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RURAL ECONOMY IN ROMANIA – EVOLUTIONS AND TRENDS

ABSTRACT

The rural area, in its multiple diversity, is subject to complex challenges coming from the macroeconomic and macrosocial processes: a) demographic and social challenges from the territorial point of view, segregation of vulnerable groups – the diminution in number of the rural population and the strong demographic ageing on the rise have an impact upon rural cohesion starting from the type of public services, their supply and ending up with the rural labour market; b) climate change challenges – the environmental risks are felt in the territory at different degrees, and vulnerabilization is regionally selective; c) challenges in relation to the loss of biodiversity, through the vulnerabilization of the natural, landscape and cultural patrimony – the regional character of the rural area can be so drastically modified that the territorial identity is lost.

Keywords: demo-educational trends, rural area, development rural, environmental problems.

JEL Classification: J24, J11, O15, O18, Q2.

1. INTRODUCTION

The strong diversity of the Romanian rural communities by regions and the main characteristic to conceive rural development essentially through the modernization and development of agriculture generate specific strategies for the potentiation of opportunities and risk diminution/exclusion.

The regional differences in the case of the Romanian rural communities stem from different historical evolution of the social becoming, from different cultural patterns that assimilated the different social and political transitions into their own mould. The concrete modality to couple the ecological, socio-economic, socio-cultural and socio-demographic systems describes the rural zones/regions/provinces; the adaptation and assimilation mechanisms of the values imposed by the macro-social system as integrating system have imposed a certain perception of the community, of their living place by people, an (accepted or denied) image that represents an essential element of regional combinations. The response of the rural society lacked institutional strategic coherence and the analytical approach of the present study targets the evaluation of context in which the Romanian rural area evolves from the perspective of opportunities to respond to the EU 2020 Strategy

desiderata. For a mostly accurate analysis and an exhaustive explanatory approach of the current development stage and perspectives of Romania's rural area in the direction proposed by the EU 2020 Strategy, we consider it necessary to contextualize the evolution of Romania's rural human capital in transition, which decisively conditions the implementation opportunities of such a strategy.

2. MATERIAL AND METHOD

The analytical approach targets two aspects:

– On one hand, to capture the main evolutions of the quantitative and qualitative characteristics of the rural human capital, which are crucial for a successful implementation of such a strategy:

    a) Quantitative – availability of human resources (as volume and demographic structure);

    b) Qualitative – the available rural human capital capacities (educational, professional);

– On the other hand, the extent to which the rural economy evolves on the sustainability and inclusive path, as these two desiderata are defined in the EU 2020 Strategy:

    c) Rural economy with sustainable growth – which efficiently uses the available human resources;

    d) Rural economy with inclusive growth – which ensures a high employment rate and economic, social and territorial cohesion.

The analytical approach is a regional one, given the zonal particularities of the demo-socio-economic phenomena and processes, which are historically conditioned sometimes and influenced by different adaptive responses to the challenges and transformations of the economic and ideological context that Romania experienced in the last two decades. In this context, the analysis focuses on the main quantitative and qualitative aspects.

The study is based on the analysis of secondary statistical information regarding the evolution of quantitative and qualitative characteristics of the rural society, on long time periods, in order to capture the general trends.

3. RESULTS AND DISCUSSIONS

The main purpose of this analytical approach is to capture the extent to which the recent evolutions of the Romanian rural human capital characteristics are able to support the knowledge-based economic growth of the rural area (that the modern economic theories consider as the most effective growth modality) and the improvement of the rural population's living standard.

The analytical approach had in view the description of the quantitative demographic phenomena (that condition the gross volume of available human

capital) as well as the qualitative demographic phenomena (that describe the fundamental characteristics of the rural human capital, the educational level in particular). The evolutions on the labour market and the occupational solutions chosen by the rural labour force were investigated in order to highlight the rural human capital access and integration capacity into an increasingly knowledge-based economy. Thus, we had in view to test the rural human capital capacity to innovate and by this, to generate economic growth and improve its own living standard.

3.1. Romanian rural population – structural changes

Romania's regional evolution was subject to the internal structural dynamics as well as to the ***problems induced by globalization***; from the regional point of view, Romania had to face the world structural changes, to manage the social consequences, in parallel with solving up its own crisis situations determined by the new economic and social trajectory initiated in the early 1990s.

Table 1
Regional exposure to the globalization-related changes on the medium term

Development region	Vulnerability index in relation to globalization, regional scores[*]
North-West	82
Center	77
North –East	95
South-East	97
South	94
Bucharest	34
South-West	82
West	84

[*] Index based on estimated productivity, labour force employment rate, high educational level and low educational level in 2020.
Source: European Commission "Regions 2020" November 2008.

3.1.1. Demographic changes – volumes

The rural population share in total population decreased from 45.6% (July 1, 1990) to 45.1% (July 1, 2013). In the demographic reductionism perspective, the diminution of the number of inhabitants is caused by the incapacity of the rural space to reproduce its own structures and is materialized into the increase of the negative values of the "natural population increase".

