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Competitiveness and innovation in rural Romania

Abstract: *In the recent period, public actions and policies have been increasingly oriented towards the improvement of economic competitiveness on account of numerous studies that signal the problems generated by the loss of performance from this perspective. This study attempts to identify the main factors that make the regional economies in Romania vulnerable in the face of competitors, mainly for the regions with strong and medium rurality features, i.e. the Predominantly rural (PR) counties and the Intermediate counties – classified according to the OECD methodology. The results of the study showed that the factors that largely contribute to widening the regional disparities with regard to rural competitiveness, making the PR counties more vulnerable are the following: (i) access to innovation and (2) the value of exports, in both the non-agricultural and agri-food economy.*

Keywords: *regional competitiveness, rural area, Romania*

Introduction

With the acceleration of economic globalisation, the debates on the competitiveness issue are becoming increasingly relevant, expression of the increasingly fierce competition worldwide. The '*competitiveness*' concept becomes a common topic of the debates from the academic and political circles as far as the globalisation of the economy is getting forward. Most often, the competitiveness concept is considered synonymous with the productivity concept. Thus, Porter (1990) states that "the only significant meaning of competitiveness at national level is that of productivity". WEF (2017) defines competitiveness as a "*set of institutions, policies and factors that determine the level of productivity of an economy and which, in its turn, determines the prosperity level that a given country can reach*". In similar terms, but more broadly, IMD (2015) defines competitiveness as the way in which "*an economy manages all its resources and competences in order to increase population's welfare*".

Recently, the public actions and policies have been increasingly oriented towards the improvement of economic competitiveness on account of numerous studies that identify the problems generated by the loss of performance from this perspective. The way in which competitiveness is defined and understood differs by the level at which competitiveness has been approached. Both in the specialty literature and in the praxeological approaches there are two levels of approaching competitiveness, namely:

1. *at the level of economic operators* – competitiveness of firms. Here, competitiveness is understood as the capacity to produce quality goods and services, at a fair price and at the right time. In other words, the competitiveness of an economic operator defines its ability to respond faster and more efficient to the customers' needs than other firms, all these firms acting as competitors on the same market (Thompson and Ward, 2005).
2. *at the level of geographical areas*. In a territorial perspective, two subsegments are differentiated: (a) competitiveness of countries and (b) regional competitiveness. Here, OECD defines competitiveness as the extent to which, under free and fair market conditions, a geographical area can produce goods and services that are successfully transacted on the international markets, while contributing to the increase of the population's real incomes, on the long term (OECD, 1996). While the firms are competing for market shares, the regions and countries are competing on the markets of mobile factors of production (labour, capital) on the basis of which they can improve their competitive ability.

Having as reference the above-mentioned conceptual delimitations, in the sense of the present analytical approach, regional competitiveness is understood as *the ability of regions to promote, attract and support the economic activity so that their population can achieve and maintain a high living standard*. According to this definition, a region is competitive when its business environment has high accessibility, produces and/or is attractive for the mobile factors

of production (highly qualified labour, innovative entrepreneurship etc.), thus generating economic growth. The successful attraction of these factors creates positive externalities, such as the benefits generated by concentration and location, which leads to increased regional economic performance in general and to social welfare in particular.

The objective of this study is to evaluate the regional rural competitiveness, more exactly the comparative analysis between the competitiveness of predominantly rural (PR) regions NUTS 3 (counties) on one hand, and the intermediate (IR) regions, on the other hand, in order to identify the parameters that facilitate/hinder competitiveness growth at the level of each type of region in Romania. Using an evaluation model of regional competitiveness developed in Croatia in 2012, we aim to determine the rural competitiveness level in Romania, nationwide and at the county level. The study had in view to determine the territorial disparities with regard to rural competitiveness between the PR and IR NUTS 3 regions (counties) (according to OECD definition). The main factors are identified that make the regional economies vulnerable in the face of competitors, mainly for the regions with strong and medium rurality levels (i.e. the PR and IR regions).

Two working hypotheses were formulated, which were tested throughout the analysis, as follows: (1) the PR regions are less competitive than the national average; (2) the weak development of the RDI sectors at regional level significantly influences competitiveness.

Theoretical background

The World Economic Forum (WEF) has published an annual report on global competitiveness for more than 35 years. Before 2004, the economies/countries were classified from the macro-economic point of view on the basis of the Growth Development Index developed by Jeffrey Sachs and from the micro-economic point of view on the basis of Michael Porter's Business Competitiveness Index (BCI). Since 2004, the Global Competitiveness has ranked countries according to the Global Competitiveness Index (GCI) developed by Xavier Sala-i-Martin; the index integrates both the macro-economic and micro-economic aspects of competitiveness.

In order to determine the GCI, the methodology developed by the WEF has in view the aggregation of twelve pillars grouped into three categories of sub-indices: *basic requirements index* (including indicators that refer to institutions, infrastructure, macro-economic environment, health and primary education), *efficiency enhances* (higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness and market size) and *innovation and sophistication factors* (business sophistication and innovation) considered to influence the national economy capacity in the successful performance in the competition with other economies.

