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AGRICULTURAL LABOR DYNAMICS IN PELAGONIA, NORTH MACEDONIA: A CASE STUDY THROUGH THE LENS OF AGRICULTURAL HOUSEHOLD AND LABOR TRANSITION MODELS

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Abstract

Agricultural labour dynamics in transition economies, particularly in the Balkans, have undergone significant shifts due to structural changes, migration trends, and evolving labour market conditions. Understanding how smallholders allocate their labour is crucial, as they form the backbone of agricultural production but face increasing challenges in sustaining their livelihoods. This study examines farm labour dynamics in the largest agriculture region in North Macedonia, the Pelagonia Region, exploring how smallholders allocate their labour amid broader labour market shifts and migration trends. Employing a synthesis approach, this study explores the interaction between agricultural households, migration patterns, and structural changes in the labour market. Findings reveal a reliance on family labour, with seasonal hiring filling gaps, though constraints on flexibility and productivity persist. Labour shortages, an aging workforce, and limited farm succession planning pose challenges to long-term sustainability. Slow structural transformation, low innovation uptake, and restricted diversification hinder adaptation to economic shifts. The policy recommendation framework focuses on three key areas: enhancing access to agricultural training, fostering modernisation through innovation, and increasing youth engagement to ensure a stable workforce. The study provides a contextualised analysis that can inform similar regions, demonstrating the applicability of established labour theories in agricultural contexts.

Key words**:** *labour trends, small-scale agriculture, survey-based analysis, Pelagonia case study, North Macedonia*

INTRODUCTION

Agricultural labour dynamics in transition economies, particularly in the Balkans, have undergone significant shifts due to structural changes, migration trends, and evolving labour market conditions. Understanding how smallholders allocate their labour is crucial, as these farmers form the backbone of agricultural production but face increasing challenges in sustaining their livelihoods.

One of the key issues is labour shortages, driven by rural-to-urban and international migration, as younger generations seek more stable and higher-paying jobs outside agriculture. This shift leaves aging smallholders with limited labour resources, affecting productivity, farm succession, and overall agricultural sustainability. The seasonal nature of agricultural work makes it difficult to secure a stable workforce, leading to further reliance on informal labour or mechanisation, which is not always accessible to small farms.

Smallholders in transition economies often engage in multi-activity strategies, balancing farm work with off-farm employment to secure household income. However, this dual engagement can reduce their long-term agricultural investment, weakening the sector's resilience. Additionally, the lack of institutional support, limited access to financial resources, and inadequate labour policies exacerbate the problem, creating long-term risks for agriculture and rural development.

Without targeted interventions, the viability of smallholder farming in the Balkans remains uncertain.

A deeper labour analysis is essential to inform policies that can sustain agricultural production

while addressing demographic and economic challenges in rural areas. Hence, drawing on survey-based data collected from smallholders in North Macedonia, this study aims to examine the labour dynamics in agriculture within the Pelagonia Region, focusing on how smallholders allocate their labour in the context of broader labour market shifts and migration trends. The analysis will be framed through key labour theories, including the Agricultural Household Models [9], the Structural Change [8] and Labour Transition theories [6].

This study addresses critical issues of labour shortages and migration in rural areas– challenges of increasing significance in many developing economies, particularly those undergoing long transitions.

There have been various studies on labour analysis conducted in the region. A recent study emphasises that land security can reduce labour outflow, while liberalised land transfers increase migration [4]. Smallholder adaptation strategies, including reliance on off-farm income, labour dependence, and migration-driven responses, are explored in different studies [1], [2], [3], [5], [7].

This study demonstrates how established labour theories can be applied to agricultural contexts, enriching existing literature with empirical evidence. By focusing on the Pelagonia Region, the study offers a detailed, contextualised analysis that can serve as a model for other regions facing similar challenges. Moreover, this study offers a recommendation framework to inform policies for agriculture and rural development in regions facing similar challenges.

