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# THE DEGREE OF INCOME DIVERSIFICATION AMONG RURAL HOUSEHOLDS IN THE POLOG AND PELAGONIA REGIONS OF NORTHMACEDONIA

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***Abstract***

*Rural development in North Macedonia has traditionally been closely linked to agricultural growth, reflecting the sector's vital role in the country's economy. However, contemporary strategies increasingly recognize the role of non-farm rural activities in improving rural livelihoods. This research examines how rural households in the Polog and Pelagonia regions diversify their income streams. To assess the extent of diversification, the Shannon Equitability Index, which considers the variety and balance of income sources, was employed. Data were collected through field interviews with 140 rural households in 2018, categorizing income into five groups: plant production, livestock production, non-agricultural activities, off-household income and transfers. Monetary poverty status was assessed, distinguishing households above and below the poverty line. Findings reveal low-income diversification levels, with Shannon Index values of 32.9% for Pelagonia and 35.2% for Polog. Notably, poorer households (42.9%) tend to distribute their income sources more evenly as a strategy to mitigate risk, unlike wealthier households (32.3%), which are more dependent on specific income streams. These findings emphasize the critical role of income diversification in promoting rural development and alleviating poverty in North Macedonia.*

***Key words*:** *Shannon Index, equitability, poverty, rural households*

## INTRODUCTION

People in rural areas primarily rely on farming, where the key inputs and factors for profitable agriculture are directly dependent on nature. Agriculture is widely regarded as a high-risk sector due to its vulnerability to natural conditions, including unpredictable rainfall, extreme weather events, soil variability, crop diseases, price fluctuations and the perishable nature of agricultural products. These uncertainties make agricultural livelihoods particularly challenging and unpredictable.Therefore, any disturbance in the supply chain of these inputs may make the production process very costly (Hossain, 2024) [11]. Due to some unavoidable risks and uncertainties, people involved with farming are losing interest in agriculture, and this scenario is acute in disaster-prone areas. Increasing the sources of income, therefore, has become an important component of the risk management strategy among rural households (Sultana, 2015) [25]. Agriculture has been changing in meaning and functioning over the past few decades. The tendency to adopt and implement a multiple strategy (engaging in various rural economic activities besides agriculture) to improve the well-being of rural households has been continuously increasing (Dharmawanand Manig, 2000) [6]. The high poverty rate and uneven rural development, along with intensified urbanization, have increased the focus on the rural non-agricultural economy as a bridging sector,connecting urban industrial development with traditional agricultural livelihoods (Bogdanov, 2015) [4].

Dharmawan and Manig (2000) [6], in their research on the development of rural household strategies for livelihood and well-being, demonstrate that rural household welfare strategies based on farm activity diversification have significant socioeconomic and environmental impacts, not only on people living in rural areas but also on those outside these rural areas.On the other hand, as urban

life becomes unhealthier and more stressful, there is a growing interest among city dwellers in seeking rural services for relaxation, recreation and a healthier lifestyle (Gjosheva Kovachevikj, 2021)[10].

Findings by Ellis and Bahigwa (2001) [9] in their research on rural well-being indicate that rural poverty is strongly linked to a lack of land and livestock, as well as the inability to secure alternative farm-based income sources that are not related to agriculture.

Scientific knowledge about models and types of diversification remains insufficiently conceptually defined. As a developmental concept, the rural non-farm economy is commonly described as:

*"The rural non-farm economy refers to a set of economic activities in rural areas, excluding those related to primary agricultural production"* (Lanjouwand Lanjouw, 1997) [16]; and *"The rural non-farm economy also includes activities linked to agriculture, such as processing agricultural products, other types of small businesses, income from social transfers, interest, dividends, rent, and remittances from urban areas"* (Davisand Pearce, 2001) [5]. Start and Johnson (2001) [20], recognizes two distinct concepts for defining the term and meaning of rural economic diversification: the multifunctionality concept and the non-agricultural linkage concept.

The multifunctionality concept includes activities carried out both on and off rural family farms, such as agricultural production, tourist accommodation, machinery rental, processing of primary products, renewable energy production, and others (*ibid*).

