INTEGRATING WINE TOURSIM INTO GREEN AGRICULTURAL TRANSFORMATION: PATHWAYS TO SUSTAINABLE RURAL DEVELOPMENT IN SERBIA

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ABSTRACT

This paper examines structural changes in Serbian agriculture and explores wine tourism's potential contribution to green transformation and rural development. Using data from the World Bank, FAO, Eurostat, and Serbia's Statistical Office for the period 2013–2023 (2024 where available), it examines key indicators of structural change, including agricultural value added, employment, productivity, and sectoral governmental expenditure, specifically the Agriculture Orientation Index (AOI). Results indicate that agriculture, forestry, and fisheries declined from 6.3% to 3.1% of GDP, reflecting structural change, while productivity growth remained uneven and vulnerable to shocks. Conversely, the wine sector witnessed an output increase of over 170%, followed by rising yields and enhanced vineyard management. Tourism also expanded, indicating increasing synergies between viticulture and tourism. The paper argues that wine tourism can support rural diversification and value creation, and recommends agricultural modernization, improved rural infrastructure, and integrated wine-tourism development in line with EU sustainability objectives.

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Introduction

The increasingly visible effects of climate change and the growing scarcity of natural resources highlight the necessity of applying the principles of sustainable development in different sectors of society, particularly within agriculture (Kushawaha et al., 2021). Sustainable agriculture has become one of the central priorities in modern economic and environmental policy, emphasizing the need to balance food security, economic efficiency, and ecological protection. The European Union (EU) embeds these goals within the Common Agricultural Policy (CAP), which integrates economic, environmental, and social objectives to promote competitive and sustainable agricultural systems (Pe'Er et al., 2019; Homet et al., 2024). As a holistic approach, sustainable agriculture emphasizes responsible resource use, ecosystem protection, and resilience to environmental and economic shocks (Atapattu et al.,2025; Raman, 2024; Herman, 2024).

For countries like the Republic of Serbia, where agriculture is a vital source of employment, food security, and rural development (Stojanović, 2021), the shift towards sustainability is an essential aspect of broader green transformation efforts. Sustainable agriculture promotes soil protection, biodiversity preservation, and reduced pollution, while encouraging diversification and social inclusion in rural communities (Rai et al., 2023; Umesha et al., 2018). These dynamics present opportunities to enhance rural economies via multifunctionality and innovation-driven development models.

Wine tourism stands out as a rapidly expanding and high-value segment that directly contributes to sustainable rural development (Bisht & Rauthan, 2023). Its emphasis on local products, ecological responsibility, and cultural authenticity makes it particularly compatible with green transformation agendas (Guzel & Gromova, 2016; Woosnam et al., 2024). Serbia's rich viticultural heritage, favorable agroecological conditions, and growing interest in rural tourism establish a strong foundation for this integration. Recent studies underscore wine tourism as a strategic driver of diversification and long-term growth for wineries (Turčinović et al., 2025), aligning with national and EU sustainability goals.

The purpose of this paper is to examine how Serbia's agricultural sector is transforming in the context of green development, with a particular focus on the wine sector and the potential of wine tourism as a mechanism for sustainable rural development. By combining macroeconomic indicators of agricultural performance with sector-specific data on viticulture and tourism, the paper aims to identify key trends, structural challenges, and development opportunities relevant in the context of Serbia's agricultural modernization and its alignment with EU agricultural policies.

In line with this objective, the paper addresses the following research questions:

(1) How has the agricultural sector in Serbia structurally transformed over the past decade in terms of value added, employment, productivity, and public support?

(2) What role does the wine sector play within this broader agricultural transformation, particularly in terms of value creation and modernization?

(3) To what extent does wine tourism represent a potential mechanism for sustainable rural development and diversification in Serbia?

Literature review

In the modern world, sustainability has become an essential and strategic issue for every kind of business (Kolte et al.,2022). Food production, a fundamental necessity for all living organisms, is directly connected to agriculture, which has a central role in supplying the diverse range of foods consumed daily, including cereals, legumes, grains, fruits, vegetables and livestock (Saikia & Laisharam, 2023). Conventional agricultural systems, characterized by intensive chemical inputs, mechanization, and hybrid seed use (Perković et al., 2017), have led to environmental degradation and greenhouse gas emissions (Praća et al., 2017). These challenges have driven the shift toward ecological and organic production models that prioritize environmental responsibility and enduring sustainability.

