https://doi.org/10.46793/zbIEP25.791O Review Paper

OCCUPATIONAL CHANGE AND EMPLOYMENT IN AGRICULTURE IN SERBIA[1]

Kosovka Ognjenović[2], Valentina Vukmirović[3], Boban Nedeljković[4], Jovan Zubović[5]

Abstract

The aim of this paper is to analyze employment trends in Serbian agriculture from 2010 to 2024, focusing on workforce size and occupational structure. We apply descriptive statistics to Eurostat and national Labour Force Survey data to track changes across subsectors and ISCO-08 groups. Our results show that total employment in the economy stayed stable, while agriculture declined continuously, mainly due to reduced self-employment. Agricultural production lost about one-third of its workforce, reflecting demographic pressures and the erosion of small farms. Forestry and fishing show irregular patterns without long-term growth. At the same time, the occupational structure remains rigid: skilled agricultural, forestry, and fishery workers account for over 80% of employment, while other groups stay marginal. These findings confirm global trends of labour moving away from agriculture but reveal limited progress in Serbia toward diversification and technological change. These shifts create serious challenges for sustainability and require targeted modernization policies.

Key words: *occupational change, employment, agriculture, Serbia.*

1 This research was supported by the Science Fund of the Republic of Serbia, #Grant No. 369, Research on Occupational Change in the Serbian Labour Market: Identifying Trends for Future Workforce Developments and Policy Responses – ROCS.

2 Kosovka Ognjenović, Ph.D., Senior Research Associate, Institute of Economic Sciences, Zmaj Jovina 12, Belgrade, Serbia, E-mail: kosovka.ognjenovic@ien.bg.ac.rs, ORCID: 0000-0002-3768-8860

3 Valentina Vukmirović, Ph.D., Research Associate, Institute of Economic Sciences, Zmaj Jovina 12, Belgrade, Serbia, E-mail: valentina.vukmirovic@ien.bg.ac.rs, ORCID: 0000-0001-8901-5206

4 Boban Nedeljković, Ph.D., Research Associate, Institute of Economic Sciences, Zmaj Jovina 12, Belgrade, Serbia, E-mail: boban.nedeljkovic@ien.bg.ac.rs, ORCID: 0000-0003-1863-6560

5 Jovan Zubović, Ph.D., Principal Research Fellow, Institute of Economic Sciences, Zmaj Jovina 12, Belgrade, Serbia, E-mail: jovan.zubovic@ien.bg.ac.rs, ORCID: 0000-0002-1717-2066

Introduction

Occupational change is now more prominent than ever. By tracking changes in occupations, researchers aim to observe how the structure of jobs evolves across occupations and economic sectors. Numerous analyses demonstrate how occupational structures shift in the global market due to structural and demographic changes, as well as labour market institutions (Apicella, 2025). The Serbian labour market remains quite inert, despite the development of labour market institutions such as the minimum wage and employment legislation protection (ELP). Following the adoption of the most recent Labour Law, greater importance was given to less secure or precarious jobs. In other words, the law recognized this type of employment for several reasons. Most notably, these include the incorporation of such practices into the formal system to provide some security for the growing number of workers choosing this type of work, as well as to 'improve' employment statistics. Additionally, the law aimed to enable greater flexibility and reduce the costs of 'new employment' for employers, that is, to relieve companies of inherited practices such as reporting the need for workers (registration of vacant jobs), along with other administrative and financial costs associated with hiring and, if necessary, termination. This, to a significant extent, contributed to informal employment (with the exception of agriculture, where such practices are generally the norm). Structural change on the other side induced shifts in the labour force from agricultural to non-agricultural sectors, which, due to demographic changes, may be challenging for the global economy (Christiaensen, Rutledge and Edward Taylor, 2020), as well as in the local context (Stanojević, Radivojević and Stanišić, 2021).