The following section provides a concise overview of the research region, followed by applied methods and theoretical framework. It then describes the sample and key determinants. The results on labour dynamics are followed by a contemporary discussion grounded in relevant labour theories. Finally, the study concludes with key takeaways, setting a structured guide for formulating recommendations.

North Macedonia, a small, landlocked country in south-eastern Europe, experiences significant regional disparities in population distribution, economic development, and access to technological innovation. With a total area of 25,713 km² and a population of approximately 1.84 million people [12], the country is divided into eight statistical regions, each with distinct demographic and economic characteristics. Out of 80 municipalities in the country, 64 are rural, making up 80 % of the total [11]. Rural areas cover 88.7 % of the territory but are home to only 47.5 % of the population [10].

These rural communities face numerous challenges, including high unemployment, increasing migration, and limited economic growth. Agriculture remains the backbone of rural livelihoods but struggles with technological underdevelopment, hindering its potential for growth and innovation.

According to SSO [11], the Skopje Region is the most densely populated, with the highest share of the young population (0-14 years old), despite having the smallest area of 1,812 km². On the other hand, the Pelagonia Region spans the largest area (4,902.93 km^2, including water surface) but has the highest proportion of the elderly population (65+). These patterns reflect a trend where younger people are more likely to migrate from rural to more urbanised areas, where they can access better opportunities. The aging population in regions like Pelagonia may further exacerbate this issue, as older individuals tend to remain in rural areas, while younger generations migrate to urban centres.

The Pelagonia Region, located in the southwestern part of the country, is the most important agricultural region in North Macedonia. Itborders Greece and Albania. The region is composed of nine municipalities (Table 1), all classified as rural areas, despite having five towns. These cities cover an area of 80 km², which represents 1.6 % of the region's total area and is home to nearly 70 % of its population. The remaining area, 4,822.93 km², consists of 339 villages (rural settlements), accounting for 98.4 % of the region's total area [10]. Bitola serves as the main administrative centre of the region.

Table 5. A brief overview of the municipalities in the Pelagonia Region

No.	Municipa-lity	Area (km^2)	Population (numbers)	Density (people per km^2)
1	Bitola	787.95	85,164	110.0
2	Demir Hisar	480.13	7,260	15.0
3	Dolneni	412.43	13,126	32.0
4	Krivogashtani	93.57	5,167	55.0
5	Krushevo	190.68	8,385	44.0
6	Mogila	251.20	5,283	21.0
7	Novaci	753.53	2,648	3.5
8	Prilep	1,194.44	69,025	58.0
9	Resen	793.00	14,373	19.0
Total	**Pelagonia Region**	**4,902.93**	**210,431**	**44.6**

Source: SSO, Census, 2022 [10].

The Pelagonia Region, with a population of 210,431 (11.5 % of the national population) [12], is heavily dependent on agriculture, particularly in the Pelagonia and Prespa Valleys. Agriculture contributes 4 % of regional production and 5 % of employment [10]. The region's favourable geography, high-quality land, and climate support agricultural success, but challenges such as fragmented land and outdated machinery persist.

Bitola Municipality holds the largest share of agricultural land (34.5 %), followed by Prilep (28.4 %) and Resen (8.8 %) [11]. The region's agriculture is diverse, with households engaged in producing cereals (wheat, barley, and maize) and vegetables (red peppers, watermelons, melons, and more), with crop rotation as the main practice. Vegetables are of great commercial value for the farmers. Industrial red pepper production has gained increased attention since there is a high market demand for this product. Watermelons are commercially also valuable, with around 90 % of watermelon production being exported [10].Wheat is of good bread-making quality but offers a low-profit margin, while barley is mainly used for livestock feed or sold to breweries.

The Pelagonia Region accounts for 20.7 % of North Macedonia's agricultural land, covering 260,488 hectares, with 44.2 % cultivated and 55.8 % used for pasture. Cultivated land consists of 84.1 % arable land and gardens, 3.4 % orchards, 0.7 % vineyards, and 11.8 % meadows (Table 2). The region faces challenges with land consolidation, outdated technology, and a lack of storage facilities for cereals.