Sustainable agriculture is increasingly recognized as a crucial pathway for fulfilling the goals of Agenda 2030 (Hurduzeu et al., 2022) and the EU Green Deal (Wrzaszcz & Prandecki, 2020). Definitions typically underscore environmental conservation, resource efficiency, and the economic and social viability of farms (Sharma & Bipana, 2024; Sow & Debnath, 2023). This approach integrates ecological principles with technological innovation to mitigate environmental consequences and bolster system resilience (Tahat et al., 2020; Aničić et al., 2019). Wang et al. (2025) highlighted that, despite considerable challenges, the transition toward sustainable agriculture offers significant opportunities, which can be realized through effective collaboration among governments, stakeholders, and the global community.

The process of green transformation of agriculture includes the transition from traditional production models to those based on innovation, digitalization and renewable energy sources (Li & Guan, 2023). The need for innovation in agriculture is not only an imperative, but also a strategic approach to increase agricultural productivity and the agricultural economy in order to solve a critical problem (Stræte et al., 2022). Promoting the green transformation of agriculture represents an effective strategy to address challenges related to resource management, environmental sustainability, and rural development. However, existing literature offers limited insights into the internal mechanisms and pathways for achieving green transformation (Li et al., 2024). Boix-Fayos & De Vente (2023) highlighted several commonly reported challenges to attain sustainable food systems, including reduced crop yields, rising land demand, nitrogen needs, changes in diet, food waste, distribution and access to food, and externalities to third countries. Jurjević et al. (2019) emphasize that technological modernization, including precision agriculture, GIS systems, and digital management tools, can improve yields and reduce environmental impact. However, Serbia lags behind EU countries in digital adoption, due largely to limited financial resources and low digital literacy among farmers (Jurjević et al., 2019), but it can be improved by ensuring reliable access to modern communication technologies, strengthening technological

resources, and promoting awareness, developing skills and training human resources in rural areas (Zečević Stanojević et al., 2024).

Tourism significantly contributes to rural development by leveraging diverse natural and cultural resources (Ivona, 2021). Agritourism strengthens links between farmers and visitors, creating new income opportunities (Ferreira & Martín, 2020). Wine tourism, in particular, has rapidly expanded as a segment that supports rural diversification, cultural preservation, and environmental protection (Jezierska-Thöle et al., 2025). Its integration with agricultural production enhances sustainable destination models by promoting heritage, biodiversity, and local economic development (Bresciani et al., 2016; Andrade-Suárez & Caamaño-Franco, 2020).

Many studies highlight wine tourism's capacity to enhance environmental performance, stimulate innovation, and strengthen regional competitiveness (García Revilla & Martínez Moure, 2021; Martínez-Falcó et al., 2024a), arguing that wine tourism can support regenerative agriculture and circular economy principles (Martínez-Falcó et al., 2024b), though the benefits depend on stakeholder collaboration and careful environmental management (Pearson et al., 2024). Digitalization has further influenced the sector, particularly in the post-pandemic context (Festa et al., 2023).

Serbia has a long-standing agricultural tradition, with most of its rural population actively engaged in farming (Trlaković et al., 2021). According to the Republic Statistical Office, the country is home to approximately 508,325 agricultural holdings, reflecting the significant role that agriculture continues to play in rural livelihoods, food production, and the national economy (Republic Statistical Office, 2023). In this context, the development of wine tourism represents an opportunity for the integration of sustainable agriculture and rural transformation, thus opening up space for green modernization of the countryside and a more competitive position of the country. Wine tourism in Serbia has a long-standing tradition of more than 120 years (Maksimović et al., 2021). Today, Serbia boasts a substantial number of wineries with the potential to develop wine tourism and hosts numerous wine-focused events, reflecting the country's rich viticultural tradition. However, the structure of wine tourists has changed significantly, with wineries and wine events now mostly visited by wine lovers, while professional visitors constitute a much smaller number (Tomić et al., 2017). Aničić et al. (2019) emphasize the necessity to revitalize the cooperative system and strengthen various forms of collaboration among agricultural producers, along with increasing support for small family farms, following the models established in developed EU countries.