Table 2
Rate of natural population increase evolution
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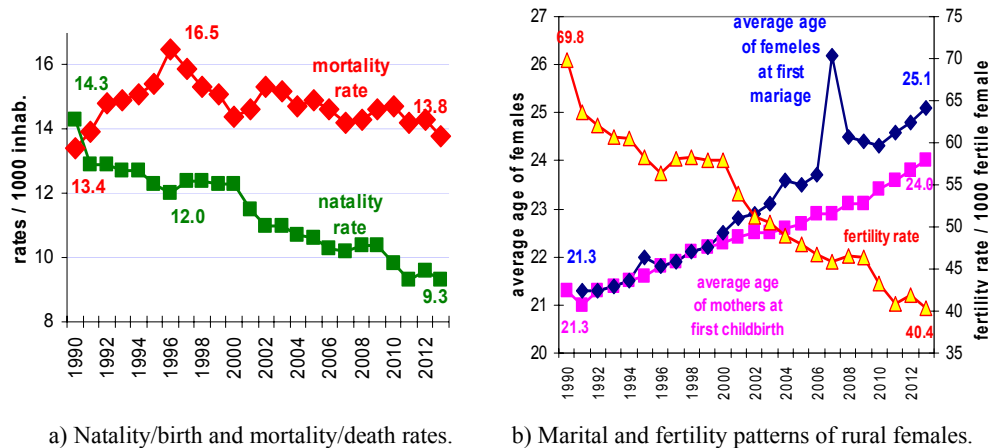|	1990	2013
Total	3.0	-2.4
Urban	4.7	-0.6
Rural	0.9	-4.6

Source: NIS, TEMPO on-line database.

The natural movement of the demographic capital has significant implications in the development and modernization of the economic and social structures specific to rural communities.

The rural demographic changes were materialized into:

– The *delayed nuptiality* phenomenon: the average age of partners increased, mainly for rural women; in 2013, the average age of men who got married was 31.1 years (28.2 years in 2000), while the average age of women was 27.2 years (24 years in 2000).

– The *delayed fertility* pattern "was increasingly pronounced in the rural areas as well, while the one-child family pattern gained ground, mainly among young couples" (Mihalache, 2010: 4).

The fertility rates had a decreasing trend for all the fertile age groups (for instance, for the most fertile groups, the decrease was significant: for the age group 20-24 years it decreased from 162‰ in 1990 to 81‰ in 2013; for the age group 25-29 years, the fertility rate decreased from 117.8 ‰ in 1990 to 77.9‰ in 2013; for the age group 30-34 years, it decreased from 81.9‰ in 1990 to 51.4‰ in 2013). The average age of mothers at first childbirth increased from 21.3 years (1990) to 24 years (2013).

a) Natality/birth and mortality/death rates.   b) Marital and fertility patterns of rural females.

Source: NIS data – TEMPO on-line database.

Figure 1. Natural movements of rural population in Romania.

– *The traditional marital stability attenuation* pattern: the increase in number of divorces in the rural area under the background of this demographic pheno-menon diminution at national level; in 1990, the divorce rate, 0.67‰, indicated the existence of rural marital cohesion (at the same time, the urban divorce rate was 2.10‰, while at national level it reached 1.42‰); in 2013, the divorce rate was 0.93‰ for the rural area, 1.68‰ for the urban area, and 1.34‰ nationwide.

From the demographic point of view, the structure by genders is maintained at rural population level, which enables a normal evolution of the specific

processes from the social and economic point of view. The demographic change of the gender structure consisted in the increase in number of rural women: in percentage terms, women accounted for 45.6% in the rural population in 1990, to reach 50.0% in the year 2013.

The demographic changes, materialized into the ageing of rural structures, were generated by a complex set of socio-demographic factors, the contribution of which is different according to the following characteristics:

– *territoriality* – the rural population in the western part of the country went through a constant "ageing" path, while the areas from the eastern part of the country experienced the same trend, with significant fluctuations.

– *the feminization of old age*: the women population had a faster "ageing" rate; the share of young women population (0-19 years) in total rural women population decreased from 15.8% (1990) to 10.8% (2013) (Popa, 2012).

The regions with the highest shares of rural population in total population are South, North-East and South-West, where more than 50% of total population lived in the countryside in 2010; this situation remained practically unchanged after 1990. At the other extreme, the most deruralized region (except for the region Bucharest, where the rural population accounted for 8.1% in total population) is the development region West, where the rural population share in total population is 37.1%[1]. The causes of the regional demographic evolutions are found in the different values of:

– *birth rate* – the region North-East with high birth rate values (much above the national average for the most part of the transition period), the regions West and Bucharest, with low birth rate values in the first decade of transition; after this moment, this became a characteristic only for the region West, while the rural area from the region Bucharest experienced an explosive rise of birth rate;

– *the internal migration rate balance,* which was negative in the period 1990-1997 in all the development regions, and it was reversed afterwards, the most attractive rural areas being found in the regions West and Center (for which about 4% and 2% respectively of the population with the domicile in the countryside, in 2010, comes from the internal migration flows in the period 1997-2010). The least attractive rural area belongs to the region South-West (which lost 0.8% of its population after 1997, by the change of its domicile from the rural to the urban area);

– *the natural population increase,* which had negative values and a general decreasing trend for the rural areas in all the development regions in the first twelve years after the collapse of the communist regime, relatively improved after 2002 as a result of a higher life expectancy for the rural population. The region North-East is a notable exception from this rule, whose rural area is historically characterized by the highest birth rate from Romania, being the only region with a positive natural population increase (before 2002), the greatest region of the country from the demographic point if view, considered the "demographic reservoir" of the country.

[1] NIS (2011) Tempo on-line database.

After 2002, while in the other development regions, the natural population increase had slightly increasing or stabilization trends, in the region North-East, this became negative and continued to decline at a fast rate. The most affected from the perspective of death/birth ratio was the region South-West, whose natural population increase reached –9.5‰ in 2010; the regions with favourable demographic perspectives for the future are Bucharest and Center, for which the natural population increase, although still negative, obviously improved after 2002.