A growing body of research examines occupational change and employment dynamics in agriculture (e.g., Aktara and Bhuyan, 2025; Zhang, Li and Ruan, 2021), mirroring broader structural transformations in labour markets worldwide. The central premise of this body of work is that agricultural employment evolves in response to technological progress (Mohammed and Sundararajan, 2024), demographic shifts (Sroka et al., 2019), policy reforms (Chang, 2011), and broader economic restructuring processes. Classical theories of structural change emphasize that as economies develop, labour reallocates from agriculture toward industry and later toward services, driven by productivity differentials and changing patterns of demand (Stanojević, Radivojević and Stanišić, 2021). These transitions are also accompanied by shifts in the occupational composition within agriculture itself, as mechanization, digital technologies, and new production models reshape the tasks and skill profiles required for agricultural work (Apicella, 2025). Contemporary

analyses of occupational change, therefore, increasingly focus on intersectoral labour mobility and intra-sectoral transformations that change the nature and quality of agricultural employment (Deininger, Jin and Ma, 2022).

In the European context, a decline in the share of agricultural employment is notable, dropping from 6.4% of total EU employment in 2005 to 4.2% in 2020 (Eurostat, 2022). Yet, researchers note the emergence of specialized, knowledge-intensive occupations in response to modernization and the adoption of advanced farming technologies driven by the rising demand and the need for the improvement of agricultural productivity (Ra, Ahmed and Teng, 2019). Research shows that precision agriculture, environmental and climate-related requirements, and diversification into agri-services have created new occupational niches while reducing the demand for low-skilled farm labour (European Training Foundation, 2025; Cao et al., 2020). At the same time, agricultural work remains characterized by significant informality and seasonality, leading to fragmented employment trajectories, precarious labour, and limited opportunities for upward occupational mobility (Maró et al., 2025). These features are especially pronounced in economies undergoing transition, or still completing structural transformations like Serbia, where traditional farm structures persist alongside modernization efforts.

Within the Western Balkan region, studies document ongoing declines in agricultural employment accompanied by demographic pressures, including workforce aging, rural depopulation, and outmigration (ETF, 2025; Malinić et al., 2025). These trends have implications for occupational structures, as shrinking rural labour pools limit the capacity for generational renewal, slow down technological progress, and constrain the emergence of new skill-intensive roles in agriculture. Scholars note that agriculture continues to play a significant role in the Serbian labour market relative to other European countries, largely due to the prevalence of small-scale farming (Jurjević et al., 2022), strong rural traditions, and the limited capacity of non-agricultural sectors to absorb surplus rural labour (Jurjević et al., 2024). The structure of agricultural employment in Serbia is characterized by a large presence of unpaid family labour, widespread informal and seasonal work, self-employment and pronounced demographic aging within agricultural households (Mijatović, Tomaš Simin and Vukoje, 2025; Korhecz et al., 2025; Gligorov, Ognjenović and Vidovic, 2011). These conditions restrict workers' ability to transition into more secure or specialized agricultural roles and reduce the overall adaptability of the agricultural workforce. Regarding employment in agriculture, it cannot be concluded that positive trends are expected in Serbia. Numerous studies suggest a shift in focus from agriculture

to non-agricultural activities, primarily in the service sector, so the observed employment trends in Serbian agriculture are expected to follow global patterns (Apicella, 2025). Supporting this, statistical data on employment trends in Serbian agriculture show that the share of agriculture has dropped from more than one-third to a quarter of total employment (Eurostat, 2025).

The aim of this paper is to analyze the employment trend in agriculture within its context, focusing particularly on employees in economic entities and self-employed individuals who work independently, often on individual farms. The analysis will also consider the impact of changes in the occupational structure of agricultural employees, including trends in occupational groups. The period of observation for these trends covers 2010–2024, or a shorter time span where data for comparison are unavailable. In this way, it will be shown how important changes in the occupational structure of employees are for the organization of agricultural production, which is influenced by numerous factors, as well as possible deficits resulting from demographic changes.