In contrast, the non-agricultural linkage concept refers to diversification activities that are not directly related to primary agricultural production but are still directly or indirectly connected to available resources of the rural family farms. These include hospitality services, rural tourism, sports, cultural and recreational activities, handicrafts, food processing, aquaculture, wild plant foraging, and more (*ibid*).This study adopts the non-agricultural linkage concept.

The European Union has been supporting the improvement of living standards and the establishment of economic stability for rural households through the development of rural non-farm economies (RNFE) for several decades.Expanding non-farm rural employment (NFRE) and diversifying income sources are key policy objectives as they enhance livelihood security and living standards (Pearce and Bank, 2001) [17]. Economic theory suggests that risk-neutral farmers allocate labor between farm and non-farm jobs to equalize expected marginal returns. In contrast, risk-averse farmers prioritize less risky jobs, even at lower wages (risk premium). Non-farm labor helps farmers either to reduce income variability (risk mitigation) or to increase overall labor returns (*ibid*)

Considering the context in which the RNFE concept develops, the diversification of economic activities in rural areas addresses numerous issues, such as:

-Absorbing the surplus rural labor force and reducing hidden unemployment.

-Reducing the risk for agricultural households by engaging them in activities that complement or replace agricultural income.

-Ensuring the survival of households when agricultural production is destroyed or threatened by adverse weather conditions and other risks.

-Contributing to the increase and efficient use of the comparative advantages of rural areas (natural and physical resources, low labor costs, etc.).

-Contributing to faster economic growth in rural areas (Sultana, 2015) [25].

The diverse range of non-farm activities aimed at meeting the needs of rural populations, encompass the production of specialty foods with traditional flavors, the collection of medicinal, aromatic and ornamental plants, rural tourism, the valorization of natural resources and the traditional character of rural communities, as well as craftsmanship focused on handmade products and artisanal services, etc. (Schwarze and Zeller, 2005) [18].

The level and type of income diversification in rural households depend on the availability and accessibility of various income sources and how different household types respond to them. This, in turn, may be influenced by

geographic location, access to labor markets and factories, human and social capital and periodic policy changes. Empirical studies indicate that education and access to infrastructure are strong determinants of diversification (Barrett et al., 2001; Block and Webb, 2001) [2, 3].

**Agriculture and rural income diversification in North Macedonia**

Approximately 40% of the population resides in rural areas.Agriculture is one of the major economic sectors of North Macedonia, like in other Balkan countries like Greece, Romania, Albania and Bulgaria, where vegetables, fruit, cereals and vine are among the most important crops (Dimova, 2022) [7].

However, in North Macedonia, agricultureshows a significant decreasein its share in the total Gross Value Added (GVA) (from 11.7% in 2014 to 8.1% in 2023) (Kotevska, et al., 2024) [15].

The structural weaknesses of Macedonian agriculture stem from the predominance of small and semi-subsistence family farms characterized by low economic activity. Investment levels are insufficient, unemployment rates remain high and the workforce generally has a lower level of education.Family farms use in average 1.80 ha of agricultural land, have 2.14 livestockunits, and among them farmers are predominantly over 55 years old (39%), with a low educationalbackground (45% have none or only primary education) (Kotevska et al., 2024) [15]. Agricultural producers have weak marketpower that leads to additional pressure on farm income.These challenges have led to intensified abandonment of thesector and depopulation of rural areas, especially by younger people. All these factors limit the adaptive capacityof the agri-food sector and additionally contribute to the deterioration of the situation during crises,visible decrease in the use of arable agricultural land, declined number of livestock and reduced production (Kotevska et al., 2024) [15].

In this context, the development of agriculture requires substantial financial support for farmers, especially for the small family farms (Janeska Stamenkovska and Simonovska, 2021) [13], initiatives and innovations for implementing the Agriculture Knowledge and Innovation System (AKIS) as proposed Simonovska et al (2022) [19].

Another aspect is related to the economic challenges, which in the rural areas are reflected in the high poverty rates and income inequality, which are crucial for understanding the broader socioeconomic context. According to official data from the State Statistical Office (SSO, 2025) [24], the poverty rate in the country in 2021 stood at 23%, with pre-social transfer poverty reaching 43.9%. Income inequality, as measured by the Gini coefficient, was 30.3% in 2021.Similar to global trends, poverty rates in rural areas of the country remain higher than in urban areas.