Livestock farming, including dairy and meat production, is a key activity in the region. Cattle farming is prominent, with a focus on milk production, though beef farming exists. Sheep, goats, and pigs are raised, but their numbers are decreasing. Poultry farming, mainly for meat and eggs, is increasing (Table 3).

Despite its agricultural significance, the region faces various challenges, including a lack of technological advancements in farming, high unemployment, and significant migration trends that contribute to labour shortages in the sector. The region's rural areas, which cover nearly the entire region, are particularly affected by these issues.

Agriculture in Pelagonia is heavily reliant on family labour, with 90 % of agricultural holdings managed by men, typically averaging 57 years old [10]. There is a shortage of agricultural labour, exacerbated by the increasing trend of rural-urban migration and limited access to modern labour-saving technology. This shortage often results in increased reliance on family members for labour and seasonal workers, leading to inefficiencies in labour allocation and farm management. Smallholders face difficulties finding adequate seasonal labour during peak production times, which can limit the overall productivity of agricultural activities.

The fragmentation of land holdings is a significant issue in Pelagonia, as in the rest of the country. While land consolidation efforts are underway to address this, the slow pace of these initiatives, combined with outdated machinery, further limits the efficiency of the labour force. This is particularly problematic for smallholders, who often lack the resources to invest in new technologies or hire skilled labour to increase productivity.

Certain municipalities within the region, have developed specialised agricultural activities. However, the labour force is often insufficient to meet the demands of these specialised sectors, leading to either underutilisation of resources or the hiring of temporary labour, often from outside the region.

Pelagonia has been impacted by rural-urban migration, like many rural areas in the Balkans, with younger individuals seeking better living opportunities in urban centres. This trend depletes the local labour pool, further exacerbating the shortage of workers in agriculture.

Table 6. Agricultural area in the Pelagonia Region, in hectares

Year	Agricultural area	Cultivated land	Arable land and gardens	Orchards	Vineyards	Meadows	Pastures
2007	267,018	115,667	96,100	3,907	1,250	14,410	150,869
2008	268,500	115,314	95,879	3,916	1,201	14,318	152,705
2009	273,786	113,832	94,160	3,875	1,202	14,595	159,473
2010	272,565	112,622	93,082	3,846	1,115	14,579	159,462
2011	272,010	112,078	92,839	3,821	942	14,476	159,451
2012	262,880	111,987	92,712	3,862	931	14,482	150,416
2013	266,072	115,191	95,858	3,865	980	14,488	150,404
2014	263,243	115,148	95,877	3,838	925	14,508	147,832
2015	262,630	114,528	95,460	3,927	986	14,155	147,839
2016	263,678	115,348	96,298	3,968	981	14,101	147,833
2017	263,978	115,628	96,383	3,969	956	14,320	147,850
2018	262,262	116,084	96,917	4,002	954	14,211	145,678
2019	261,061	115,233	95,999	3,992	873	14,369	145,328
2020	260,192	114,356	96,092	4,006	803	13,455	145,336
2021	260,488	115,220	96,888	3,974	788	13,570	145,002

Source: SSO, MakStat, 2022 [10].

Table 7. Livestock production in the Pelagonia Region, in heads

Year	Cattle	Pigs	Sheep	Goats	Horses	Poultry	Beehives
2007	42,768	33,568	242,293	7,651	4,259	372,222	3,416
2008	46,237	25,853	105,374	7,569	4,933	447,591	2,233
2009	51,445	25,846	228,984	7,322	6,919	399,813	2,424
2010	56,229	17,943	152,649	5,567	4,632	317,114	7,496
2011	55,211	18,639	171,650	5,358	4,753	369,176	6,038
2012	58,246	16,333	143,109	3,710	2,139	274,625	6,402
2013	56,988	8,246	133,788	2,006	3,082	312,466	974
2014	55,890	9,153	132,868	4,588	2,864	355,062	...
2015	57,492	9,694	130,270	4,957	2,940	301,901	1,835
2016	58,609	15,225	116,549	5,208	1,341	280,530	8,535
2017	59,340	21,997	90,712	3,866	2,455	396,071	6,681
2018	61,404	14,433	74,823	7,319	1,072	427,438	805
2019	49,835	16,418	73,259	4,238	647	405,666	11,453
2020	67,561	18,791	65,791	4,390	380	412,262	2,807
2021	40,810	25,143	102,171	3,189	453	492,428	15,523

Source: SSO, MakStat, 2022 [10].

