Analysis of Demographic Trends and Human Resources in the Agrarian Sector

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Abstract

Agriculture is an important sector for regional economies across Europe, especially in rural areas where it supports livelihoods and ensures food security. However, its sustainability is correlated to demographic dynamics. This article explores the relationship between demographic trends and the development of agrarian sector, emphasizing the critical importance of human resources for achieving sustainable economic development. The rural and urban-rural population structure is reflecting an imbalance accentuated by demographic trends such as population aging and rural-urban migration, phenomena that reduce the availability of young labour in the agricultural sector. The comparative analysis of European regions highlighted significant variations in the demographic structure. The article highlights the importance of adopting an integrated perspective, addressing both demographic challenges and the needs to modernize the agricultural sector, to ensure the resilience of regional economies in Europe.

Keywords: agriculture, labour force, rural economy, sustainable development

JEL Classification: J11, Q15

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1. Introduction

Major changes are occurring in Europe's demographic structure and this has implications for all sectors of the economy, particularly agriculture. Due to aging and migration of young people to urban centres, most rural areas face depopulation and a lack of qualified human resources (Selod et al., 2021). In the value chain of the agriculture sector, the role of the labour force and qualified human resources as a driver of sustainable economic development is considered very important. Besides this, labour force availability influences the response of this sector to current challenges like climate change or global food demand. In

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addition, human qualified resources are crucial for the adoption of modern technologies, increasing productivity, and protecting the environment (Iancu et al., 2022).

Apart from the demographic decrease, Romanian agriculture is burdened by having to improve its processes, and deal with inefficiencies that are embedded in its structures, as Romanian rural areas developed small-scale agricultural properties which involved low production efficiency due to absence of economies of scale (Dobos, 2024). At the same time, the emigration of qualified professionals to Western Europe further deteriorates the situation, as the sector becomes dependent on unskilled and older rural inhabitants. The combination of these aspects threatens not only agricultural outputs but also the socio-economic life of the rural households.

In this context, this article explores the relationship between demographic trends and the development of agrarian sector, emphasizing the critical importance of human resources for achieving sustainable economic development.

2. Methodology

This research was based on an analysis of official data acquired from the Romanian National Institute of Statistics (NIS), the European Union Open Data Portal (Eurostat), and the World Bank (WB). These datasets allow broader insights into employment patterns, sectoral development, and the socio-economic drivers of change in the agricultural workforce of Romania.

The basis of the research methodology was quantitative framework put into practice by using statistical metrics to analyse agricultural employment over last years. Key variables retrieved include resident population by rural urban area, population employed in agriculture. Comparisons were made between Romania and other European Union member states in order to fully understand the challenges and implications associated with declining agricultural employment.

3. Results and discussions

The analysis of the dynamics of the resident population in Romania, divided by residence area between 1992 and 2024, highlighted significant changes. A general downward trend is observed in the total population of Romania, starting with more than 23 million people in 1992 and reaching around 20 million in 2024. Although the total population of Romania has steadily declined, the differences between urban and rural environments are significant, suggesting complex processes.

In the urban area, showed modest growth of resident population in the first years of the analysed period, this was followed by a subsequent stagnation. The national statistics data on the total population registered a slight increase in the first part of the period (1992-1997), followed by stagnation and then a gradual decrease, reaching from 12.5 million in 1992 to 12.19 million in 2024 (Figure 1).

The rural area however, was affected by depopulation, determined, most probably by the migration of the citizens to the cities or intermediate areas, the emigration of important share of population to other countries and the demographic decline. The rural population has steadily declined from 10.67 million in 1992 to 9.65 million in 2024, reflecting the depopulation of villages.

Figure 1. Dynamics of resident population in Romania over 2019-2024, mil people, by resident area (NIS Data)
Source: authors' contribution

Romania is characterized by a significant percentage of rural population, in contrast to Western European countries (Haragus et al., 2020). According to Eurostat data, Romania stands out for a significant percentage of rural population (53.59%), compared to other European countries such as Bulgaria (12.86%) or Italy (10.36%). Only 12.02% of Romania's population lives in urban areas, which underlines the predominantly rural nature of the country.