The region Bucharest has a special situation, given its componency (it includes Bucharest, the capital city, and only one county around this municipality whose population accounts for slightly over 8% of the population in the region). As a result, the share of the rural population is very low, but this indicator had an increasing trend in the period between the two population censuses (11.4% in 1992 and 11.1% in 2002), to diminish afterwards under the incidence of changing the status from village to town of certain communes in the vicinity of Bucharest[2] and of increasing the number of the population in Bucharest. However, after 2007, an accelerated growth of the rural population from the region Bucharest could be also noticed. This evolution is explained by the attractiveness of the metropolitan area of the capital that provides a very important position capital as regards two markets, i.e. the urban labour market and the agri-food market.

Under the background of a generalized demographic decline, in absolute terms, the rural population size diminished by over 11% in the 22 years of transition (1990-2012), the rural areas from the regions in the eastern part of the country (North-East and South-East) experiencing a demographic contraction that was much lower than in the remaining regions. The descending demographic trends were considerably accelerated in the last decade, in all the western and southern regions, including Bucharest (Table 3).

Table 3
Modifications of the population in Romania's rural area in the period 1990-2012

Region	Rural population – number –			Relative modification of rural population volume %		Share of rural population in total population %	
	1990	2000	2012	2000/1990	2012/1990	1990	2012
National level	10,858,714	10,158,363	9,618,389	-3.8	-11.4	46.7	45.0
North-West	1,458,726	1,346,008	1,270,353	-6.5	-12.9	48.8	46.8
Center	1,131,230	1,043,943	1,029,435	-5.4	-9.0	39.5	40.8
North-East	2,190,440	2,148,212	2,105,157	0.4	-3.9	57.9	56.8
South-East	1,358,279	1,262,219	1,256,871	-2.5	-7.5	45.5	45.0
South	2,194,952	2,022,408	1,897,895	-5.4	-13.5	60.6	58.5
Bucharest	260,223	256,021	192,590	3.3	-26.0	11.2	8.5
South-West	1,416,513	1,309,413	1,152,595	-5.3	-18.6	57.5	51.9
West	848,351	770,139	713,493	-5.9	-15.9	38.5	37.4

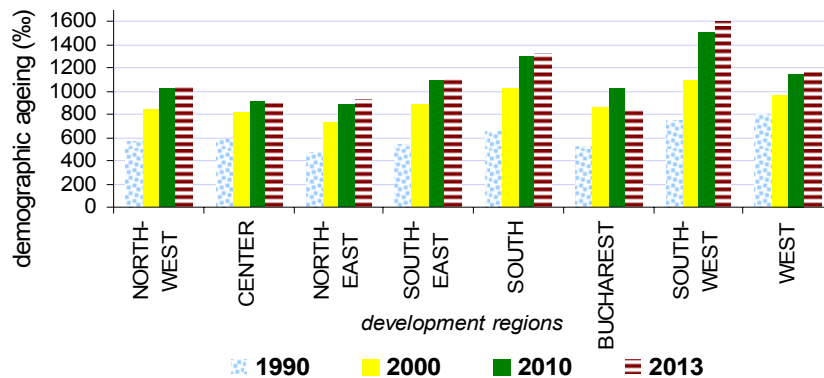*Source*: calculations based on NIS data, Tempo on-line database.

[2] Voluntari, Popeşti Leordeni, Pantelimon, Bragadiru, Chitila are former communes of the county Ilfov, which acquired urban status after 2004.

According to the conclusions of the World Bank studies[3], there is a high significance correlation between the urbanization level and the income per capita. Extrapolating this conclusion to Romania's case, we can state that in the regions with higher urbanization level (inside the Carpathians ring and Bucharest) we can expect social structures in which the social categories from the base of the social hierarchy are narrower in size as the urbanization is accompanied by a diminution of the share of population employed in agriculture with lower productivities and incomes.

3.1.2. Regional disparities in the rural population's age structure

The population's age structure, after more than twenty years of transition, reveals the advanced level of the rural population's *demographic ageing*. This modification is a consequence of the birth rate decrease in the rural areas that will have significant implications upon the human capital in the future, in which the degenerative processes (ageing, for instance) are under risk of irremediable aggravation.

While in the urban area *the demographic ageing index[4]* was 976.4‰ in 2013, starting from 313.9‰ in the year 1990, this index was much higher in the rural area throughout the transition period. In the last 25 years, the Romanian rural area was characterized by the increase of the elderly population's pressure upon the young population, the ageing index almost doubling in the period 1990-2013 from 592‰ to 1123.9‰ (NIS data) and reflecting the size of risk stemming from the compression of potential inflows in the population of working age doubled by the intensification of outflows from the population of working age.
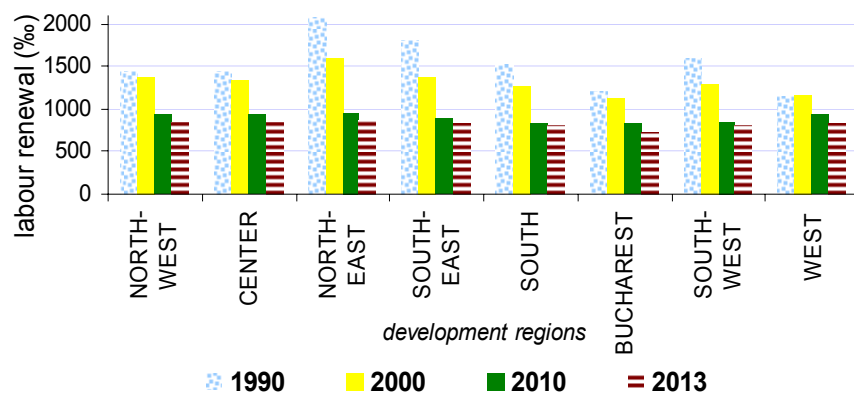

Source: NIS, Tempo on-line database.