The main sources of income for rural households remain agriculture and related processing activities (Gjosheva Kovachevikj, 2021) [10]. However, the non-agricultural sector has the potential to play a critical role in reducing poverty, stimulating economic growth, and addressing rural-urban migration. Rural households earn, on average, 10% less than their urban counterparts, with lower employment-based income but higher earnings from self-employment (*ibid*). Entrepreneurial skills and investments in non-agricultural activities could improve rural incomes and reduce dependence on primary agriculture (Gjosheva Kovachevikj, 2021) [10].The non-farm activities are also noticeable in Macedonia, where rural tourism is developing through the utilization of local capacities for accommodation, hospitality, hiking trails and sightseeing, but with very modest progress. According to the latest statistical data, in 2013 there were 25,176 agricultural farms, accounting for 15% of all individual farms (178,125), that were involved in activities beyond primary agricultural production. By 2016, this figure had risen by 3,535 farms to a total of 28,711, marking a 14% increase; however, more recent data is not available (Gjosheva Kovachevikj, 2021) [10].

Official statistical data (2015, 2017) [21, 22] show that, non-agricultural activities in Macedonian rural areas are generally focused on processing primary livestock products (10,467 agricultural farmsin 2013 and 11,771 agricultural farmsin 2016), collecting forest

plants (6,543 agricultural farms in 2013 and 8,354 in 2016 and processing plant production (5,735 agricultural farmsin 2013 and 7,829 agricultural farmsin 2016). A very small proportion of farms are engaged in tourism and accommodationrelated activities (106 farms or 0.4% in 2013; 472 farms or 1.3% in 2016), while home crafts accounted for only 0.3% in 2013 (98 farms) and 0.5% in 2016 (189 farms) (Table 1).

Table 1. Number of individual agricultural farms by additional activity type, 2013 and 2016

| Year | 2013 | 2016 | 2016/2013 (%) | Share in 2013 (%) | Share in 2016 (%) |
|---|---|---|---|---|---|
| Handicrafts | 98 | 189 | 93 | 0.3 | 0.5 |
| Tourism and accommodation | 106 | 472 | 345 | 0.4 | 1.3 |
| Aquaculture | 128 | 272 | 113 | 0.4 | 0.8 |
| Wood processing | 176 | 2,309 | 1.21 | 0.6 | 6.6 |
| Forestry activities | 1,484 | 1,403 | -5 | 5.1 | 4.0 |
| Other gainful activities | 2,388 | 496 | -79 | 8.2 | 1.4 |
| Processing of plant production | 5,735 | 7,829 | 37 | 19.7 | 22.3 |
| Picking forest plants | 6,543 | 8,354 | 28 | 22.5 | 23.8 |
| Processing of animal production | 10,467 | 11,771 | 12 | 35.9 | 33.5 |
| Total | 29,138 | 35,111 | 20 | 100 | 100 |

Source: SSO, 2015; 2017 [21, 22].

Regarding the share of rural non-agricultural income in total rural income in the country, the statistical data (SSO, 2017) [22] show that income-generating activities from non-agricultural production accounted for up to 10% of total income in 71% of rural households. Non-agricultural income with a share of 10% to 50% in total income was present in 25% of agricultural households. The lowest share, only 4%, was recorded for non-agricultural income contributing 50% or more to total farm income (Table 2).

Table 2. Income shares of non-farm activities in total rural income, by targeted regions, 2016

| Regions | Total | Up to 10% | Share (%) | From 10% to 50% | Share (%) | Over 50% | Share (%) |
|---|---|---|---|---|---|---|---|
| North Macedonia | 28.711 | 20.347 | 71 | 7.283 | 25 | 1.081 | 4 |
| Pelagonia | 3.001 | 2.103 | 70 | 704 | 23 | 194 | 6 |
| Polog | 3.059 | 1.963 | 64 | 1.008 | 33 | 88 | 3 |

Source: SSO, 2017 [22].

The data reveal that non-agricultural activities contribute only minimally to total household income, even among families involved in such work. Notably, Pelagonia has a larger proportion of households where non-farm earnings make up a significant portion of income compared to Polog. To better understand the dynamics of rural household economies, this study will specifically address the following research questions:

(1)What is the income composition of rural households?