Materials and methods

This research integrates macroeconomic and sectoral data, covering the period 2013-2023 (or 2024 where available). Core agricultural indicators, such as agriculture value added (% GDP), agricultural employment (% total employment), and agricultural value-added growth, were derived from the World Bank's World Development Indicators. Data on agricultural and total government expenditure was sourced from FAO (2024)

and used to compute the Agriculture Orientation Index (AOI) following FAO/SDG 2.a.1 methodology:

AOI = (Agricultural value added/GDP) ÷ (Agricultural expenditure/Total expenditure)

Values exceeding one indicate that agriculture is accorded a greater policy priority in comparison to its economic contribution, whilst values below one suggest relative underinvestment. AOI for Serbia was taken directly from the World Bank SDG database, while AOI for the European Union was calculated using FAO COFOG agricultural expenditure and WDI agricultural value-added data. However, despite both datasets adhering to the same SDG methodology, slight disparities may arise from variations in data coverage, aggregation, and harmonization.

National-level statistical data were supplied by the Statistical Office of the Republic of Serbia (2024), which includes total agricultural output, crop and wine production, vineyard area, yield per hectare, and tourism statistics, such as the number of tourist arrivals and overnight stays. Agricultural output and wine production originally reported in RSD were converted to EUR using average annual exchange rates provided by the National Bank of Serbia (Table 1).

Table 1. Average annual exchange rate EUR/RSD

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
EUR/ RSD	113.1	117.2	120.8	123.1	121.3	118.3	117.9	117.6	117.6	117.5	117.3	117.1

Source: NBS (2024)

The analysis employs descriptive and comparative statistical methods to investigate long-term structural dynamics in Serbian agriculture. Trends, growth rates, and structural ratios are examined to identify changes in agricultural performance, while figures and tables illustrate the correlations between agricultural output, wine production, and tourism development. This methodological approach enables a structured assessment of macro- and sector-level patterns relevant to green agricultural transformation and rural development in Serbia.

The study adopts a descriptive and exploratory perspective, focusing on the identification of long-term structural trends rather than on establishing causal relationships. Although the analysis is policy-oriented, it does not seek to estimate causal effects between agriculture, viticulture, and tourism, but instead examines their co-evolution over time at the national and sectoral levels. Accordingly, the findings should be interpreted as indicative of structural patterns and development potentials, rather than as evidence of direct policy impacts.

Within this framework, green agricultural transformation is interpreted in empirical terms as a structural process reflected through changes in economic contribution, employment dynamics, public support orientation, productivity trends, and the development of higher value-added and multifunctional activities. Given macro-level

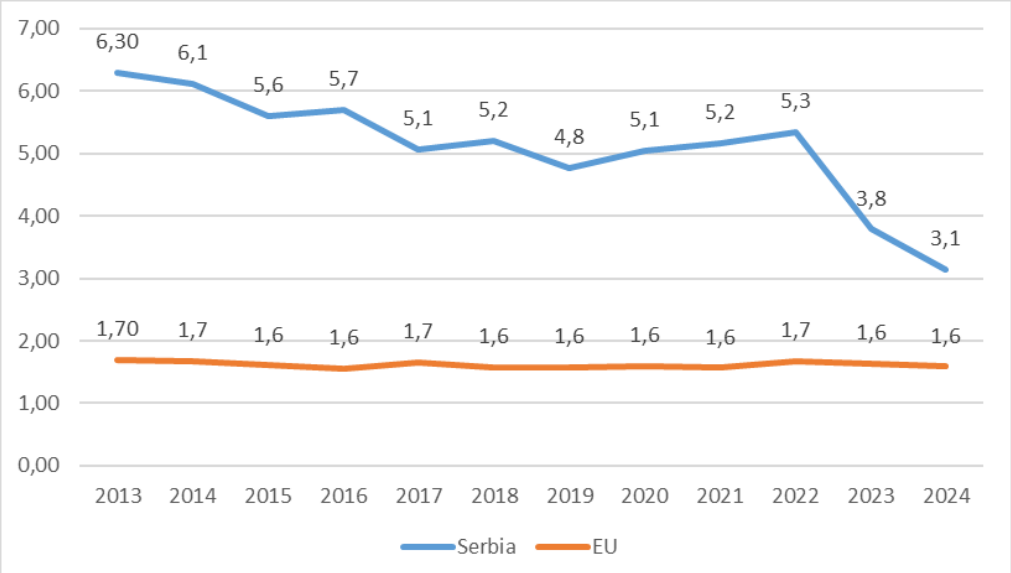
data constraints, the concept is assessed through a set of complementary indicators capturing economic, structural, and sectoral dimensions rather than through a single synthetic measure. This approach is consistent with applied policy-oriented research on agricultural transformation in transition and EU candidate countries, where gradual structural change and diversification are central analytical perspectives.