MATERIALS AND METHODS

The labour analysis was based on survey data collected from smallholders in the Pelagonia region in March 2023. The survey employed a combination of online survey and in-person interviews conducted by skilled local interviewers–advisers from the head office of the National Extension Agency (NEA). The sample consisted of 60 agricultural households.

The questionnaire was carefully designed to structure the labour analysis and ensure comprehensive data collection. It was divided into three main sections.

The first section gathered demographic and structural information about agricultural households, including family composition, legal status, commercial production focus, and future expansion plans.

The second section examined labour dynamics, capturing details on the engagement of family members and hired workers, as well as assessing labour utilisation on farms.

The third section covered general data on respondents. The questionnaire primarily relied on closed-ended questions to facilitate quantitative analysis.

Data processing and analysis methods

The data processing employs fundamental statistical methods, including ratio analysis, descriptive statistics, and cross-tabulations. The study's key contribution lies in integrating theoretical frameworks to explain the underlying determinants of labour dynamics in the research area.

The research heavily depends on the analytical and integrative skills of the researchers to interpret the collected data. It focuses on how smallholders allocate their labour within the broader context of labour market shifts and migration trends. Using a synthesis approach, the study examines the interactions between agricultural households, migration patterns, and structural changes in the labour market. By identifying key trends and patterns, the research provides a framework of recommendations to address labour shortages in agriculture and mitigate the effects of migration on the agricultural workforce.

Theoretical framework

The theoretical framework for analysing labour in Pelagonia's agriculture is rooted in two main perspectives: the Agricultural Household Model, and Structural Change and Labour Transition Theories.

The Agricultural Household Model, developed by Singh, Squire, and Strauss, considers farm households as both producers and consumers of labour [9]. It emphasises the way family labour interacts with hired labour in small-scale farming while accounting for non-wage factors such as self-sufficiency and food security. This model highlights endogenous labour allocation, where households decide whether to use family labour, hire external workers, or engage in off-farm employment based on relative wages, production needs, and consumption priorities. It also considers non-wage factors affecting labour supply, including food security, risk aversion, and farmland sizes. Market imperfections and labour constraints play a crucial role, as rural labour markets often face seasonality, informal contracts, and credit limitations, influencing decisions on labour use. The model provides insights into why smallholders may be reluctant to commercialise their farms, emphasising the role of family labour and the challenges associated with hiring external workers.

Structural Change and Labour Transition Theories offer a broader perspective on how labour shifts from agriculture to other sectors as economies develop. The Lewis Model describes agriculture as having surplus labour, which gradually moves to industry due to higher wages [6]. This transition is seen as a driver of economic growth, with industrial profits further stimulating expansion and employment. However, the model has limitations, as it assumes an unlimited labour supply and does not fully account for migration barriers or the possibility of rural labour shortages. Rostow's Stages of Growth further elaborate on economic transitions, outlining how agriculture's role diminishes as economies industrialise [8]. In the early stages, agriculture dominates the economy, but as productivity improves and infrastructure develops, labour gradually shifts toward industry and services. Mechanisation reduces agricultural employment, leading to a stage where agriculture's share in GDP becomes minimal, with most workers engaged in non-agricultural sectors.

These studies collectively illustrate how labour in transition agriculture is shaped by structural reforms, institutional constraints, and smallholder adaptation strategies, particularly in the Balkans.

RESULTS AND DISCUSSIONS

Description of farms and households

The survey sample consists of rural households in the Pelagonia region, with the majority located in Bitola (43 %) and Prilep (32 %) (Fig. 1).