Figure 2. Regional trends in the demographic ageing index evolution in rural areas.

[3] Bourguignon, F. (2004) – *The Effect of Economic Growth on Social Structures*, The World Bank, http://elsa.berkeley.edu/~chad/bourguignon.pdf, p. 29.
[4] *Demographic ageing index* – number of persons aged 65 years and over in 1000 persons aged 0-14 years.

Across regions, there are significant demographic ageing disparities, the regions South-West and South being subject to the highest risks with regard to the future demographic structure. While in the first years of transition, the regional demographic dependency ratios were less than one for all the development regions, the demographic processes that marked their evolution in transition (birth rate decrease, increasing share of elderly population) deteriorated the simple social reproduction perspectives at regional level; in 2013, only in three of the eight regions (i.e. North-East, Center and Bucharest), the number of persons aged 0-14 years exceeded the number of people aged 65 years and over (Figure 2).

Source: NIS, Tempo on-line database

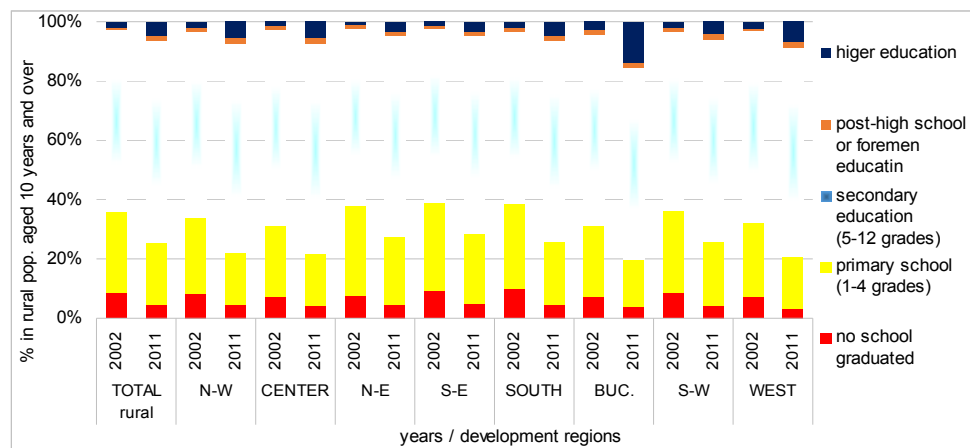Figure 3. Regional labour renewal index evolutions in the rural areas.

In early transition, the rural areas of all development regions had labour renewal indices greater than one, with the young labour force having a considerable importance in the active population's age structure from the eastern half of the country. If, until the year 2006, the *labour renewal index* (15-29/30-44 years) reached values greater than one in all development regions, after this moment the effects of the negative demographic processes could be felt, and under the background of the already decreased birth rate and of the increasing population ageing trend, this ratio became less than one with consequences upon the available labour force diminution. We assist today to the phenomenon of reversing the ratio between the active population groups at the beginning of their active life (15-29 years) and those at the maturity of their active life (30-44 years) in all development regions. The previous disparities between regions in this respect disappeared (Figure 3).

The effect of this phenomenon is the increase of the active population's average age, followed by a diminution of its total volume in time, as far as the present mature active population shifts to the category of active population at the end of its career and then withdraws from activity, their place being no longer replaced by similarly numerous labour contingents at the beginning of their active life.

3.2. Changes in educational structure

The education and training level has an extremely important role in the size of risk that determines the failure in people's professional career. The lower the household members' educational level, the higher the poverty risk under the background of low incomes generated by the lack of education, independently of other characteristics of the household. Education represents the only opportunity for the children from these families to surmount the poor people status in the future.

Between the last two population censuses (2002 and 2011), in the structure of rural population aged over 10 years, the share of persons with no schooling decreased from 8% to 4%. At the same time, the specific weight of rural population with a high educational level (short and long time higher education, including master's degree and PhD) doubled in relative figures, its share in the rural population over 10 years old increasing from 1.6% to 4.7% at rural level (Figure 4).

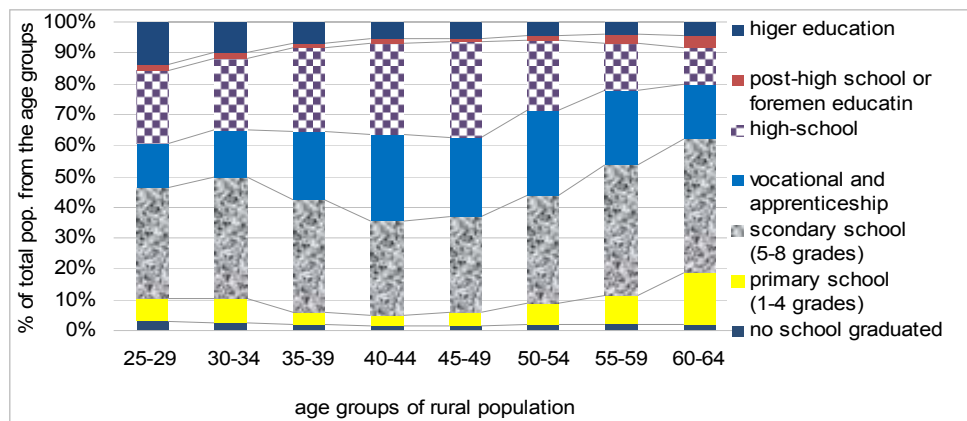*Source*: NIS data – Population census, 2002 & 2011.