Results and Discussion

Structural Changes in Serbian Agriculture in Comparative Perspective

The results indicate a continuous decline in the contribution of agriculture, forestry, and fishing to Serbia's GDP (from 6.3% to 3.1%) over the observed period (Figure 1). While agriculture remains structurally important, its relative economic weight has diminished, reflecting broader processes of structural transformation typical of transition economies. This trend is consistent with patterns observed in EU member states, where agricultural value added has steadily decreased as economies diversify toward services and higher value-added activities (Pe'er et al., 2019).

Figure 1. Agriculture, forestry, and fishing, value added (% of GDP)



Source: Authors

However, the Serbian trajectory differs in pace and structure. Unlike the EU, where declining agricultural shares are accompanied by strong productivity growth and technological upgrading, Serbia's reduction in agricultural GDP contribution occurs alongside persistently high agricultural employment (see Figure 3). Similar mismatches between employment and value added have been identified in other Western Balkan and Southeast European countries, where structural adjustment remains incomplete and agriculture continues to absorb surplus labor (Aničić et al., 2019; Trlaković et al., 2021). This suggests that Serbia's agricultural transformation is still largely extensive

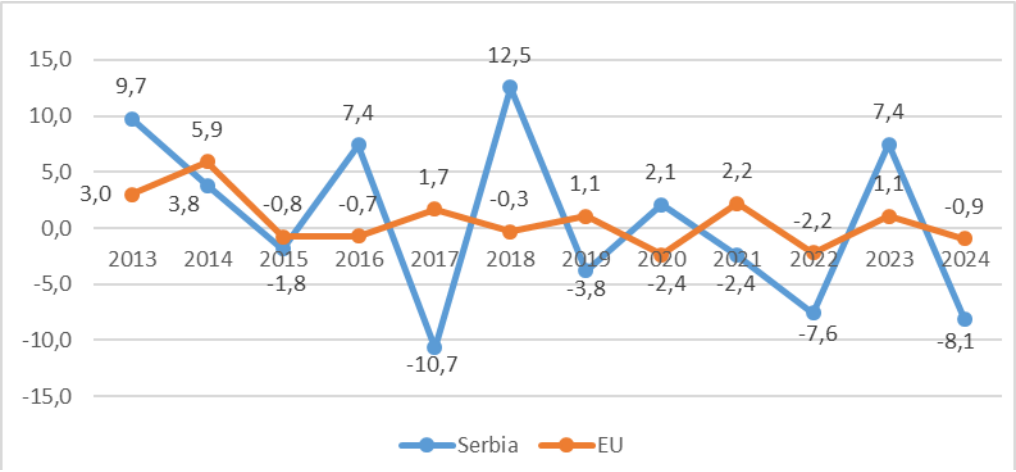
rather than productivity-driven, underscoring the necessity for a more focused strategy regarding investment and technical modernization.

From a sustainability perspective, this structural pattern limits Serbia's capacity to respond effectively to climate change and market shocks. Contemporary sustainable agriculture frameworks emphasize productivity improvements through innovation, resource efficiency, and diversification, rather than reliance on labor absorption as an adjustment mechanism (Hurduzeu et al., 2022; Sharma & Bipana, 2024). The Serbian case therefore illustrates a partial and uneven transition, where structural change is occurring without sufficient qualitative upgrading.

Volatility of Agricultural Growth and Climate Vulnerability

Agricultural value-added growth in Serbia exhibits pronounced volatility, with sharp contractions followed by strong recovery years (Figure 2). This contrasts with the relatively stable growth patterns observed in the EU, where policy instruments under the Common Agricultural Policy (CAP) play a stabilizing role through income support, risk-management tools, and rural development measures (Pe'er et al., 2019).