Data and Methodology

The paper uses descriptive statistical analysis to show how employment trends have developed over a 15-year period. Selected univariate time series are presented, including the development of total employment in the Serbian economy ('All NACE activities') and total employment in the agricultural sector ('Agriculture-Total'). Additionally, changes in the number of employees and self-employed are examined separately for the total economy ('Total-Empl', 'Total-Self-empl') and the agricultural sector ('Agriculture-Empl', 'Agriculture-Self-empl'). The data represent the number of employed persons, given in thousands, and are analyzed for the period 2010–2024. These data are provided by Eurostat statistics at the level of the National Classification of Economic Sectors (NACE, Rev. 2), as defined by national accounts standards. The agriculture sector comprises 'Crop and animal production, hunting and related service activities' (time series name 'Production'), 'Forestry and logging' ('Forestry'), and 'Fishing and aquaculture' ('Fishing').

The occupational structure in the agriculture sector is defined by the International Standard Classification of Occupations 2008 (ISCO-08), which includes ten occupation groups classified from 0 to 9. Group 0 is not relevant for this economic sector and is excluded from the analysis. These data are collected by national statistics and are based on the definitions of the European Union Labour Force Survey (EU LFS). Due to changes in data collection methodology and survey

questionnaires, there may be some methodological discontinuities. In addition, data for Serbia are not available for the entire time period, but are provided from 2013 to 2024 for most of the observed occupation groups. Changes in the structure of occupations reflect the labour market's and sectoral response to structural shifts driven by the impact of technology.

Results and Discussion

Figure 1 shows that total employment in Serbia remained stable at around 3.3–3.4 million persons from 2010 to 2024, but its composition changed notably. Employee numbers grew steadily after 2014, reflecting gradual formalization, while self-employment declined continuously, indicating contraction of own-account work. Agriculture followed an opposite trend: total agricultural employment fell sharply, almost entirely due to the reduction in self-employment, while employee numbers stayed low and largely unchanged. These patterns suggest that, despite moderate formalization in the overall labour market, agriculture continues to shrink and remains dominated by family-based and self-employed labour. This is in line with the trends reported in Korhecz et al. (2025) and Gligorov, Ognjenović and Vidovic (2011).

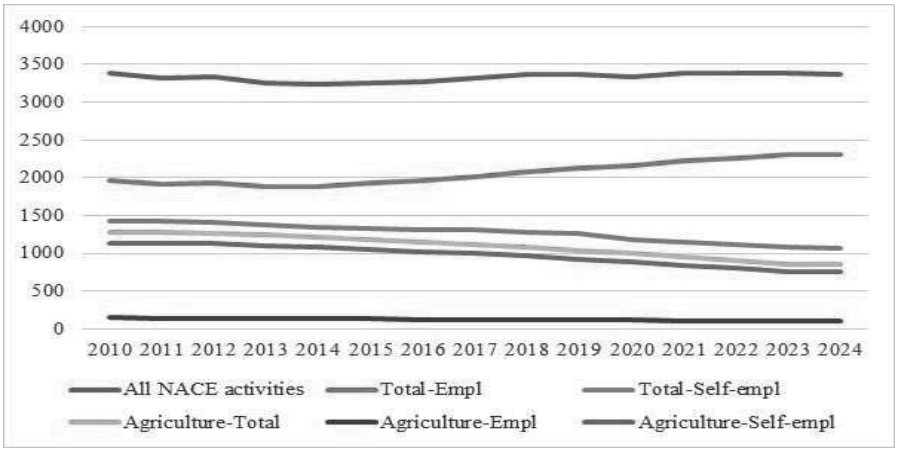

Figure 1. Employees and self-employed in all economic activities and agriculture in Serbia (in 000)

Source: Eurostat (2025). National Account Statistics.

Note: NACE stands for NACE Rev. 2 classification of economic activities.