However, the continuous decrease of the rural population, together with the trends of urbanization and the formation of intermediate areas, indicate the need for policies aimed at the revitalization of rural communities and balancing the distribution of the population. Intermediate areas (close to cities of intermediate remote areas) in Romania house 34.39% of the population, indicating a more balanced distribution compared to other states such as Germany (40.81% intermediate) or Hungary (64.23%). (Figure 2)

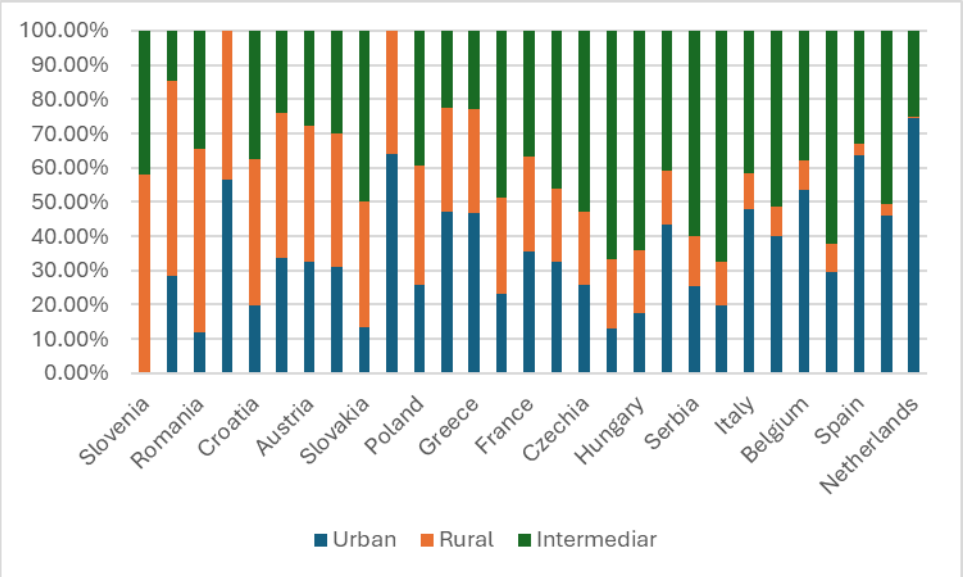

Figure 2. Distribution of population across European countries, by area of residence, expressed as share of total population, 2023 (EUROSTAT data)
Source: authors' contribution

In recent decades, agricultural areas in Europe, including Romania, have been deeply affected by significant demographic changes, which have put pressure on the economic and social sustainability of these regions (Pugliese et al., 2021). Two of the most relevant trends are population aging and rural-urban migration, phenomena that have a direct impact on rural development and the agricultural sector (Christiansen et al., 2020).

Population aging is one of the most serious demographic problems for agricultural areas in Europe. In many rural regions, the average age of the population is steadily increasing, amid declining birth rates and the migration of young people to urban areas. In Romania, this phenomenon is particularly accentuated (Oprea et al., 2021; Dumitru et al., 2022). Studies show that the rural population has experienced significant aging, with a high percentage of residents over 65, especially in less accessible regions (Mitrică et al., 2019). This aging has profound implications for agriculture, where most active farmers are nearing or past retirement age. The lack of youth in agriculture reduces the capacity to innovate and adopt modern technologies, which affects productivity. At the same time, subsistence households in rural areas, characteristic of many regions in Romania and Eastern Europe, act as a safety mechanism for the elderly population, but prevent the restructuring of farms and the consolidation of the agricultural sector (Dragan et al., 2022; Popescu et al., 2021).

Rural-urban migration is another major trend transforming the demographics of agricultural areas. In recent years, young people from rural areas

have migrated massively to cities, both in search of better economic opportunities and for access to education and social services. Romania, for example, has lost a significant part of the active rural population, contributing to the depopulation of villages and increasing the polarization between urban and rural areas (Cucu, 2022).

This process is also driven by economic disparities between rural and urban areas. Income and employment opportunities are much lower in rural areas, which discourages young people from staying in these regions. In Europe, more developed regions such as Northern Italy or Southern Germany attract increasing numbers of internal and international migrants from poorer agricultural areas such as Romania or Bulgaria (Haragus & Földes, 2020).