(2)How does the degree of income diversification differ between poor and wealthier households?

## MATERIALS AND METHODS

### Data collection

The data for this study was collected through structured interviews conducted in the Polog and Pelagonia regions in 2018, involving a total of 140 farm households, 70 from each region.

Representative micro-units were carefully selected to account for the inherent heterogeneity among households. The selected regions differ significantly in their main characteristics, including demographic structure, economic development, ethnic composition, natural resources, and cultural and historical heritage. Data collection was carried out using pre-tested questionnaires through direct field visits and face-to-face interviews with respondents.

**Measurement of rural poverty**

The study examines rural monetary poverty to assess the impact of household diversification strategies on poverty reduction, in the targeted regions, Pelagonia and Polog. To measure the poverty of thehouseholds in the sample, the most widespread method based on income was used,by comparing the income of the household with the poverty threshold, which isequivalent to 60 percent of the median national equivalent income of the personsliving in the household (SSO, 2018) [23]. To enable comparisons between households of different sizes and demographic compositions, an equivalence scale was used as a deflator to adjust for these variations. The equivalence scale utilized in this analysis aligns with the one adopted by the State Statistical Office,based on the OECD equivalent scale with weights of 1.0 for the first adult, 0.5 for any other household member aged 14 or over and 0.3 for each child below age 14 (SSO, 2018) [23]. The poverty threshold is calculated as follows:

$$gEI = \frac{THI}{HES} \quad (1)$$

where:

EI - Equivalent income

THI - Total household income

HES - Household equivalence size calculated on the basis of the equivalence scale

$$PT = 0.6 * MNEI * HES \quad (2)$$

where:

PT – Poverty threshold

MNEI – Medial national equivalent income

**Classification of income sources**

This study develops a classification for rural household income to meet research objectives. Existing literature features numerous classification systems for rural income. While terms like 'off-farm income' and 'non-farm income' are often used interchangeably, they represent distinct concepts. Ellis (2000) [8] specifically defines off-farm income as income derived from wages from other farms, while Barrett et. al. (2001) [2] define these incomes as household income from activities outside the property. As previously emphasized, this study adopts the concept of non-agricultural linkage economies – non-farm income, which implies that in the Rural Non-Farm Economy (RNFE), there are activities not directly related to primary agriculture, but are still linked to the resources available to rural households as economic units in rural areas (Start and Johnson, 2001) [20]. In this analysis there are considered five groups of income sources: 1. income from plant production, 2. income from livestock production, 3. income from non-agricultural activities, 4. income earned outside the household and 5. income from transfers.To get a realistic picture of income from agriculture and rural activities, the net incomes from these two sources were considered, calculated as the difference between gross incomes and fixed and variable costs.

**Measurement of income diversification**

There are several methods to measure the diversification of rural incomes, including the Shannon Index (Wan et al., 2016) [26],Simpson Index (Koiry et al., 2024) [14] and Herfindahl-Hirschman Index (HHI) (Banerjee and Mistri, 2019) [1].

In this study, the Shannon Index is used as it effectively captures both richness and evenness. Unlike the Simpson Index and HHI, the Shannon Index is sensitive to variations in smaller income sources and applies logarithmic weighting, preventing dominance bias. The Shannon Equitability Index (E), adapted from ecological applications where it measures the structure of species stability (Wan et al., 2016) [26], is employed to analyze income distribution equity among households. This index accounts for both the number of income sources and evenness (proportional distribution) of income sources, providing a robust measure of household-level diversification.Following Schwarze and Zeller (2005) [18], the index is calculated as:

$$E = \left[\frac{H_{income}}{-\sum_{i=1}^{S}\left[\left(\frac{I}{S}*\ln\left(\frac{1}{S}\right)\right)\right]}\right] * 100 \text{.....(3)}$$

$$H_{income} = -\sum_{i=1}^{S}[(incshare_i) * ln(incshare_i)] \text{.....(4)}$$

E – Shannon index for equality
S – Number of income sources
$incshare_i$– The share of income from activity i in the total household income
Ln – Natural logarithm
$H_{income}$– Shannon index for income diversity within a household,quantifying two dimensions: the number of income sources, and the equitability of their distribution.
The Shannon Equitability Index (E) ranges from 0 to 100, quantifying the percentage of achieved income diversification relative to its theoretical maximum. Higher index values indicate greater income diversification at the household level, reflecting a more balanced distribution across multiple revenue sources.