The most recent WEF report analysed the competitiveness of 138 economies. Switzerland, Singapore and the United States ranked in the first three places, while Chad, Mauritania and Yemen were in the last places. Romania ranked 62nd, with the score of GCI of 4.30. Thus, Romania outperformed countries such as Slovakia, Hungary and Croatia, but on the other hand it lagged behind Poland, Bulgaria and Turkey (Figure 1).

	Economy	Score[1]	Prev.[2]	Trend[3]
1	Switzerland	5.81	1	
2	Singapore	5.72	2	
3	United States	5.70	3	
4	Netherlands	5.57	5	
5	Germany	5.57	4	
6	Sweden	5.53	9	
7	United Kingdom	5.49	10	
8	Japan	5.48	6	
9	Hong Kong SAR	5.48	7	
10	Finland	5.44	8	
129	Congo, Democratic Rep.	3.29	n/a	
130	Venezuela	3.27	132	
131	Liberia	3.21	129	
132	Sierra Leone	3.16	137	
133	Mozambique	3.13	133	
134	Malawi	3.08	135	
135	Burundi	3.06	136	
136	Chad	2.95	139	
137	Mauritania	2.94	138	
138	Yemen	2.74	n/a	

Figure 1. Top ten first and last countries, by the Global Competitiveness Index
The score is established from 1-7.
Source: WEF (2017).

The score obtained by Romania in recent years did not change very much, yet Romania's position in the ranking changed each year (Table 1). We consider it relevant for the theme of this study to mention the positions that Romania has in the hierarchy of the 138 countries for each of the twelve pillars, thus providing a picture of the framework in which Romania's economy evolves. Thus, the pillars for which Romania ranks the highest are the Macro-economic environment (28), Market size (402) and Technological training (48) and the lower positions are found for Business complexity (104), Institutions (92), followed by Infrastructure, Good health and primary education, Efficient labour market (for each of these pillars Romania ranked 88th in the global hierarchy). For all the other pillars, Romania's position in the ranking is lower than the position of the general rank, as follows: Developed financial markets (86), Higher education and training (67), Efficient goods markets (80).

Table 1. Romania's position in WEF reports in recent years

Year	Position in the rankings / Number of economies	Global Competitiveness Index total score
2016-2017	62 / 138	4.3
2015-2016	53 / 140	4.3
2014-2015	59 / 144	4.3
2013-2014	76 / 148	4.1
2012-2013	78 / 144	4.1

Sources: WEF Global Competitiveness Reports in the last five years.

According to the same report, the most important five factors that have a negative impact upon the development of business environment in Romania are in the following order: *access to finance, ineffective government, taxation level, labour inadequate to market requirements, corruption*. Romania should intervene to remediate the deficiencies in relation to the market access (through investments in infrastructure), more transparent decision making processes and institutional flexibility as well as for the improvement of the access to innovations and labour market flexibilisation.