Figure 2. Agriculture, forestry, and fishing, value added (annual % growth)



Source: Authors

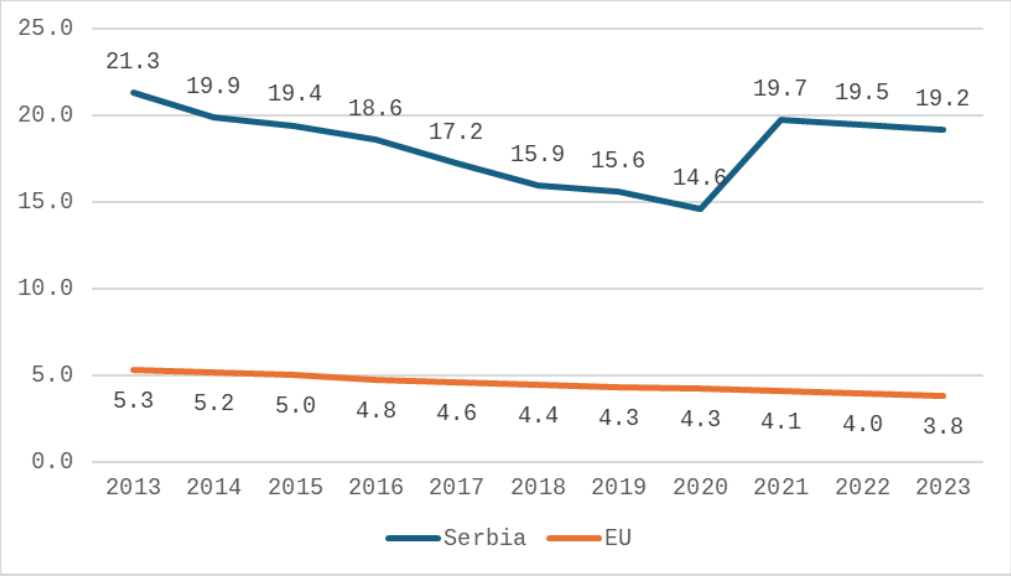
The observed volatility in Serbia is consistent with findings from studies on transition and emerging agricultural economies, which identify strong climate exposure, a production structure dominated by primary crop activities, and broader structural constraints as key drivers of instability (Praća et al., 2017; Jurjević et al., 2019; Županić et al., 2021). Additional research highlights low productivity levels and limited modernization as persistent challenges that further constrain adaptive capacity in such systems (Aničić et al., 2019). As a result, agricultural yields remain highly sensitive to weather conditions, while technological and structural limitations reduce the sector's ability to respond to external shocks.

Compared with countries that have advanced further in green agricultural transformation, such as newer EU member states that have absorbed CAP funds for modernization (OECD 2022; Matthews 2018), Serbia displays weaker resilience mechanisms. Li and Guan (2023) emphasize that green transformation requires not only environmental orientation but also investment in innovation, digitalization, and climate-smart technologies. The Serbian results confirm that without such investments, sustainability goals remain vulnerable to external shocks.

Employment Structure and Productivity Gaps

Despite a gradual decline, agricultural employment in Serbia remains significantly higher than the EU average (Figure 3). While the EU has experienced parallel declines in agricultural employment and value added, indicating productivity-led transformation, Serbia shows a persistent decoupling between labor input and economic output.

Figure 3. Employment in agriculture (% of total employment) (modeled ILO estimate)



Source: Authors

This pattern reflects what Aničić et al. (2019) describe as structural duality, referring to the coexistence of relatively more modernized and market-oriented segments alongside traditional small-scale farming characterized by low productivity. Similar dynamics have been documented in other transition economies, where limited access to capital, technology, and knowledge constrains structural adjustment processes and slows the transformation of agricultural labor structures (Jurjević et al., 2019; Zečević Stanojević et al., 2024).

From a policy standpoint, maintaining high agricultural employment without corresponding productivity growth poses long-term sustainability challenges. Sustainable agriculture frameworks stress that social sustainability should be achieved

through income diversification and value creation, not through the preservation of low-productivity employment.

Public Support and the Agriculture Orientation Index

An alternative viewpoint on Serbia's agricultural development can be derived from the Agriculture Orientation Index (AOI), which assesses the degree to which public expenditure aligns with the sector's contribution to the national economy. The AOI is defined as the ratio of government expenditure on agriculture, forestry, and fishery to the agriculture value added share of GDP. A value of one indicates balanced prioritization, but value below one denotes underinvestment in relation to the sector's economic significance.