Figure 4. The education level of rural population 10 years and over.

By regions, the general improvement tendency of the rural population's educational level has been maintained, yet significant disparities can be noticed as regards the intensity of this improvement. Thus, the regions inside the Carpathians ring (North-West, Center, West) as well as from the rural areas of Bucharest Region had higher shares of population with higher educational level than the national average in the period 2002-2011. The best educational structure was found in Bucharest Region, where more than 13% of the rural population over 10 years old graduated higher education. Region West comes next, where the share of population over ten years old that graduated higher education was 6.7%, followed by the Region North-West (5.6%). These rural areas have a comparative advantage as the increase of the population's educational level leads to the improvement of

the attractivity of the regions for investments carriers of innovation, which incorporate a high technology level and generate regional economic growth. The driving effect of innovative investments on the population's incomes has been already demonstrated in the specialty literature, the rural areas of the above-mentioned development regions proving that they have a stimulating human potential for this economic development pattern.

For the other development regions, in the southern and eastern part of Romania, the rural population's general educational level growth rate is slower, and these are under risk of a slower evolution to a knowledge-based economy.

The analysis of the interest in education by rural population's age groups reveals a contradictory evolution in the case of rural young generation. Unfortunately, according to the data of the last Census, in the year 2011 the share the young rural people (between 25 and 35 years) who graduated 8 schooling years at most reached 48%, while for the age categories at the maturity of their active life, the importance of the rural population belonging to these educational groups was under 40% (Figure 7). From the educational standpoint, the young rural generation seems to be characterized by a bipolar structure. Thus, half of the young people aged under 35 years have a low educational level, similar to that of the age groups at the end of their active life. On the other hand, the share of young people (25-34 years) who graduated higher education courses is higher than in the case of the other age groups (12% in the case of young people compared to 5% for the rural population aged 35-64 years).

Source: NIS data – Population census, 2011.

Figure 5. The education level of rural population by age groups in 2011.

Practically, half of the rural young people have no vocational training. In this way, the young population is under risk of endangering its access opportunities and active involvement in the labour market.

3.3. Rural economy

The modernization of Romania's rural universe presupposes the occupational empowerment of existing resources, re-allocation of economic resources and the social maturation of the institutional system. The lack of strategic consistency of the territorial approaches in Romania determined inadequate solutions for putting into value the existing economic potential. "The territory is very little put into value in adding value to economic processes" (ME, 2014).

The statistical analyses reveal that a strong contraction of the population of working age was produced in the rural areas, under the influence of massive internal migration flows from the rural to the urban areas, which characterized the first years of transition in Romania. The poor diversification of the rural economy and the perpetuation of this situation in time, associated with the agricultural land ownership reconstitution and constitution and the emergence of the small individual farms make the active population continue to be highly dependent on the primary sector of the rural economy, or even to increase this dependency in the regions that are not able to stimulate the development of private enterprises in the secondary and tertiary sectors on the basis of functional market economy. The rural human resources live their own history, generated by the endogenous demographic processes of the rural area and by the vulnerability of local rural economies. Labour force in agriculture is much oversized compared to other EU member states. The employment rate in agriculture, forestry and fisheries at national level remains high, i.e. 28.6% in 2011, compared to the EU average (4.7%), and its evolution in recent years, beginning with 2005 (31.6%) has not been spectacular.
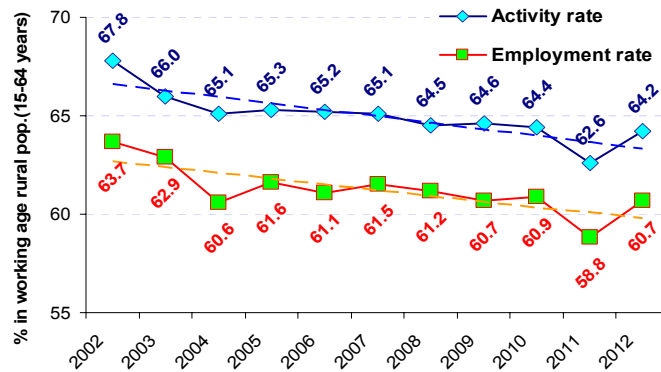
In the conditions more than modest provided by the rural economic activities, the rural population's activity rate followed a decreasing trend, resulting in the employed population decline. Until the year 2002, the largest part of the employed population was found in the rural area. Starting with the year 2003, the largest part of the employed population is living in the urban area, i.e. 54.7% in the year 2013 (MARD, 2013; NIS, 2014).

Table 4
Evolution of rural population contribution to the labour force

%

	Activity rate, 15-64 years	Employment rate, 15-64 years	Unemployment rate, 15-64 years
1996	75.4	71.8	4.8
2013	64.4	60.7	5.8

Source: own calculations based on NIS data – TEMPO on-line database.