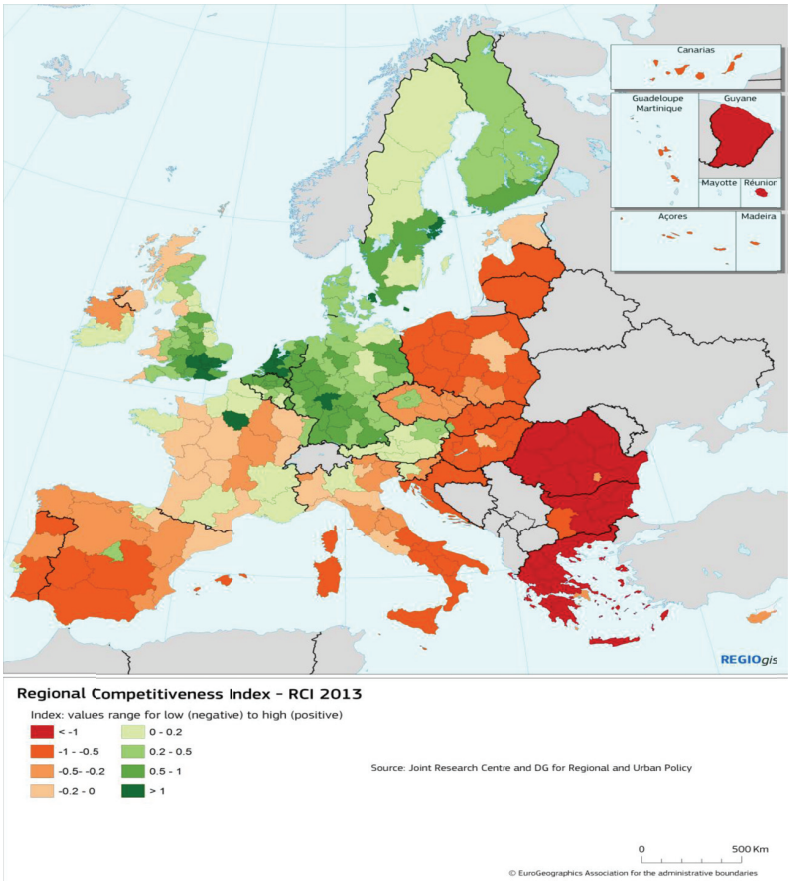


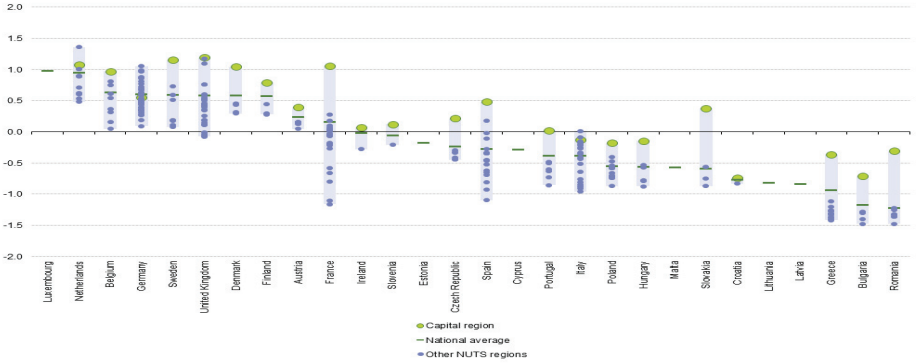
Figure 2. Regional competitiveness index at NUTS 2 level, 2013 (EU-28=0)

Source: Annoni and Dijkstra (2013).

Measuring the regional disparities and the identification of the main factors that contribute to competitiveness improvement across regions are on the research agenda of the European Union (EU), which has included the increase of territorial convergence among its objectives. The first report on the competitiveness

of the EU's regions was published in 2010, and was resumed and adjusted with regard to the indicators used in the calculation of Regional Competitiveness Index (RCI) in 2013 (Annoni and Dijkstra, 2013). Like the GCI calculated by the WEF, the Eurostat RCI has three pillars that are relatively similar in terms of explanatory relevance, yet differentiated by the number of component indicators and territorial approach (at national level – in the GCI and at regional level – in the Eurostat RCI). The indicators that describe the regional competitiveness evaluated at the level of EU regions are grouped into three categories, as follows: the *Base sub-indicator* (including indicators referring to institutions, macro-economic stability, infrastructure, health, primary education); *Efficiency sub-indicator* (tertiary education, labour market efficiency, market size); *Innovation sub-indicator* (technological training, business complexity, innovation).

The conclusions of Annoni and Dijkstra (2013) indicate that at EU level, competitiveness has a strong regional dimension, as within each EU Member State there are development regions with different competitiveness levels. France, Italy, Spain are relevant examples in this respect, which confirms that the analyses at national level cannot accurately capture the territorial disparities and realities. An approach based only on the value of indicators at national level may induce errors in the objectives of public policies and would lead to widening territorial disparities. Figure 2 presents the regional competitiveness disparities at EU level. Seven out of the eight NUTS 2 regions of Romania (the Bucharest region is the exception) some one of the lowest RCIs in the EU-28.



(*) The light purple shaded bar shows the range of the highest to lowest region for each country. The dark green bar shows the national average. The green circle shows the capital city region. The dark purple circles show the other regions. Chemnitz (DED4), Leipzig (DED5), Emilia-Romagna (ITH5), Marche (ITI3), Cheshire (UKD6) and Merseyside (UKD7): estimates based on the NUTS 2006 classification.
Source: European Commission (Joint Research Centre and Directorate-General for Regional and Urban Policy)

Figure 3. Regional disparities of competitiveness index at NUTS 2 level (EU-28=0)
Source: Eurostat (2015).

The regional competitiveness disparities become even more evident when they are illustrated as deviations of the regional indices value from the EU-28 average. The data for Romania reveal that not even the Bucharest region, which the country's best performing region, can reach the average competitiveness value of the EU Member States (Figure 3). According to the data of

the same source (Table 2), three regions of Romania are among the ten regions with the lowest competitiveness in the EU: South-West and Centre (RCI 4.2) and South-East (RCI 0.1).

Table 2. The ten most competitive and least competitive NUTS 2 regions of the EU-28 (index = 0 – 100)

Top 10	Region (NUTS code)	RCI 2013	Bottom 10	Region (NUTS code)	RCI 2013
1	Utrecht (NL31)	100.0	257	Peloponnisos (EL25)	5.1
2	London area (UKH2, UKH3, UKI1 and UKI2) (2)	94.2	258	Sud-Vest Oltenia (RO41)	4.2
3	Berkshire, Buckinghamshire and Oxfordshire (UKJ1)	93.5	259	Centru (RO12)	4.2
4	Stockholm (SE11)	92.7	260	Anatoliki Makedonia, Thraki (EL11)	3.9
5	Surrey, East and West Sussex (UKJ2)	90.7	261	Notio Aigaio (EL42)	3.7
6	Amsterdam area (NL23 and NL32) (3)	90.1	262	Dytiki Makedonia (EL13)	2.8
7	Darmstadt (DE71)	89.2	263	Yugoiztochen (BG34)	2.7
8	Île de France (FR10)	89.1	264	Sterea Ellada (EL24)	2.2
9	Hovedstaden (DK01)	88.8	265	Sud-Est (RO22)	0.1
10	Zuid-Holland (NL33)	87.6	266	Severozapaden (BG31)	0.0