Table 2. The agriculture orientation index for government expenditures

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Serbia	0.29	0.31	0.32	0.31	0.37	0.34	0.40	0.33	0.32	0.37	0.67
EU*	0.35	0.36	0.36	0.34	0.33	0.35	0.35	0.35	0.34	0.34	0.36

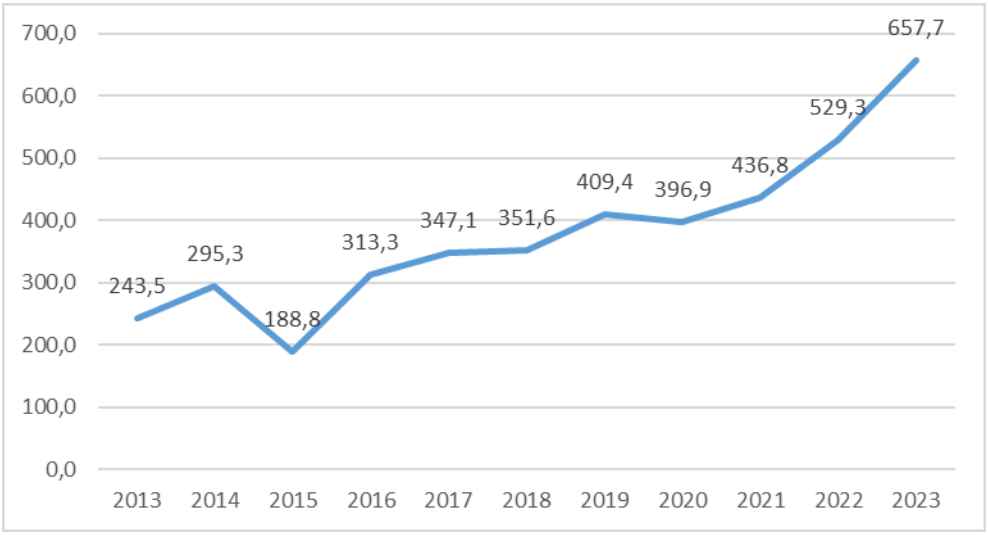
Source: World Bank data360; *authors based on the FAO database.

Between 2013 and 2023, the average agriculture Output Index (AOI) for the European Union was approximately 0.35, showing that agriculture expenditure constitutes about one-third of the sector's contribution to GDP. Although this may indicate underinvestment from a purely proportionate viewpoint, it actually demonstrates a mature, high-efficiency system where agricultural and rural support is facilitated through multifunctional CAP instruments, which means that funds can also be distributed indirectly (via rural development, environmental schemes, and structural instruments) (Pe'er et al., 2019; Wrzaszcz & Prandecki, 2020). Conversely, Serbia's AOI fluctuated between 0.25 and 0.40 during most of the decade, indicating a limited governmental focus on agriculture. However, a significant rise to about 0.7 in 2023 implies a strategic move towards enhanced prioritizing. This may indicate improvement in the process of alignment with EU standards and harmonizing its agricultural expenditure frameworks with EU protocols, especially via IPARD and Green Transition initiatives.

Dynamics of Wine Production and Viticulture

Although total agricultural output grew by roughly 36% throughout the decade, wine production surged by nearly 170%, rising from EUR 243.5 million in 2013 to EUR 657.7 million in 2023 (Figure 4). This growth rate significantly surpasses that of the total agricultural sector, indicating heightened market demand and structural enhancement within Serbian viticulture. Although vineyard area decreased moderately from approximately 21,000 hectares in 2013 to 17,700 hectares in 2023, the yield per hectare increased from 5.8 to 7.3 tons, indicating transition towards more intense and technologically sophisticated production systems, supported by expenditures in vineyard revitalization and quality enhancement.

Figure 4. Annual wine production (EUR million)



Source: Authors

Serbia's wine production dynamics are consistent with global trends in emerging and premium wine regions, where modernization focuses on quality upgrading rather than area expansion (García Revilla & Martínez Moure, 2021). Also, compared to traditional bulk-oriented agricultural production, viticulture exhibits stronger compatibility with sustainability principles, particularly through differentiation strategies, territorial embeddedness, and value upgrading (Bresciani et al., 2016; Andrade-Suárez & Caamaño-Franco, 2020).

Recent studies show that the integration of wine tourism and sustainability-oriented practices is associated with improvements in economic performance, environmental management, and social outcomes in wine-producing regions (Martínez-Falcó et al., 2024a; 2024b). Serbia's results align with these findings, suggesting that viticulture can act as a catalyst for green agricultural transformation when linked to tourism and local value chains.