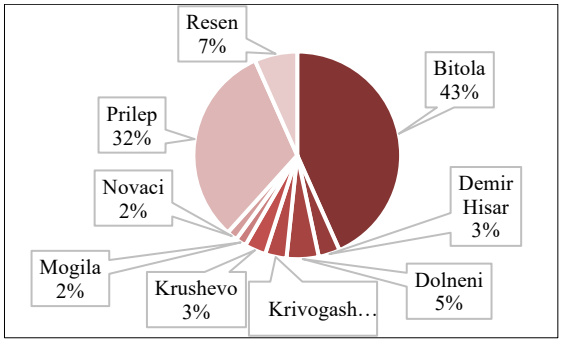

Fig. 2. Spatial distribution of the households in the sample
Source: Survey, 2023.

The remaining households are distributed across seven other municipalities. Household sizes vary, averaging 5.1 members, with the largest in Krushevo, Mogila, and Novaci (6.0) and the smallest in Krivogashtani (4.0).

Migration is limited, as 84 % of households reported no migrating family members. Among those that experienced migration (16 %), most relocated abroad, primarily from Bitola, Resen, Prilep, and Demir Hisar.

Agriculture is the main income source for over 40 % of households, though many also supplement their earnings with salaries, pensions, or income from renting out equipment. Agricultural holdings are mostly family farms (35 %)registered at the Ministry of Agriculture, Forestry and Water Economy, while 18 % operate as companies, 8 % as individual farmers, and 33 % are registered through the Pension and Disability Insurance Fund.

Income distribution among farms is diverse, with the majority earning between 25,000-49,000 EUR (Fig. 2).

Recordkeeping practices vary, with Prilep farms showing the highest consistency, whereas purely rural municipalities lag in this aspect. Advisory services from the National Extension Service (NEA) are widely used (95 %). Agricultural cooperatives are rare (7 %), limiting the benefits of collective market access and resource-sharing.

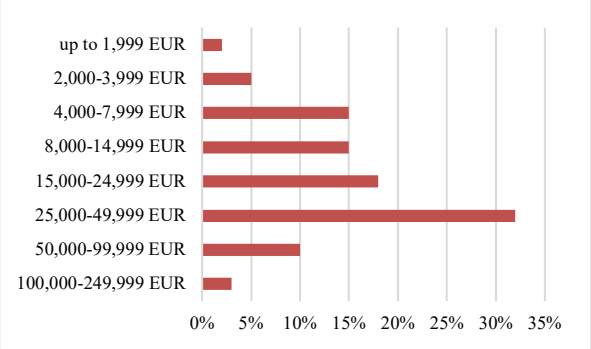

Fig. 3. Economic size of sample farms: Three-year average agricultural income
Source: Survey, 2023.

Farms display varied agricultural orientations. While many engage in mixed farming, specialisation in tillage (cereals) is common. Mixed farms and tillage farms report the highest incomes. However, diversification is low (5 %), with some farms engaging in on-farm processing or value-added activities. Farm ages vary widely, with most falling within the 10 to 30-year range, reflecting a mix of long-established farms and newer operations. The average farm age is 23 years. Regarding generational transfer, 49 % of households have identified a successor to continue farm operations, an uncommon trend in the country. Given the tendency of young people to leave rural areas and avoid farming, succession planning is essential for ensuring the long-term sustainability of farms by facilitating the transfer of knowledge, experience, and ownership across generations.

The aging farmer population is another key challenge. The average farm owner in Pelagonia is 47.6 years old, lower than the national average of 55 years but still relatively high. Attracting younger individuals to farm ownership and management remains crucial for the sector's sustainability. Farm ownership in the Pelagonia region follows the national trend, where men predominantly own and manage farms. While farm management can occasionally be handled by spouses, children, or siblings, decision-making largely remains in the hands of male owners. This gendered stereotype limits women's and youth's access to resources, training, and decision-making power, restricting their contributions to agriculture.