(1) Chemnitz (DED4), Leipzig (DED5), Emilia-Romagna (ITH5), Marche (ITI3), Cheshire (UKD6) and Merseyside (UKD7): estimates based on the NUTS 2006 classification.
(2) Aggregated data to take account of commuting patterns, comprising: Bedfordshire and Hertfordshire (UKH2), Essex (UKH3), Inner London (UKI1) and Outer London (UKI2).
(3) Aggregated data to take account of commuting patterns, comprising: Flevoland (NL23) and Noord-Holland (NL32).
Source: European Commission (Joint Research Centre and Directorate-General for Regional and Urban Policy)

Source: Eurostat (2015).

So far, the studies on competitiveness referring to Romania have targeted the analysis, from this perspective, of the national economy sectors or focused on the description of territorial disparities with regard to competitiveness across development regions. Research studies on the evaluation of rural competitiveness in Romania and on its determinant factors are relatively modest, and they mainly refer to the competitiveness of the main sector of rural economy – agriculture (Bojnec and Fertő, 1999; Sarris et al, 1999; Fogarasi, 2008).

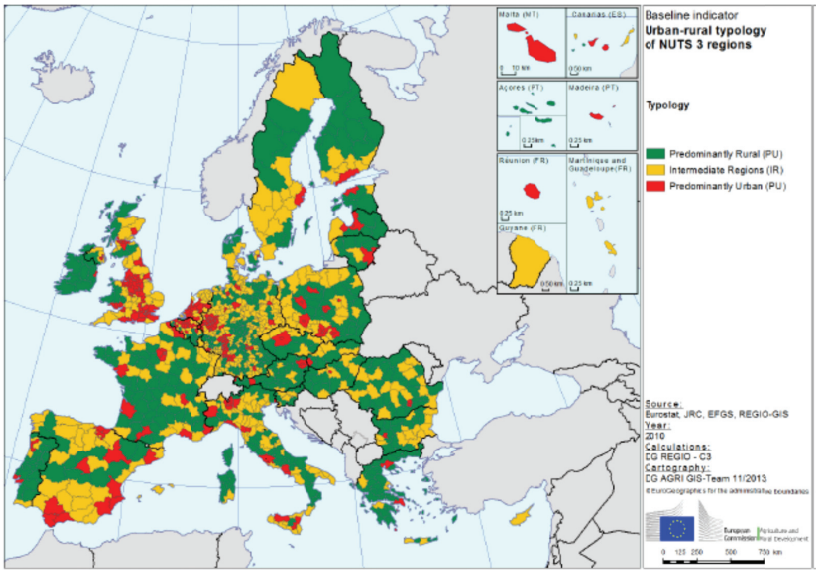


Figure 4. NUTS 3 map of the EU by rurality level
Source: EC (2013).

Table 3. Importance of predominantly rural regions (PR) and of intermediate regions (IR) in Romania and by groups of EU Member States

	% of the territory		% of population		% GVA		% labour employment	
	PR	IR	PR	IR	PR	IR	PR	IR
EU-27	51.6	38.4	22.6	35.1	15.6	30.0	20.6	33.9
EU-15	49.8	39.1	18.1	34.1	14.3	29.5	16.7	33.0
EU-N12	57.2	36.2	39.8	38.8	28.7	35.4	36.0	37.5
Romania	**59.8**	**39.4**	**45.6**	**43.8**	**32.7**	**42.1**	**41.8**	**46.2**

Source: EC (2013).

In view the fact that in Romania the regions with (stronger or more attenuated) rurality characteristics, including here the PR and the IR regions, have a significant socio-economic importance compared to the other EU Member States (Figure 4), we consider that a competitiveness analysis based on a methodology adapted to the particularities of the rural spaces best responds to the national context. The importance of regions with rural characteristics in Romania can be evaluated by a set of relevant geo-economic-social parameters: share of these regions in the national territory, in total population, in labour employment and in value-added formation. According to these parameters, the PR regions of Romania account for 60 per cent of the national territory, being the living space of 45.6 per cent of the country's population, while contributing 32.7 per cent to gross value added (GVA) formation and 41.8 per cent to labour employment (Table 3). The IR regions are added to these regions, which also significantly contribute to the country's descriptive parameters, making Romania the most rural EU Member State.