According to the literature, the high proportion of the rural population in countries such as Romania can be attributed to the fragmentation of agricultural land, the low level of urbanization and external migration that mostly affects urban areas. For example, land fragmentation and rural depopulation limit infrastructure development and investment in these areas (Popescu, 2021). Moreover, reduced access to public services and quality education in rural areas can encourage migration to urban areas or other countries (Selod et al., 2021). The accelerated development of urban areas compared to rural ones has encouraged the migration of the population, this process being influenced by the significant discrepancies registered at the regional level (Iancu et al., 2022).

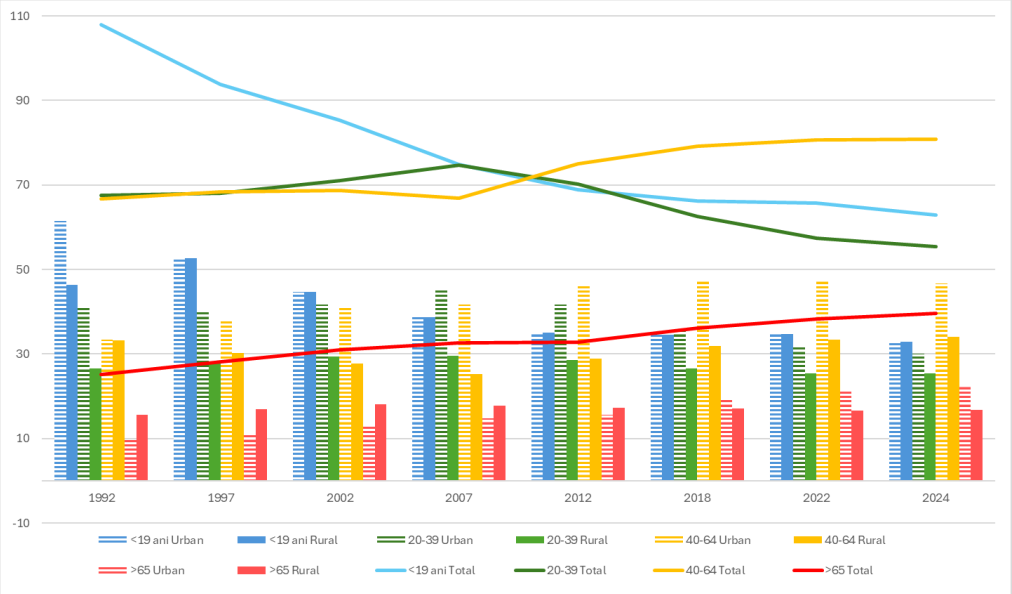

Figure 3. Dynamics of resident people in Romania by age groups, by area of residence, to 100.000 pers. (NIS data)

Source: authors' contribution

The data highlight the evolution of the resident population in Romania by age group and place of residence (urban/rural) in the period 1992-2024. There is a significant decrease in the population under 19 years old, both in urban and rural areas, from 10.8 million people in 1992 to 6.3 million people in 2024. The young population (20-39 years) has decreased, by also, from 6.8 million people to 5.5 million people, and this decrease is more pronounced in the urban environment.

The 40-64 age group saw moderate growth during this period, from 6.7 to 8.1 million people, indicating a demographic aging process, while the over-65 population grew steadily, especially in the urban environment, where it increased more than twice (from 1.0 to 2.3 million people).

In rural areas, the over-65 population has remained relatively constant, reflecting the migration of young people to cities or out of the country and natural ageing. These trends suggest major demographic changes, with implications for economic development, rural sustainability and the socio-economic balance between urban and rural environments.

Agriculture holds a central role in Romania's economy, with about 12% of the population employed in agriculture-related activities, significantly higher than the average for European Union (EU) which is 4%. In the same time, there are 2.9 million agricultural landowners in Romania with an average farm-size of about 4.5 hectares. This is corresponding to one-third of the EU's agricultural holdings, that have an average farm sisze of 15 hectares.