Typically, farms are associated with the location of the rural household. Farm investment intentions are high (83 %), with farmers prioritising machinery replacement, farm modernisation, and expansion. However, the adoption of innovation (2 %), digitalisation (3 %), and green agriculture practices (15 %) remains low, and over 60 % of farmers show no intent to adopt these changes. The lack of forward-thinking hinders the potential benefits that could be derived from embracing new ideas, technologies, and practices in agriculture. This reluctance limits the sector's ability to improve efficiency, sustainability, and competitiveness.

Labour determinants

Family labour is the dominant source of labour in the surveyed agricultural households, with an average of three family members engaged in farm work (Table 4). Educational attainment among farm family labour varies, but most members have completed high school. However, additional agricultural training is

rare, limiting opportunities for innovation and improved farm practices.

Table 8. Labour distribution across farms (in number of people)

	Internal labour	External labour	
Indicator	Family labour	Permanent employees	Seasonal labour
Mean	2.95	1	4.1
St. dev.	1.25	0	2.6
Mode	2	1	3
Range	5	0	14
Minimum	1	1	1
Maximum	6	1	15

Source: Survey, 2023.

Seasonal labour is also widely utilised (54 %), with farms typically employing three seasonal workers annually, though the average reaches 4.1 workers. Additional temporary labour is hired during peak periods, such as planting and harvest seasons. About 53 % of seasonal workers are local, while the remaining come from other regions. Foreign labour is rare, which is not typical for the country. Seasonal workers are typically employed for 30 days per year, and are paid daily, usually in cash. Hiring decisions are influenced by quality, expertise, cost, and availability.

In contrast, the presence of permanent employees is minimal, with only three farms reporting a full-time hired worker. This indicates a strong reliance on family and seasonal labour, with limited long-term employment in the sector. Permanent employees work an average of 9.7 hours per day, and receive a monthly salary, mostly via bank transfer. Permanent workers lack formal agricultural education, even though key hiring factors include quality, expertise, availability, and cost.

Farm capacity for employment refers to the potential or capability of a farm to provide employment opportunities. It represents the ability of a farm to accommodate and sustain a certain number of workers based on its size, resources, production activities, and labour requirements. In the region, farms cannot often employ permanent labour since farms are predominantly small-scale with limited economic power, minimal technological advancements, and a lack of diversification. However, there is a need for seasonal labour, as indicated by approximately half of the households surveyed. The main constraints in hiring seasonal labour include the scarcity of available workers, insufficient quality and expertise among potential workers, and the financial constraints faced by the farms, making it challenging to adequately compensate workers.

Farm labour dynamics

Farm labour dynamics in the Pelagonia Region illustrate how smallholders allocate their labour in response to broader labour market shifts and migration trends, framed through key economic theories (Table 5).

Table 9. Labour allocation by smallholders (in number of people)

Factor	Impact on labour choice
Farm size and profitability	Small-scale farms rely on family labour to reduce costs, while larger ones hire seasonal workers.
Seasonality of work	Farms avoid permanent employees and instead, hire workers only when needed.
Risk and uncertainty	Farmers hesitate to commit to permanent employees due to income variability and weather risks.
Labour availability	Family members provide a stable workforce, while seasonal workers fill temporary gaps.

Source: Own synthesis of findings, 2023.

Smallholder farms primarily operate within a subsistence and semi-commercial model, where household members supply most of the labour due to economic constraints and limited mechanisation. The reliance on seasonal rather than permanent labour reflects *a cost-minimisation strategy*, with hiring driven by necessity rather than long-term employment planning. The low rate of migration further suggests that most households do not replace family labour with remittance income. Instead, they prioritise on-farm work while supplementing their income through off-farm activities such as salaries, pensions, and renting equipment. This *mixed livelihood strategy aligns with the non-separability hypothesisin agricultural household models*, where household and farm labour decisions are

interdependent and shaped by market conditions and resource constraints.