Methodology

In order to evaluate the RCI of the NUTS 3 (counties) development regions with different rurality characteristics – PR regions on the one hand and IR regions on the other, the statistical model developed by Mikuš et al., 2012 to measure the territorial disparities in the regional competitiveness of Croatia was adapted. While the competitiveness evaluation models implemented by the WEF or Eurostat are constructed on three pillars as described above (*basic needs, efficiency and innovation*), the model developed in the Croatian study includes four sets of indicators namely:

1. human resources;
2. situation of the non-agricultural sector economy;
3. situation of the agricultural sector economy;
4. other income generating activities of the farm households.

After the identification of the available statistical information in the territory, at county level in Romania, we attempted a most comprehensive coverage of the set of indicators included in the Croatian model. Yet certain indicators

from the initial model were not available at the disaggregated county level in Romania's official statistical data. In order to increase the compatibility between the Croatian model on the study on rural competitiveness and the reputed models developed by the international forums, we considered the need to adjust this model by introducing the innovative component in it.

Table 4. Adapted model for competitiveness evaluation at county level

Variable – Original Croatian model	Variable – Adapted model
Group – Human resources	
Population employed in the rural area (pers)	Employed population (thou. pers.)
Population with higher education (pers.)	Population with higher education (pers)
Young population in the rural area (pers.)	Young population (pers)
Population density (pers/km^2)	Population density (pers/km^2)
Group – Situation of non-agricultural sector economy	
GVA (EUR)	Turnover (thou. EUR)
Value of exports (EUR)	Value of exports (thou. EUR)
Investments in durable goods (EUR)	Density of local active units (no. of local active units / 1000 inhabitants)
Net average wages (EUR)	Net average wages (EUR)
Group – Situation of agricultural (primary) sector	
Average farm size (ha UAA /farm)	Average farm size (ha UAA /farm)
GVA (EUR)	Turnover (thou. EUR)
Value of exports (EUR)	Value of exports (thou. EUR)
Investments in durable goods (EUR)	Density of local active units (no. of local active units / 1000 inhabitants)
Net average wages (EUR)	Net average wages (EUR)
Group – Other income generating activities on the farm households	***Group – Specialisation and innovation***
Share of tourism households	Share of population employed in non-agricultural sectors
Share of handicraft households	RDI employees in 10000 employed civilians
Share of processing households	Share of crop production value in total agricultural output value
Share of households that gain from other income generating activities	

Source: adaptation from Mikuš et al. (2012).

This determined the research team from the Institute of Agricultural Economics of the Romanian Academy to try to identify other series of statistical data available at NUTS 3 level that are compatible with the unavailable indicators in terms of statistical significance. Thus, the Croatian model was adapted according to the available statistical data from Romania and the need to introduce the innovative parameter in the descriptive framework. The main modifications brought to the initial model (Table 4) consist of:

- the replacement of the indicator *Gross value added by Turnover*, which includes, besides the gross value added, the value of intermediary consumptions used to produce the goods and services traded in a given period;
- the replacement of the indicator *Value of investments in tangible durable goods* by *Density of local active units/1000 inhabitants*, both for the agricultural sector and for the non-agricultural sector, is justified by the fact that a higher density of local active units is synonymous with a higher attractiveness of a given geographical area for investors and investments;
- the group of indicators *Other income generating activities on the farm households* was replaced by a series of three indicators reunited under Specialisation and innovation. This last adjustment to the initial model was justified, on the one hand, by the need to introduce in the study two of the pillars used in the well-known competitiveness evaluation models (WEF and EU), namely: *Innovation and business complexity* revealed by the specialisation level that can induce productivity increase. On the other hand, this methodological decision to change the last set of indicators was motivated by the purpose and coverage area to which the present study has been subsumed. Thus, the present study targets the comparative competitiveness evaluation of a larger region, at NUTS 3 level, which includes both the rural and the urban areas, and including in the model only the information referring to the farmer households would bring incomplete information with regard to the openness to alternative activities in the investigated area. On the other hand, increasing the specialisation level in non-agricultural activities of the regional economies (expressed by higher shares of the population employed in non-agricultural activities) and the development of livestock production generate increasing opportunities for the primary sector of the regional economy to become competitive, as the pressure on the land resources decreases with the non-agricultural employment and the value added in agriculture increases with livestock production development. Furthermore, the chances for an economy to become competitive increase as far as its access to innovation increases. Hence, in the model proposed for this analysis, an indicator was introduced that reflects the innovative capacity at NUTS 3 level, namely: *Employees in RDI in 10000 employed civilians*.

For the model adapted to the county level in Romania, the data were extracted from statistical sources of secondary data at the level of the year for which data were available in the official statistics – 2014. The only indicators for which data were extracted at the level of previous years are the Population with higher education (the source being the Census of Population and Dwellings, 2011 of the Romanian National Institute of Statistics, NIS) and Average farm size (the source being the Structural Farm Survey, 2013).