Figure 2 provides a closer look at agricultural production, which accounts for the largest share of agricultural employment. Total employment in this subsector decreases from more than 1.3 million persons in 2010 to approximately 0.8 million in 2024, marking a reduction of roughly one-third over 15 years. This downward trend is driven almost entirely by the continuous contraction of self-employment, reflecting the long-term erosion of small agricultural holdings and demographic thinning of the rural labour force. In contrast, the number of employees in agricultural production remains relatively stable and substantially lower than the number of self-employed. Although minor fluctuations occur, employee numbers do not contribute significantly to the overall decline in the sector. This stability indicates that agricultural production in Serbia continues to rely overwhelmingly on family labour and own-account workers, with limited expansion of formal wage employment. Evidence from Mijatović, Tomaš Simin and Vukoje (2025), and Korhecz et al. (2025) points in the same direction.

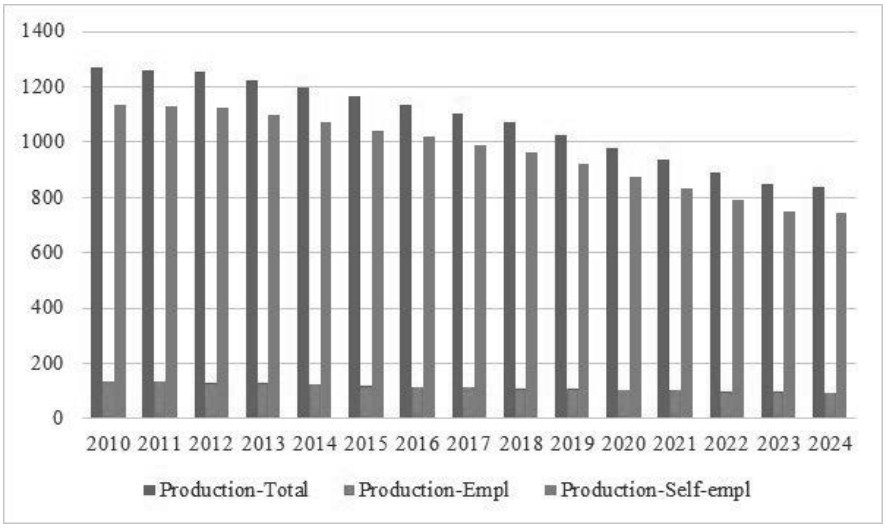

Figure 2. Employees and self-employed in crop and animal production, hunting and related service activities in Serbia (in 000)

Source: Eurostat (2025). National Account Statistics.

Note: NACE stands for NACE Rev. 2 classification of economic activities.

This contraction is further reflected in percentage changes across agricultural subsectors (Table 1). The overall trend indicates a persistent decline in total agricultural employment, with the most pronounced decrease observed in 2020 (-4.4%). The (crop and animal) production group mirrors this trajectory, confirming its dominant share in the sector. Forestry exhibits a more volatile

dynamic: after a modest increase in 2010 (+2.7%), employment contracted in subsequent years, culminating in a sharp decline by 2024 (-4.9%). Fishing shows the greatest variability, with a substantial rise in 2010 (+13.3%), followed by significant losses in 2020 (-13.0%). Despite a partial recovery in 2024 (-2.0%), the long-term trend suggests instability rather than sustained growth. Overall, these results point to a gradual reduction in agricultural employment, accompanied by sectoral disparities and occasional short-term fluctuations, particularly in smaller subsectors such as fishing and forestry. Similar patterns are highlighted in the European Training Foundation (2025) report on the skilling up of the Western Balkans Agri-Food sector.

Table 1. Changes in employment in agriculture in Serbia (percentage change)

Element	2010	2015	2020	2024
Total Agriculture	-0.5	-2.6	-4.4	-1.3
Production	-0.5	-2.6	-4.4	-1.3
Forestry	2.7	-3.4	-0.6	-4.9
Fishing	13.3	-0.9	-13.0	-2.0

Source: Eurostat (2025). National Account Statistics.