The *limited focus on farm succession planning, combined with an aging farmer population, presents challenges for future labour availability*. Without a younger workforce willing to take over farm operations, reliance on family labour may decline, leading to an increased demand for hired workers. The predominance of family and seasonal labour suggests that *farms in Pelagonia remain in a traditional or pre-transition phase, consistent with theories of economic growth*. The absence of permanent employees further indicates that most farms are not yet fully commercialised and continue to operate on a semi-subsistence basis.

The *widespread use of seasonal workers supports labour transition theories*, which suggest that agriculture does not permanently absorb surplus labour but instead provides temporary employment before workers migrate to other sectors. *This dynamic reflects a slow structural transition*, where agriculture remains a key but temporary source of employment for rural populations.

The *Pelagonia Region exhibits partial evidence of structural transformation theories*, which suggest that as economies develop, labour shifts from agriculture to industry and services, driven by urbanisation and higher wages in non-agricultural sectors. Low levels of diversification indicate that *most farms limit alternative income streams that could support labour retention*. High reliance on seasonal labour reflects a shift towards more *flexible employment patterns, a characteristic of agricultural sectors undergoing transition*. Minimal foreign labour, with only one permanent foreign worker, reported, contrasts with broader migration trends in agriculture, where countries facing rural labour shortages often rely on migrant workers. Instead, farms in Pelagonia depend mostly on local seasonal labour and domestic workers from other regions.

The persistent role of family labour, coupled with limited technological adoption and digitalisation, suggests that *structural change is occurring at a slow pace*. While investment intentions are high, actual modernisation efforts remain limited, constraining productivity growth and reducing incentives for labour reallocation. The combination of these factors highlights the need for targeted policy measures.

Key labour challenges and implications

The labour dynamics in Pelagonia present several key challenges, structured in the following groups:

(i) labour market constraints;
(ii) gender and generational aspects, and
(iii) modernisation and innovation gaps.

Labour market constraints

The study identifies three main barriers to hiring external labour: *a*) labour shortages **-** a common issue in rural economies experiencing outmigration; *b*) lack of skilled workers - agricultural training is rare among both family and hired labourers, *c*) financial constraints - small-scale farms struggle to offer competitive wages.

These constraints reinforce household dependency on family labour and limit the potential for employment expansion.

Gender and generational Aspects

Farm ownership and management remain male-dominated, limiting opportunities for women and youth. Given that generational transfer is uncommon in the country, the relatively high succession rate in Pelagonia (49 %) is promising. However, encouraging young farmers to remain in agriculture remains a challenge, with limited access to training and resources further discouraging participation.

Modernisation and innovation gaps

Despite high investment intentions**,** actual adoption of new technologies remains low. Without modernisation, farms may struggle to transition from labour-intensive to more efficient, mechanised operations, which could reduce dependency on family and seasonal labour, improve working conditions attractive toa younger workforce, and enhance productivity and income stability, mitigating rural outmigration.

CONCLUSIONS

Following the aim of this research, the study investigates farm labour dynamics in Pelagonia

and illustrates how smallholders allocate their labour in response to broader labour market shifts and migration trends. Findings highlight key structural challenges. The region's labour structure reflects a mix of traditional agricultural household patterns and emerging structural pressures. While family labour remains dominant, labour shortages, an aging workforce, and weak succession planning threaten long-term sustainability. Seasonal hiring mitigates labour gaps but remains constrained by financial and structural limitations.

Slow structural transformation, low innovation uptake, and limited diversification restrict the sector's adaptability. Farms prioritise household labour due to income uncertainty, while the financial unsustainability of permanent employees reinforces dependence on informal labour arrangements. Limited youth involvement further signals challenges in modernisation and generational renewal.

Targeted policies are essential to ensuring long-term sustainability. Expanding agricultural training can enhance labour quality, mechanisation and innovation adoption can reduce reliance on manual labour, and strengthened succession planning can secure a stable workforce. Addressing these challenges will help Pelagonia's farms navigate labour market shifts, fostering a more resilient and productive agricultural sector. The study also provides a contextualised framework that can inform similar regions, demonstrating the relevance of established labour theories in agriculture and offering practical insights for policy and development.

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