-ISSN 1650-9544-Refereed Articles Oct 2003-no 5;
25. Okrasa, W. (2014), *Towards a data-and-policy spatially integrated system in the local context: From evidence –based to policy –driven*

statistical knowledge, Conference of European Statistics Stakeholders Methodologists, Producers and Users of European Statistics Sapienza University of Rome, Central Statistical Office, Rome, 24-25 November, 2014 http://cdss.sta.uniroma1.it/files/site/Abstract/Okrasa_Wlodzimierz.pdf

26. Overman, H. and D. Puga (2002), 'Unemployment clusters across Europe's regions and countries', *Economic Policy*, **34**, 115–47.
27. Patuelli, R., (2007), *Regional Labour Markets in Germany: Statistical Analysis of Spatio-Temporal Disparities and Network Structures*, VRIJE Universiteit, 2007;
28. Webber, D.J., Pacheco, G., (2010), G*etting people out of unemployment: A spatial perspective across Auckland*, *Department of Economics, Auckland University of Technology, NZ, 2010*;Zachary, A. S, (2010), *Spatial analysis of changes in the unemployment rate: a county-level analysis of the New England States*, Saint Leo University, Research in Business and Economics Journal, 2010;The bibliography list must comprise only the papers that were referred to in the text, alphabetically ordered after the first author's or editor's surname.

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29. *Hărți Arc Gis Online*Baza de date Romania 1:1000 000, realizata de Esri Romania si oferita gratuit spre a fi utilizata in scop educational Arc Gis Online**;**31. ***, (2013), Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions…..