The human capital characteristics and their evolutions in time have a decisive *impact on the rural population's access and participation to the labour market.* Due to population's ageing, the activity rate of the rural population is under constant decline. The rural employment rate also declined, due to the lack of job opportunities in both rural and urban areas (Figure 6).
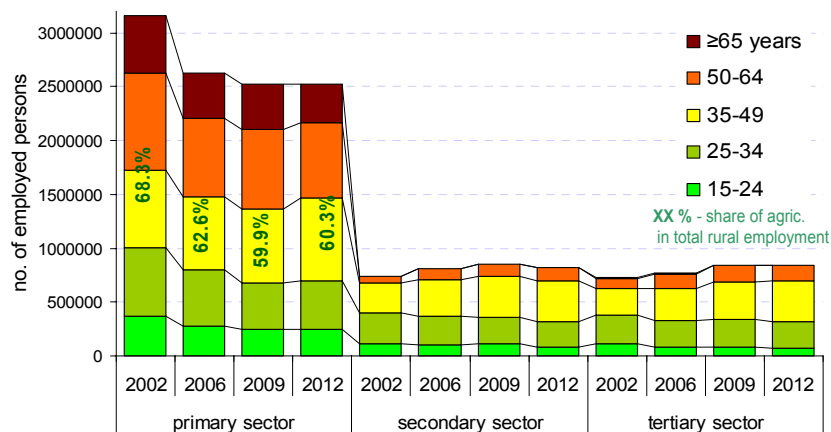
Source: own calculations based on NIS data – TEMPO on-line database.

Figure 6. Evolution of rural activity and employment rates.

The age structure of the active rural population constantly deteriorated in the last decade, with significant influences on the innovating capacity of the labour recruitment pool. Thus, while the rural active population volume was down by 10% in the period 2002-2012, the number of active young persons (15-24 years) decreased by one-third in the same period. Thus, we reached the present situation in which one in three active rural persons is more than 50 years old, while this ratio is only one in five people in the urban area.

The occupational structure of the population of rural communities from Romania was and continues to be dominated by the primary sector (represented by agriculture for its most part). Although the number of persons working in agriculture decreased by one-fifth in the period 2002-2012, the share of agriculture in labour employment is above 60% in rural Romania. In general, the young people under 35 years old and the persons over 50 years old exited from the farming activity.
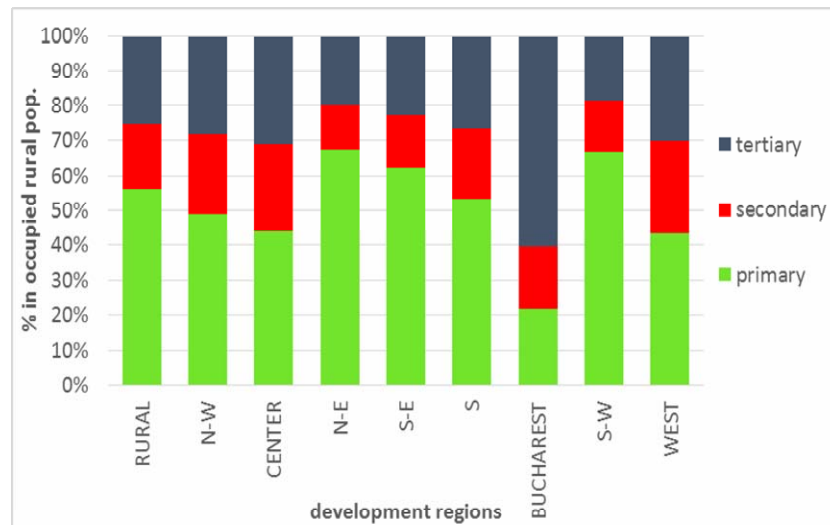

Source: own calculations based on NIS data – TEMPO on-line database.

Figure 7. Evolution of Romanian rural employment by activity sectors and age groups.

The population working in agriculture is underemployed in reality in Romania. According to the data of the 2010 Agricultural Census, the average number of days effectively worked in agriculture by a person employed in this sector is 47 days/ person/year and most of them perform agricultural work on their own holding.

Across regions, significant disparities can be noticed with regard to the rural population's occupational structure, which reflect the structure of regional rural economies as well as the population's dependence on the agricultural resources.

Source: NIS data – Population Census, 2011.

Figure 8. Regional structure of rural employment by activity sectors, 2011.

The statistical data referring to the regional structure of the employed population by activity sectors confirm the maintenance and even increase of regional economic disparities. Thus, the rural economies of the development regions in Romania can be grouped into three categories: predominantly agricultural regions (the regions from the south and east of Romania – North-East, South-East, South, South-West); intermediary regions (categories in which the development regions inside the Carpathians ring are included, where the share of the population employed in the primary sector of the rural economy is slightly under 50%); regions with low dependence on agriculture (where employment in the primary sector has a low significance compared to the secondary and tertiary sectors) (Figure 8).

It seems that the public policies have not succeeded in ensuring territorial convergence in the Romanian rural space, and the inter-regional disparities in the economic opportunities and in education were maintained over time.

3.4. Quality of environmental factors across regions

Nature is the support to society development and people's economic activity is based on the continuous natural potential flow from the environment.

The economic activities use environmental resources – air, water, soil and natural resources – and put pressure upon the natural environment. Crop production, livestock production and forestry are activities that put a significant pressure upon soil, flora and fauna, while industry, human settlements and transport can have an indirect negative impact upon these components as direct effect of emissions in the air and of water discharges.

The environmental problems initially have a local origin, but if they develop on a larger scale, they can affect large areas becoming territorial, regional or global problems.