Table 5. Data source for the indicators included in the adapted model for competitiveness evaluation

Group / Indicators	Source
Group – Human resources	
Employed population (thou. pers.)	NIS, Tempo on-line, TEMPO_FOM103D
Population with higher education (pers.)	NIS, Census of Population and Dwellings 2011
Young population 0-20 years (pers.)	NIS, Tempo on-line, TEMPO_POP106A
Population density (pers./km^2)	NIS, Tempo on-line, TEMPO_POP106A, Statistical yearbook – area in km^2
Group – Situation of non-agricultural sector economy	
Turnover (thou. EUR)	NIS, e_Demos database
Value of exports (thou. EUR)	NIS, Tempo on-line, TEMPO_EXP101J
Density of local active units (no. of local active units /1000 inhabitants)	NIS, Tempo on-line, TEMPO_INT101R, TEMPO_POP106A
Net average wages (EUR)	NIS, Tempo on-line, TEMPO_FOM106E
Group – Situation of primary sector economy – agriculture	
Average farm size (ha UAA /farm)	NIS, Structural Farm Survey, 2013
Turnover (thou. EUR)	NIS, e_Demos database
Value of exports (thou. EUR)	NIS, Tempo on-line, TEMPO_EXP101J
Density of local active units (no. of local active units /1000 inhabitants)	NIS, Tempo on-line, TEMPO_INT101R, TEMPO_POP106A
Net average wages (EUR)	NIS, Tempo on-line, TEMPO_FOM106E
Group – Specialisation and innovation	
Share of employed population in non-agricultural sectors	NIS, Tempo on-line, TEMPO_FOM103D
RDI employees in 10000 employed civilians	NIS, Tempo on-line, TEMPO_CDP102E
Share of crop production value in total agricultural output value	NIS, Tempo on-line, TEMPO_AGR206A

Source: adaptation from Mikuš et al. (2012).

The calculation formula of the competitiveness indicators (components of RCI) was the following:

$X_i = 100(x_i/X)/(p_i/P)$, where:

- the small letters represent the values at the level of NUTS 3 region, and the capital letters the values at national level;
- x_i represents the variable chosen for each category of NUTS 3 region and X for the national level;
- p_i represents the population at the level of NUTS 3 region categories, and P at national level.

Each indicator was assigned a specific weight equal to that of the other indicators from the group, and for each group an intermediate value of index was calculated (SI), using the arithmetic mean. The values thus determined for

each group of indicators (SI) were used for the calculation of the value of *RCI at the level of counties and of the categories of NUTS 3 regions (PR regions or IR regions*, according to the OECD classification). The calculation of the RCI for each category of region results from the aggregation of SI values, determined as arithmetic mean in the hypothesis in which the rank of each component in the rural competitiveness explanation is equal.

Results and discussion

The specialty literature highlights the existence of significant disparities in the territory and the lack of homogeneity of the national and/or regional blocks from the competitiveness level perspective. Given this assumption, we propose an analysis of the competitiveness level of the administrative territorial subdivisions of the development regions, i.e. the counties, considering that the higher the spatial disaggregating level of the analyses in territorial profile, the higher is the accuracy of the formulated conclusions.

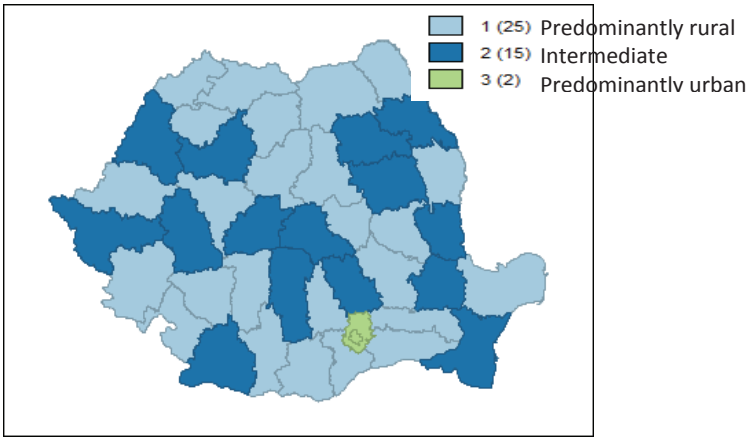


Figure 5. Classification of Romania's counties by the rurality level according to the OECD methodology

Source: EC (2013).

According to the OECD methodology, most of the counties in Romania belong to the categories of regions where the rural characteristics prevail. Of the 42 NUTS 3 administrative-territorial units in Romania, 25 fall into the category PR and other 15 counties belong to the category IR regions.

The results of rural competitiveness evaluation in the (PR and IR) counties in Romania are presented next, at 2014 horizon, having as a methodological basis the model described above. These calculations are an evaluative approach that can be subject to changes proportionally with the availability of data at NUTS 3 level and the progress of socio-economic research in measuring competitiveness.

Rural competitiveness was determined for the two categories of NUTS 3 regions, categories defined by their rurality level, in order to test the previously formulated hypothesis according to which the rurality level influences the regional competitiveness level. The rural competitiveness level of PR and IR counties was determined in relation to the national average using the RCI developed during the study. The results of the application of the Rural competitiveness index computation model are presented in the next table, for the 25 counties considered PR and for the 15 IR counties of Romania.