Beyond these quantitative shifts, the occupational structure within agriculture remains highly rigid (Figure 3). Skilled agricultural, forestry, and fishery workers account for approximately 80-85% of total agricultural employment, which reflects the traditional, labour-intensive character of Serbian agriculture.

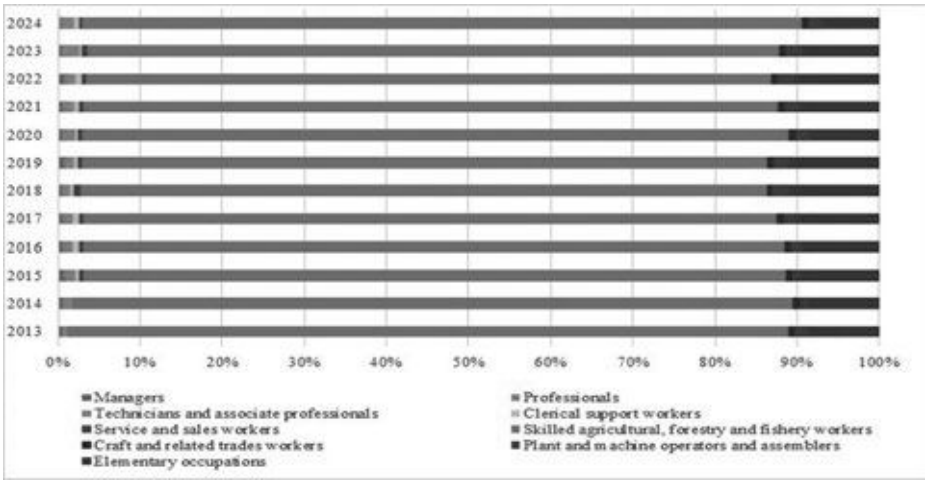

Figure 3. Occupational structure of the employed in agriculture in Serbia (population 15 and over) in %

The second-largest group, Elementary occupations, represents 10-15% of agricultural employment, with no clear upward or downward trend. All other occupational groups together account for only a small fraction of total employment, each typically remaining below 2-3%. Their shares show minimal variation across the observed period, suggesting that structural upgrading, professionalization, or technological transformation within agricultural employment has been limited. Overall, the occupational structure appears slow to adjust, characterized by the dominance of skilled agricultural workers and a stable share of elementary occupations. The near-absence of growth in higher-skilled groups underscores the sector's limited occupational diversification and its continued reliance on traditional forms of labour.

Conclusion

The findings indicate that Serbian agriculture is shaped by two compound challenges: a shrinking labour force and slow structural adaptation. These dynamics raise concerns about the sustainability of small-scale farming and the sector's capacity to adapt to demographic pressures, technological change, and evolving market demands. Strengthening occupational upgrading, supporting modernization, and improving working conditions may help alleviate labour shortages and enhance the sector's overall competitiveness.

The analysis presented in this paper relies on descriptive statistics, which, while valuable for illustrating key trends, cannot fully capture the underlying drivers of these developments. These insights should therefore be interpreted with caution, especially given recent methodological revisions in the Labour Force Survey, the primary source for internationally comparable labour market data, which may influence the consistency of intertemporal comparisons. A deeper investigation into the factors shaping workforce movements, occupational restructuring, and the interactions between demographic shifts and technological adoption in agriculture is essential for a more comprehensive understanding of the observed patterns. Future research should build on this descriptive foundation by employing analytical approaches that can uncover causal mechanisms and assess the effectiveness of potential policy responses. Such work would contribute to evidence-based strategies for guiding the transformation of Serbia's agricultural labour market in a sustainable and resilient direction.

References

1. Aktara, A., Bhuyan, M. (2025). Changing jobs, changing landscapes: Do land use patterns reflect occupational shifts? *Area.*

2. Apicella, A. (2025). Automation in Agriculture: Occupational Trends, Worker Outcomes, and Labor Market Implications. *International Journal of Academic Research in Business and Social Sciences*, 15(8), 398-418.