Industry represents the economic activity that has the greatest contribution to environment pollution, by the great quantity of gaseous, liquid and solid pollutants released in the air and water.

In the year 2012, at national level there were 548 industrial units that exceeded the allowed threshold values, by 28 industrial units more than in 2011 (520 industrial units) and by 41 industrial units more than in 2010 (507 industrial units).

Table 5
The distribution of industrial units that exceeded the European limits by regions, 2012

Development regions	Number of industrial units
North-West	57
Center	83
North-East	83
South-East	66
South	109
Bucharest – Ilfov	25
South-West	30
West	95
Total	548

Source: National Environment Protection Agency, *National Environment Report*, 2013.

Most industrial units that exceeded the allowed threshold values were located in the development regions South and West. By contrast, the fewest industrial units that exceeded the allowed thresholds were located in Bucharest-Ilfov and in South-West.

Industrial activities play an important role in economic welfare and job creation and they still have a significant impact on the environment.

Transport activity pressures on the environment are represented by air pollution, as a result of emissions from combustion processes in internal combustion engines and noise and vibration – the major crossroads, along roads, near railway hubs and airports.

Agriculture with the intensive stock raising is represented by poultry or pig farms generating a great quantity of pollutants, which mainly affect the air quality and consequently water and soil.

The industrial, transport and agricultural activities all contribute to environment pollution. The intensive development of these sectors increased the pollution level in a period when environment protection was not considered a priority.
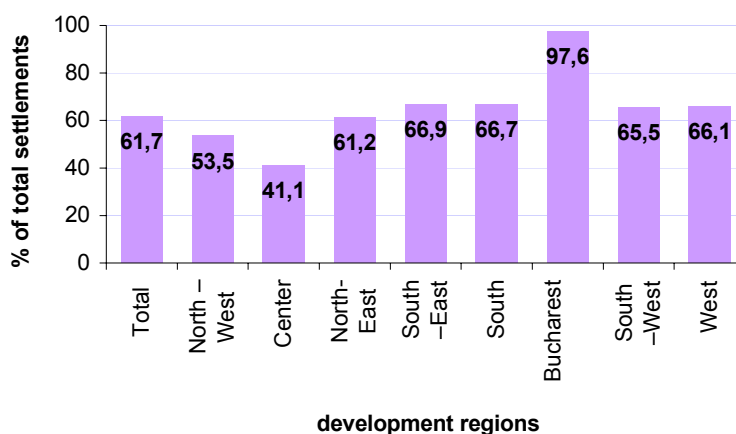
Water is a vulnerable and limited natural resource, an indispensable element for life and society.

In Romania, the surface waters are the major source for meeting the human needs, including drinking water. Water quality is influenced by natural and anthropogenic factors.

Water pollution is a process of physical, chemical or biological deterioration of water quality during the human activities, and as a result water becomes improper for use.

Chemical pollution resulting from the discharge into waters of the chemical compounds such as nitrates, phosphates and other substances used in agriculture, of some residues from the metallurgic, chemical, wood, pulp, foundries industries.

Nitrates can result from waters, from natural sources, and mainly from anthropic sources, such as human dejections, industrial and agricultural discharges (fertilizers and animal dejections). Water pollution by nitrates has become a major problem in recent years. This is mainly manifested in the areas where farming under intensive system is practiced and where nitrogen fertilizers are frequently applied.

Source: own calculations based on NIS data, National Environment Protection Agency, National Environment Report.

Figure 9. The distribution of settlements established
in areas vulnerable to nitrate pollution, by regions.

Nationwide, there are 1963 settlements established in areas vulnerable to nitrate pollution[5], which represented 61.7% of the total settlements of the country distributed in the 8 development regions.

[5] The vulnerable areas to nitrate pollution were established on the basis of the natural soil, land, weather and hydro-geological conditions referring to the transfer of nitrates to the ground and surface water layers and on the basis of nitrogen balance (nitrogen produced by animal dejections – nitrogen extracted by crops) at the level of administrative units corresponding to the basic units from the European Nomenclature of administrative units (NUTS5): communes, towns (except for municipalities that are county capital cities).

In 5 development regions of Romania, the percentage of localities established as vulnerable areas to nitrate pollution is higher than the national average (see figure above). This situation can be explained by the fact that in these regions the relief, weather and soil conditions are favourable to crop cultivation and livestock raising under intensive system and there is a higher concentration of industrial activities.

In the development region Bucharest-Ilfov the percentage of localities established as vulnerable areas to nitrate pollution gets closer to 100%, mainly due to the high regional urbanization and industrialization level. In this region pollution comes both from agricultural and non-agricultural (mainly transport) sources.

The most important water pollution sources are the following:

– human agglomerations/localities that do not have wastewater collection systems or appropriate systems for the collection and disposal of sludge from the water treatment plants, as well as the localities that do not have proper domestic waste storage and disposal facilities;

– agri-business farms that do not have adequate manure storage/disposal facilities, localities identified as vulnerable areas to nitrate pollution from agricultural sources; units that use pesticides and do not comply with the legislation into effect;

– storage units for raw materials, finished products, auxiliary products, with improper waste storage, units that produce diffuse accidental pollution, abandoned industrial sites.