Table 6. Rural competitiveness index in the predominantly rural and intermediate regions of Romania

Group / Indicators	Rural competitiveness indicators for:	
	INT*	PR**
Group – Human resources		
Employed population (thou. pers.)	97.67	94.67
Population with higher education (pers.)	102.52	68.60
Young population 0-20 years (pers.)	98.93	105.61
Population density (pers./km^2)	110.76	75.06
Average of indicators from Group 1 (SI_1)	*102.47*	*85.98*
Group – Situation of non-agricultural sector economy		
Turnover (thou. euro)	79.81	41.47
Value of exports (thou. EUR)	122.00	62.69
Density of local active units (no. local active units /1000 inhabitants)	99.94	69.21
Net average wages (EUR)	94.47	82.24
Average of indicators from Group 2 (SI_2)	*99.06*	*63.90*
Group – Situation of primary sector economy – agriculture		
Average farm size (ha UAA /farm)	102.73	98.36
Turnover (thou. EUR)	85.57	107.69
Value of exports (thou. EUR)	71.55	42.29
Density of local active units (no. local active units /1000 inhabitants)	97.68	115.47
Net average wages (EUR)	100.71	96.83
Average of indicators from Group 3 (SI_3)	*91.65*	*92.13*
Group – Specialisation and Innovation		
% pop. Employed in non-agricultural sectors	102.11	86.01
No. of RDI employees in 10000 employed persons	102.44	21.69
% crop production value in total agricultural output value	99.25	100.1
Average of indicators from Group 4 (SI_4)	*101.27*	*69.34*
Rural competitiveness index (RCI)	***98.61***	***77.84***

***INT –NUTS 3 regions considered 'Intermediate' according to the rurality level.**
**** PR – NUTS 3 regions considered 'Predominantly rural' according to the rurality level.**
Source: not stated.

In 2014, overall, the PR counties are 22.1 per cent less competitive than the socio-economic system of Romania in its totality, while the counties that are considered IR from the rurality perspective are 1.4 per cent less competitive than the national average (Table 6). Moreover, there is a strong dependency between population density at county level (used as a proxy for the degree of

rurality of the county) and rural competitiveness index calculated at NUTS 3 level (Figure 6); the correlation coefficient is 0.980. As a result, the first hypothesis advanced in our study has been confirmed, as it has been shown that a higher rurality level has a negative influence upon rural competitiveness.

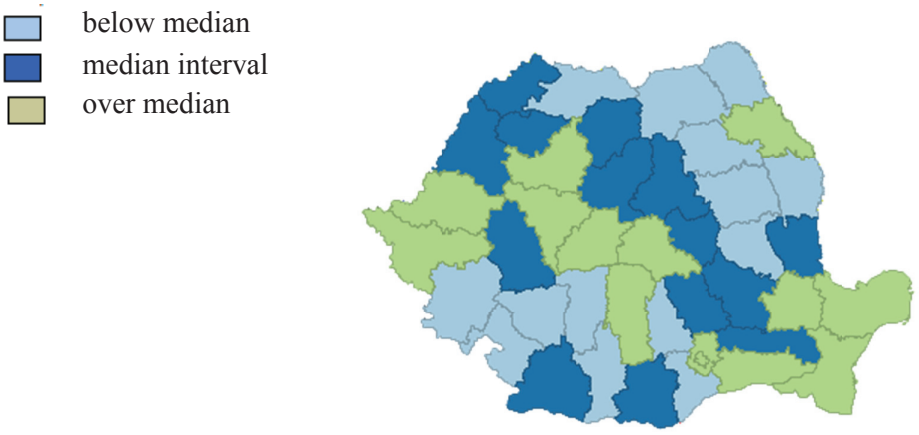


Figure 6. Rural competitiveness index at county (NUTS 3) level in Romania
Source: not stated.

The analysis of the four components (groups) of the Rural competitiveness index, as well as of the component indicators, reveals the strengths that contribute to the competitiveness of the two categories of NUTS 3 regions, as well as the weaknesses that make the PR regions have a lower competitiveness than the national average. Thus:

- comparing the intermediate indices of competitiveness, for each of the four groups of indicators, it results that in the two categories of counties, the NUTS 3 IR regions have positive competitive advantages compared to the PR counties;
- the comparative analysis between all the model parameters reveals that the PR regions have the weakest competitive performance for the group of indicators describing the *non-agricultural economy* for which the capacity of the economy of PR counties to face competition is 36.01 per cent lower than the national average. On the other hand, for the IR counties, the intermediate indicator of competitiveness for the group SI_2 has quite a similar value to that of the national average (the average of the indicators from the group *non-agricultural economy* accounting for 99.06 per cent of the national average);
- significant competitiveness disparities between the categories of regions are found for all the groups of indicators in the model, but, after the *non-agricultural economy*, the greatest differences are quantified in the case of indicators describing the *specialisation and innovation* for which the PR NUTS 3 regions have performances 30.66 per cent lower than the na-

tional average, while for overall IR counties, the intermediate indicator of competitiveness for the group specialisation and innovation (SI_4) has a value higher than the national average (1.27 per cent higher than the national average);