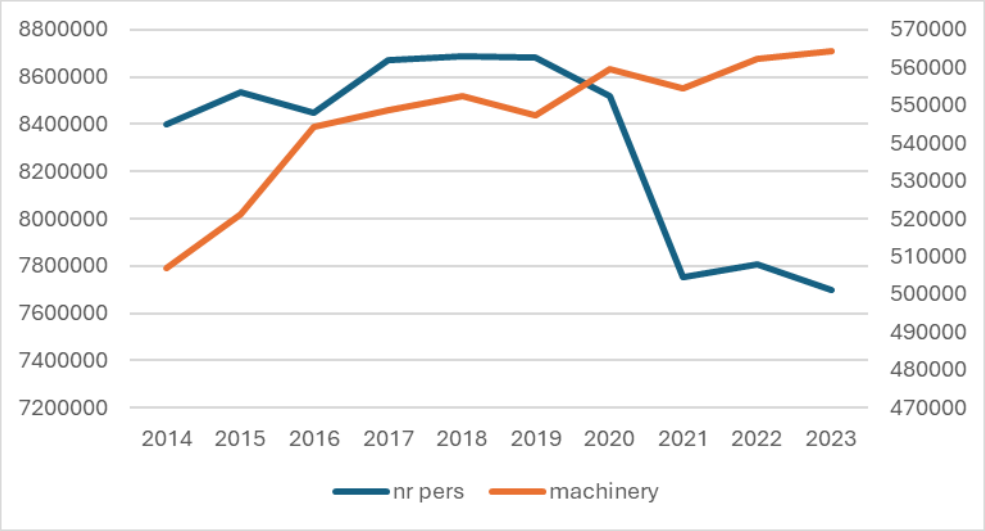

Figure 4. A comparison for people employed in agriculture and number of agricultural machineries, Romania, (NIS Data)
Source: authors' contribution

In Romania, the dynamics and trend of employment in agriculture reflect both internal economic transformations and European influences. The percentage of the population employed in agriculture has decreased significantly in recent

decades, from over 40% in the 1990s to approximately 18% in 2022 (Dumitru et al., 2023). This decline is driven by the migration of the rural population to cities or abroad, where economic opportunities are more diversified and better paid. At the same time, the mechanization and modernization of agriculture can contribute to reducing the demand for manual labour, favouring the transition to more efficient farms, but with reduced staff (Marin et al., 2023).

This trend suggests that investments for mechanization can lead to counterbalance the decline in labor by increasing the efficiency of agricultural processes. The progressive increase in the number of machines, combined with technological upgrading, will lead to a transition to a more capital-intensive agriculture that requires less labor but uses more efficient equipment. The structural transformations in agriculture involve that mechanization plays a key role in sustaining productivity in the context of declining active labor force. However, agriculture remains an important sector for the rural population, being an essential source of income, especially within subsistence households. The analysis here underlines the need for policies that stimulate the modernization of the sector and support economic diversification in rural areas.

Population aging and rural-urban migration have direct consequences on the sustainability of agricultural areas. In addition to the loss of the active workforce, these phenomena lead to the degradation of the social and economic infrastructure in rural areas. In Romania, the effects are particularly visible in isolated villages, where access to medical services, education and basic utilities is limited (Dragan et al., 2022).

However, there are also opportunities. The development of rural infrastructure, investments in digitization and programs dedicated to young farmers can contribute to the revitalization of agricultural areas. European policies, such as those promoted by the Common Agricultural Policy, can play an essential role in combating these trends and ensuring sustainable rural development.

Conclusions

The demographic structure of rural regions reveals a real contrast with urbanized zones. Rural areas often face declining populations, with fewer young people and a disproportionate number of older residents. Urban-rural interfaces highlight migration patterns, as younger generations move to cities for better opportunities, leaving behind aging communities with limited human capital for agricultural development. Key demographic trends influencing agrarian sector include population aging and rural-to-urban migration. These trends pose challenges such as labour shortages and decreased productivity. However, the opportunities may come from public policies that support modernization, such as mechanization and digitalization in agriculture, which can mitigate the workforce deficit.

Adapting the structure of the agricultural sector to respond to demographic challenges represents an essential element of public policies at the moment.

Demographic changes, such as the aging of the population and the migration of young people to cities, have significantly reduced the labour force available in Romanian agriculture. Thus, it becomes essential to implement policies that support the modernization of the agricultural sector through mechanization and modern technologies. however, the adoption of modern technologies and the transition to sustainable agricultural practices depend on the availability of a skilled workforce. hence the essential role of qualified human resources in sustainable agricultural development. therefore, an integrated approach that combines demographic, economic and technological policies is important to support Romanian agriculture in the context of major transformations in the population structure.

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