Soil quality is affected to a smaller or larger extent by one or several restrictions. Their damaging influences are reflected by the deterioration of the soil characteristics and functions, mainly in their bio-productive capacity and, what is even a more serious issue, the quality of the agricultural products and food safety are affected, with serious consequences for the quality of human life. These restrictions are determined either by natural factors (climate, form of relief, etc.) or by anthropogenic agricultural and industrial activities; in many cases, the above-mentioned factors may act together in a negative way, resulting in soil quality decrease and diminution of soil functions.

In 2012, the main restrictions on agricultural soil quality were the following:

– drought which affected about 7.1 million ha, out of which the largest part of the 3.2 million ha previously equipped with irrigation facilities;

– periodical moisture excess in soil that affected about 3.8 million ha;

– water erosion was present in different degrees on 6.3 million ha, out of which about 2.3 million are equipped with anti-erosion facilities, causing soil loss of up to 41.5 t/ha per year.

At country level, the following areas are expected to suffer from slope erosion: 6,300,000 ha by water erosion, 378,000 ha by wind erosion and 702,000 ha from landslides of various types.

Different slope erosion processes affected 3,372,916 ha, out of which 664,879 ha were extremely strong. Over 33.5% (1,129,652 ha) of the reported area was in the North-East region, while large areas affected by erosion and landslides are also found in South-East (20.4% – 689,410 ha), Center (440,745 ha), West (329,238 ha) and North-West (316,809 ha).

Other natural and/or anthropogenic processes also affected soil quality, namely:

– primary and/or secondary consolidation, on 1,553,276 ha, out of which very strong and excessive consolidation on 214,081 ha. The largest areas are found in the regions West (32.4%), North-East (28.5%), South (14.7%) and Center (12.2%);

– the sediment caused by erosion, signalled out in 8 counties on 13,299 ha, out of which strong pollution on 4,808 ha, very strong and excessive on 2,014 ha. About 85% of the affected area is located in the region North-East (11,293 ha).

4. CONCLUSIONS

The analysis of the current stage and evolutions of demography (population number, rurality level, age structure) and of rural human capital education, by regions, represents, together with the analysis of labour force characteristics, the main elements of the ex-ante analysis for the construction and implementation of a knowledge-based strategy. The main conclusions of the evolution analysis of the main characteristics defining the present rural human capital are the following:

From the *rurality level* perspective, two demographic patterns can be noticed into which the Romanian regions can be classified; these patters result from the different territorial development stages of Romania:

• lower rurality level, specific to the regions West, Center and Bucharest

• higher rurality level in the regions outside the Carpathians ring (North-East, South, South-West, South-East, North-West).

The differences in the rurality level are transposed into regional disparities in the occupational structures, the urbanization level being in direct correlation with the non-agricultural employment.

The analysis of the populations's *age structure* reveals two aspects:

• the future social structures have the tendency to get worse due to the *population's strong demographic ageing* and to the forecasted population's regeneration incapacity. In the year 2010, the number of the population aged 0-14 years exceeded the number of the population aged 65 and over only in two of the eight regions (North-East and Center). The demographic ageing significantly impacts the populations' innovating capacity in a given territory, as it is well-known that old age is associated with a relative conservatorism, a reluctant behaviour to novelty, to innovation, a lower learning capacity and a lower capacity to adopt new techniques and technologies;

• in the twenty years that passed from the 1989 revolution, under the background of birth rate decline, we experienced the reversal of ratio between the groups of active population at the beginning of their active age (15-29 years) and those at the maturity of their active life (30-44 years). Consequently, the "capacity" of the labour force from the rural areas to reproduce over generations is under continuous deterioration, with significant implications upon the rural area capacity

to supply new labour force that is innovating, flexible and easily adaptive to the knowledge-based economy requirements, and upon the pension budget possibilities to be financially sustainable. The previously described situation is characteristic to the rural areas in all the Romanian development regions.

The educational level of the rural human capital is quite low and it affects the economically active population's capacity to get successfully integrated on a highly dynamic labour market that requires an increasingly high training and a high occupational mobility that can be provided only by a longer schooling period that makes it possible for individuals to accumulate a wide range of knowledge and to enlarge their knowledge base through specialization. In general, in the regions where great economic (industrial or services) units operated in the past and absorbed a significant amount of labour input, the share of rural population with medium or higher education level is higher, and the educational pattern of parents is also followed by their children, at least in part[6]. An aggravating circumstance in this analytical context is the decrease of the young population's interest in education.

In order to reduce the potential of nitrate pollution in vulnerable areas the following measures are required:

– use of specific methods of sustainable and biological agriculture systems: crop rotation (perennial and annual vegetable crops are preferred) to improve nitrogen balance in soil, using organic waste materials generally coming from the livestock sector (solid compost is preferred), in combination with mineral fertilizers for providing crop nutrients but also to conserve soil fertility. The fertilizer rates to be applied are based on calculations of the balance in soil nutrients in order to avoid overuse, mainly in the case of nitrogen, and to reduce production costs and environment pollution;

– livestock waste storage must comply with certain rules, in order to minimize pollution, storing them outside the sensitive areas and away from water sources;

– use of irrigation techniques that do not lead to fertilizer infiltration in soil;

– soil protection against erosion

In the areas declared as vulnerable to nitrate pollution is necessary to develop programs of action to protect the waters against pollution caused by nitrates from agricultural sources, which should specify that agricultural farm management must comply with the principles of the Code on Good Agricultural Practice.

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[6] The educational level of respondents from the Rural EuroBarometer 2005 sample is positively correlated with the parents' educational level (the correlation coefficient value between the respondent's educational level and his/her mother's education is 0.457, while in father's case, this is 0.498).

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