## RESULTS AND DISCUSSIONS

According to the obtained data for the structure of the income sources, it is observed that the highest share of income in the entire sample comes from primary agricultural production, accounting for 37% (4,228 EUR), followed by income from transfers (35%, 4,080 EUR), which include pensions, social transfers, assistance from other individuals and government financial support or subsidies (Figure 1).
This indicates a high dependency of households on this type of income, which is also known as unearned income.
Net income from non-agricultural activities realized by the household ranks third in importance, with a share of 17% (1,910 EUR). This type of income is not primary, but can represent a solid additional source of funds for the household.

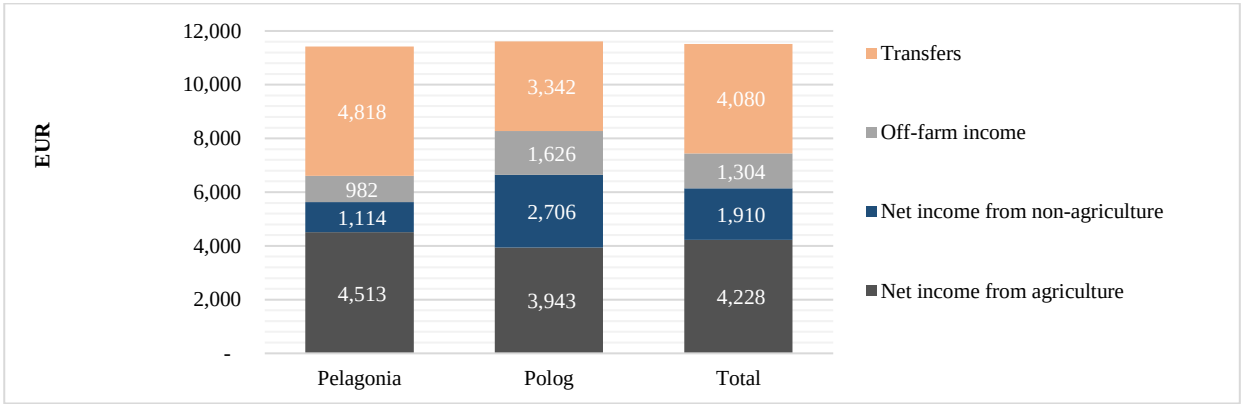


Fig. 1. Structure of average annual income of rural households by regions
Source: own calculations.

Income from wages and seasonal labor outside the household are the lowest, with a share of 11% (1,304 EUR). According to Jakimovski (Jakimovski, 1984) [12], the category of households where a significant part of the income originates outside the farm is less tied to agricultural production, that is, to the productive way of agricultural production, intensification, specialization and expanded reproduction. These households are more oriented towards agricultural production for self-consumption. They offer their products very little on the market and use their monetary resources to purchase industrial goods to raise personal standards and save within the household. Analyzing by regions, the income from transfers in households in the Pelagonia region has the highest values, with a share slightly less than half of the total income, accounting for 42% (4,818 EUR). Agricultural income follows closely at 39% (4,513 EUR), demonstrating near parity with transfer income sources. On third place are incomes from non-agricultural activities within households,

which are approximately the same as incomes from wages and from seasonal hired labor, with a share of 9% (982 EUR) and 10% (1,114 EUR) respectively (Figure 1). In the Polog region, the structure of income in rural households shows smaller differences compared to the Pelagonia region, with the highest share being from agriculture at 34% (3,943 EUR), followed by income from transfers at 29% (3,342 EUR), net income from non-agricultural activities at 23% (2,706 EUR) and lastly, wages and seasonal labor accounted for the smallest share at 14% (1,626 EUR).