3. Cao, S., Yu, N., Wu, Y., Wang, Z., Mi, J. (2020). The Educational Level of Rural Labor, Population Urbanization, and Sustainable Economic Growth in China. *Sustainability 2020*, 12, 4860.

4. Chang, T-Y. (2011). The influence of agricultural policies on agriculture structure adjustment in Taiwan: An analysis of off-farm labor movement. *China Agricultural Economic Review*, 3 (1): 67–79.

5. Christiaensen, L., Rutledge, Z., Edward Taylor, J. (2020). The Future of Work in Agriculture: Some Reflections. The World Bank Policy Research Working Paper no. 9193.

6. Deininger, K., Jin, S., Ma, M. (2022). Structural Transformation of the Agricultural Sector In Low- and Middle-Income Economies. Annual Review of Resource Economics, 14:221-241.

7. European Training Foundation (2025), Skilling up the Western Balkans agri-food sector; Foresight report, Turin, Italy.

8. Eurostat (2025). Databases. Available at: https://ec.europa.eu/eurostat/data/database (accessed September 28, 2025)

9. Eurostat. Farmers and the agricultural labour force – statistics. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farmers_and_the_agricultural_labour_force_-_statistics

10. Gligorov, V., Ognjenović, K., Vidovic, H. (2011). Assessment of the Labour Market in Serbia. Research Reports 371. The Vienna Institute for International Economic Studies.

11. Jurjević, Ž., Matkovski, B., Đokić, D., Zekić, S. (2024). A Methodological Framework for Evaluation of Rural Settlements: Rural Index of Serbia. *Land*, 13, 2183.

12. Jurjević, Ž., Zekić, S., Matkovski, B., Đokić, D. (2022). Sustainability of Small Farms in Serbia: A Comparative Analysis with the European Union. *Agronomy*. *12*(11), 2726.

13. Korhecz, R., Vladisavljević, M., Sedlak, O., Marcikić Horvat, A., Eremić Đodić, J. (2025). Demographic Analysis of the Agricultural Population of Serbia. *Economics of Agriculture*, 72(1), pp. 205-224.

14. Malinić, V., Sedlak, M., Krstić, F., Joksimović, M., Golić, R., Gajić, M., Vujadinović, S., Šabić, D. (2025). Land Cover Changes in the Rural Border Region of Serbia Affected by Demographic Dynamics. Land, 14(8), 1663.

15. Maró, Z., Nagy, J., Molnár, E., Mizik, T. (2025). Challenges and potential solutions to employment issues in the agri-food sector of developed countries - A systematic literature review. Sustainable Futures, vol. 10.

16. Mijatović, A., Tomaš Simin, M., Vukoje, V. (2025). Key Determinants of the Economic Viability of Family Farms: Evidence from Serbia. *Agriculture*, 15(8), 828.

17. Mohammed, A., Sundararajan, S. (2024). Automation, innovation, and resilience: Securing sustainable livelihoods through evolving employment dynamics in agriculture. In *Responsible production and consumption* (1st ed., p. 10). CRC Press.

18. Ra, S., Ahmed, M., Teng, P.S. (2019). Creating high-tech 'agropreneurs' through education and skills development, *International Journal of Training Research*, 17:sup1, 41-53.

19. Sroka, W., Dudek, M., Wojewodzic, T., Król, K. (2019). Generational Changes in Agriculture: The Influence of Farm Characteristics and Socio-Economic Factors. *Agriculture*, 9, 264.

20. Stanojević, J., Radivojević, V., Stanišić, T. (2021). Forecasting the main structural changes in agriculture of the Republic of Serbia. Economics of Agriculture, 68(3), 759-772.

21. Zhang, H., Li, Y., Ruan, J. (2021). Winner or loser: urban work experience and rural labour occupational change after return migration, Applied Economics, 53:60, 6964-6981.