- the only parameters of the model for which the PR and the IR NUTS 3 regions have a relatively similar competitive performance are those from the *primary sector economy*, for which the competitiveness level represents 91.65 per cent and 92.13 per cent respectively of the national average;
- the factor that mostly determines the inter-category competitiveness differences between the economic components of the model (both of the primary economy sector and of the non-agricultural economy) is the value of exports. Thus, while the intermediate indicators of competitiveness (X_i) for the *value of exports* of the non-agricultural economy represents only 62.69 per cent for PR regions, in the case of IR counties the same indices reach 122 per cent of the national average. Moreover, there is a statistically significant correlation between rural competitiveness index calculated at NUTS 3 level and the export value both of the primary sector and economy of the non-agricultural economy (the values of the correlation indicators being 0962 and respectively 0733[1]). Figure 7 shows the regional disparities between the values of exports of non-agricultural sectors, on the one hand and agriculture on the other hand.
- by comparing all the indicators included in the model, the largest disparities between the PR and the IR regions are found between the intermediate indicators of rural competitiveness for Innovation, more exactly, in the case of the *number of RDI employees per 10,000 employed civilians*. Thus, while for the PR NUTS 3 regions, the intermediate indicator of competitiveness accounts for only 21.69 per cent of the national average, for the other category of counties, the competitiveness level in innovation is 102.44 per cent (Figure 8). Moreover, the degree of rurality (approximately by the population density at county level) is positively correlated with the density of the employees in RDI sector.

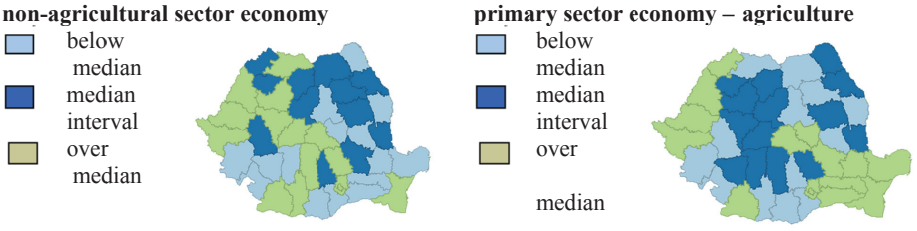


Figure 7. Value of exports at county level (thousand EUR)
Source: not stated.

[1] Correlation is significant at the 0.01 level (2-tailed).

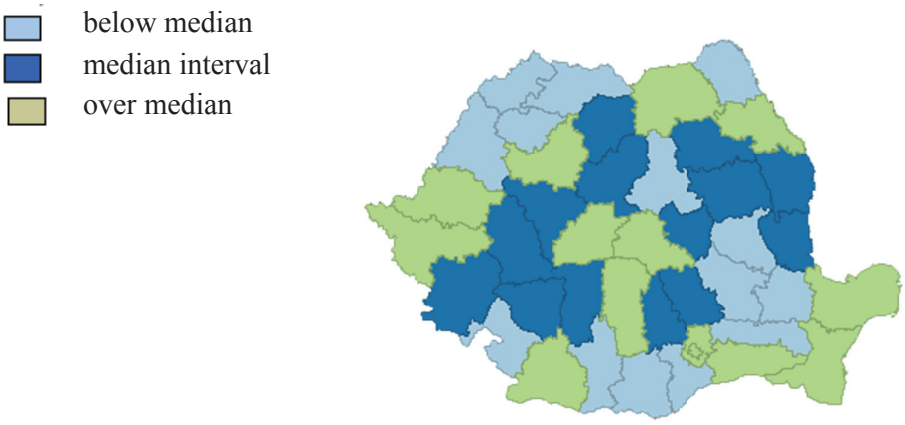


Figure 8. Territorial disparities between no. of RDI employees per 10000 employed persons

Source: not stated.

Consequently, innovative capacity is the factor for which the competitiveness disparities between the categories of regions are the most significant and this can be considered the main comparative advantage that leads to competitiveness increase in the investigated regions, making the difference between the PR and the IR regions. Thus, the second hypothesis of this study, namely that *the poor development of the RDI sectors at regional level significantly impacts the competitiveness level*, has been positively validated, also at national level.

Conclusions

Following the application of the competitiveness evaluation model, it results that the economies of the PR NUTS 3 level regions are less competitive than the economies of the IR regions. The application of the rural competitiveness evaluation model at the level of all counties in Romania in 2014 reveals that the factors that mostly contribute to the amplification of rural competitiveness territorial disparities between the two categories of NUTS 3 regions are the following:(1) the number of staff employed in RDI activities that ensures the comparative advantage of access to innovation and (2) the value of exports, in both the non-agricultural and agricultural economy, which certifies the competitive advantage of regional economies on the international markets. Our final conclusion is that, in order to increase rural competitiveness, measures are needed to improve the performance of the PR counties in the first place, with a priority focus on RDI sector development and innovation transfer in all the economic sectors.

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