Tourism Growth and Synergies with Agriculture - Integrating Wine Tourism into Green Transformation

The dynamics of tourism in Serbia over the last decade have reflected the structural changes seen in agriculture and viticulture. From 2013 to 2024, total tourist visits more than quadrupled, rising from 2.2 million to 4.4 million, while the number of foreign visitors surged by 158%. Overnight stays exhibited a comparable trend, increasing from 6.6 million to 12.7 million (Figure 5). Following a brief downturn in 2020 attributed to the COVID-19 pandemic, tourism saw a robust resurgence, propelled by domestic demand and the increasing appeal of specialized sectors such as gastronomy and wine tourism.

Figure 5. Tourists' arrivals and tourists' nights spent in Serbia, 2013-2024



Source: Authors

Within this context, the wine sector exhibits characteristics that are compatible with the principles of green transformation, particularly through its orientation toward higher value-added production, more efficient resource use, and the preservation of cultural and landscape heritage (Bisht & Rauthan, 2023; Guzel & Gromova, 2016). The integration of viticulture into tourism activities enhances agricultural multifunctionality, as vineyards simultaneously function as production units, cultural assets, and elements of the rural environment. This approach is consistent with broader rural development strategies promoted by the EU and the OECD, which emphasize diversification of rural economies, non-farm income generation, environmental sustainability, and social cohesion (OECD, 2022; European Parliament, 2022).

The parallel growth of tourism and wine production in Serbia suggests the emergence of synergies between viticulture and rural tourism. This observation aligns with existing research that identifies wine tourism as a complementary mechanism for rural development, capable of fostering economic diversification, strengthening territorial identity, and increasing local value creation (Andrade-Suárez & Caamaño-Franco, 2020; Jezierska-Thöle et al., 2025). At the same time, the literature cautions that the sustainability impacts of wine tourism depend heavily on supportive institutional frameworks, adequate infrastructure, and effective coordination among stakeholders (Pearson et al., 2024; Turčinović et al., 2025). In this respect, Serbia's experience is comparable to that of other transition economies, where wine tourism represents a promising yet still unevenly developed pathway for rural diversification.

Compared with established EU wine regions, Serbia remains at an earlier stage of institutional and infrastructural development. Nevertheless, the existence of organized wine routes and increasing entrepreneurial activity indicates a gradual movement toward development patterns observed in European models of sustainable rural tourism (Jezierska-Thöle et al., 2025; Maksimović et al., 2021). Illustrative examples, such as wine routes in Fruška Gora, Šumadija, and the Negotinska Krajina, demonstrate how wineries can generate additional value through tasting rooms, small-scale accommodation, local gastronomy, and cultural events, thereby contributing to the formation of a more integrated wine tourism ecosystem. In line with existing research (Bresciani et al., 2016; Sow & Debnath, 2023), the Serbian case underscores the importance of diversification and multifunctionality as key pathways toward green and sustainable rural development.

Taken together, the results highlight the interconnected nature of agricultural transformation, sectoral differentiation, and tourism development in Serbia. While traditional agriculture continues to face structural challenges and volatility, the wine sector illustrates how targeted modernization and value upgrading can enhance resilience. The parallel expansion of tourism, particularly wine tourism, further reinforces the role of multifunctionality as a linking mechanism between agriculture and rural development, suggesting that integrated sectoral approaches are essential for advancing green and sustainable rural transformation.

Conclusion

The results of the study affirm that the agricultural sector of Serbia is experiencing steady but uneven transformation, which is characterized by decreasing GDP contribution, consistently high agricultural employment and significant fluctuations in value-added growth. These patterns indicate that a sector is still hindered by technological lag, climate vulnerability, and limited diversification. At the same time, the Agriculture Orientation Index shows historically low but recently improving levels of public support, suggesting a potential alignment with EU agriculture policy frameworks.

In contrast to broader agricultural stagnation, the wine sector indicates a notable trend of modernization. Wine output increased significantly despite a reduction in vineyard area, demonstrating improvements in yield and quality. These structural changes reflect global trends in premium wine regions and correspond with EU sustainability and rural diversification goals. Furthermore, the rapid growth of tourism fosters synergy between viticulture, rural hospitality, gastronomy, and cultural heritage, thereby enhancing local economies through multifunctionality.