To examine the income structure at a household level, the distribution of income sources across the entire sample was analysed. The results of the poverty level calculations for households below the poverty line reveal that the overall poverty rate within the entire sample is 17%, which includes 24 rural households. Of these, 14 households are from the Pelagonia region, representing a 20% poverty rate, while 10 households come from the Polog region, accounting for 14% of the households in that region (Table 3). These findings indicate notable regional differences in poverty levels, with the Pelagonia region exhibiting a higher poverty rate compared to Polog.

Table 3. Income level and poverty rate among poor rural households

| Regions | Pelagonia | Polog | Total |
|---|---|---|---|
| Number of households | 14 | 10 | 24 |
| Poverty rate | 20% | 14% | 17% |
| Mean (EUR) | 4,960.38 | 7,118.72 | 6,039.55 |
| Maximum (EUR) | 24,892.36 | 27,792.49 | 27,792.49 |
| Minimum (EUR) | -2,182.11 | -1,850.00 | -2,182.11 |
| Standard Deviation (EUR) | 3,997.74 | 5,791.29 | 5,091.67 |
| Coefficient of Variation | 81% | 81% | 84% |
| t test = -2.548, p<0.05 (0.012) | | | |

Source: own calculations.

A significant income disparity exists between poor households in Pelagonia (mean = 4,960.38 EUR) and Polog (mean = 7,118.72 EUR), with Pelagonia households earning 30.3% less annually(t = -2.548, p = 0.012). Both regions show a large variation in income levels, with the standard deviation of 3,997.74 EUR for Pelagonia and 5,791.29 EUR for Polog indicating considerable income disparities among these households.

Table 4 presents the income diversification results for rural households, as measured by the Shannon Equitability Index. The Shannon Index of Equality is slightly higher in Polog (35.2%) than in Pelagonia (32.9%), indicating a marginally more diversified income structure. However, compared to other studies, these values remain relatively low, reflecting limited income diversification in both regions.

Table 4. Shannon index of equality by regions

| Indicator | Total | Pelagonia | Polog |
|---|---|---|---|
| Number of households | 140 | 70 | 70 |
| Shannon Index of Equality | 30.7% | 32.9% | 35.2% |
| Shannon Index below the poverty threshold | 42.9% | 41.9% | 43.2% |
| Shannon Index above the poverty thresholds | 32.3% | 30.2% | 33.7% |

Source: own calculations.

Notably, the Shannon Index below the poverty threshold is higher (42.9%) than above (32.3%) in both regions. Households below the poverty line show a more balanced income distribution across the five rural income sources (41.9% in Pelagonia, 43.2% in Polog), whereas wealthier households rely more on specific income sources (30.2% and 33.7%, respectively).

This finding implies that poorer households tend to rely more equally on multiple income sources, whereas wealthier households are more dependent on specific dominant sources of income.

## CONCLUSIONS

The analysis of income diversification among rural households in Pelagonia and Polog highlights significant differences in income distribution patterns, particularly concerning poverty status. These observed disparities likely stem from fundamental differences between the two study regions, including variations in: natural conditions, economic structures, demographics and traditional practices. The results indicate that households below the poverty threshold have a more evenly distributed income structure across

various sources, as reflected in the higher Shannon Index values (42.91% in total, 41.98% in Pelagonia, and 43.20% in Polog). In contrast, households above the poverty threshold exhibit lower Shannon Index values (32.28% in total, 30.2% in Pelagonia, and 33.7% in Polog), suggesting that higher-income households tend to have a more specialized income structure with dominant income sources.

These findings reinforce the importance of well-structured diversification strategies in reducing rural poverty. While diversification can serve as a mechanism to stabilize income, excessive fragmentation across multiple sources may limit the potential for specialization and long-term economic growth. This suggests that overly diversified income structures can have negative effects, as households may struggle to achieve efficiency and scale in any single activity, ultimately hindering their economic advancement. Policies should therefore focus on promoting balanced diversification, where one dominant income source, such as agriculture, is supported by complementary activities, rather than an entirely equal distribution of income across all sources.

To enhance rural household resilience and economic sustainability, policy measures should encourage access to non-farm activities by improving rural infrastructure, facilitating access to markets, providing financial support, and investing in education and skill development tailored to the needs of the rural economy. By fostering a strategic mix of income sources, rural households can achieve greater financial stability while maintaining opportunities for growth and specialization in key sectors.

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