From a policy perspective, these findings emphasize the significance of leveraging high-value, culturally ingrained sectors, such as viticulture and wine tourism, to accelerate Serbia's green agricultural transformation. This approach is consistent with the Common Agricultural Policy's focus on smart specialization, environmental protection, and rural economic diversification. Enhancing the regulatory framework

for wine tourism, expanding IPARD funding, and improving local value chains would allow Serbia to maximize the economic, social, and environmental benefits of this development path.

To realize the potential adequately, the following policy recommendations are proposed:

- Harmonize national agriculture and rural development strategies with the EU Green Deal and CAP – Serbia should enhance its policy alignment with the Common Agricultural Policy (CAP 2023–2027) by integrating sustainability criteria, climate adaptation strategies, and biodiversity protection into all agricultural support programs, with a stronger emphasis on CAP Pillar II priorities.
- Increase investment in agricultural modernization and climate resilience – Strategic investments in irrigation systems, climate-smart technology, crop insurance programs, early warning systems, and mechanization are crucial for mitigating volatility in agricultural production.
- Enhance institutional and financial support for the wine sector – The recent rise in agricultural expenditure should be accompanied by better targeting and transparency. Funding should prioritize value-added chains, eco-certification, sustainability standards, and digital tools for vineyard and winery management.
- Integrate wine tourism into national and regional rural development strategies – A coordinated framework connecting agriculture, tourism, and cultural heritage would enhance policy coherence and promote the development of integrated rural products. This alignment would promote sustainable revenue diversification and enhance Serbia's position in the regional wine tourism market.
- Develop integrated wine and rural tourism clusters – Corridors such as Fruška Gora, Šumadija, and Negotinska Krajina should combine vineyard modernization, hospitality, gastronomy, and heritage. These clusters can follow EU initiatives such as such as the CAP 2023–2027's Smart Villages strategy (supporting digital and social innovation in rural areas) and the EAFRD under the CAP, providing rural development funding for diversification and sustainability.
- Promote green innovation and certification in viticulture – Enhancing access to renewable energy technologies (e.g., solar-powered wineries, water recycling systems) and advocating for organic and low-emission viticulture would allow better alignment of Serbian producers with EU sustainability criteria. The introduction of eco-labels and Protected Geographical Indication (PGI/PDO) certification should be encouraged to enhance export competitiveness and customer confidence.
- Enhance institutional and governance capacity – Creating specialized inter-ministerial coordination frameworks among the Ministries of Agriculture, Tourism, and Environmental Protection would improve strategic planning and the coherence of rural development initiatives. This coordination is crucial for

improving access to EU funds and enabling local authorities to develop and implement integrated development projects.

- Invest in human capital and the transfer of knowledge – The shift towards sustainable and innovation-driven agriculture and tourism requires new skills. Training programs in sustainable viticulture, agrotourism management, digital marketing, and circular economy principles should be developed in cooperation with universities and vocational schools. Cooperation with EU educational networks, such as Erasmus+ for Rural Innovation, can further foster this process.

Overall, Serbia's progress toward green transformation will depend on the integration of policy tools, access to EU funds, and effective coordination across sectors. The wine sector represents a concrete success narrative, highlighting how modernization, cultural legacy, and ecological awareness can converge into a sustainable development paradigm. By aligning national objectives and strategies with EU regulations, Serbia can strengthen its agricultural sector, improve environmental management, and establish itself as a competitive and sustainable wine and tourism destination in the Western Balkans.

Limitations and Future Research Directions

This study is predominantly descriptive and relies on secondary data, which may contain discrepancies in coverage, indicator definitions, and reporting methodology. In addition, the analysis is conducted at the macro and sectoral level and does not capture micro-level dynamics related to individual farms, wineries, or tourist behavior. Consequently, the findings should be interpreted as indicative of structural trends and policy-relevant linkages rather than firm-level or consumer-level impacts. Regional differences within Serbia are inadequately represented, potentially obscuring variations in agricultural productivity and the advancement of wine tourism. Future research should integrate regional datasets, geographical analysis, and econometric models to investigate localized development patterns. While the Agriculture Orientation Index provides insights into policy prioritization, it does not assess the qualitative effectiveness of public spending. Thus, complementary indicators for green investment and sustainability outcomes should be established. Ultimately, the relationship between wine tourism and rural sustainability requires deeper investigation using field surveys, stakeholder interviews, and case studies to better understand stakeholder behavior, governance challenges, and green transition pathways at the local level.

Conflict of interests

The authors declare no conflict of interest.

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