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Navigating Crop Choice Dilemmas between Coffee and Avocado Farming among Smallholder Farmers in Murang'a County, Kenya

Abstract. This study explores the evolving crop preferences of smallholder farmers in Murang'a County in Kenya, who transitioned from coffee farming to avocado cultivation largely due to prolonged poor prices of coffee. Avocado farming, though initially was very promising, has encountered significant challenges including exploitation of farmers by brokers, price volatility and little support by cooperatives. With the recent surge in global coffee prices, smallholder farmers face uncertainty about whether to continue with avocados or to revert to coffee. The general objective of this study was to explore farmers' perceptions on which direction they should take in the choice between coffee and avocados cultivation. Based on data collected from 116 smallholder farmers in Murang'a County, the researcher examined factors that influenced choice between the two crops. The paper was guided by the Sustainable Livelihoods Framework (SLF) and the Rational Choice Theory (RTC). The study found that crop profitability had a strong influence on farmers' crop choice decisions. Profitability drove the initial shift from coffee to avocados and shaped the current reconsideration of coffee farming following the recent global price increases. Market price volatility increased uncertainty instead of guiding clear crop choices, leading farmers to favour diversification over full commitment to either coffee or avocados. Institutional support and access to farming inputs affected farmers' willingness to return to coffee. Weak cooperatives and limited extension services discouraged a complete return to coffee despite the recent improved prices. The study concluded that farmers' crop choice decisions in Murang'a County were shaped by a complex interaction of economic incentives and institutional conditions than by price alone. The study recommends strengthening cooperative support, supporting and encouraging crop diversification, improving access to farming inputs and providing market guidance to help smallholder farmers make informed and sustainable crop choices.

Keywords: avocado cultivation, coffee farming, crop choice, diversification, price volatility, smallholder farmers

JEL Classification: Q12, Q13, O13

Introduction

For decades, coffee has occupied a central role in Kenya's agricultural economy, emerging as one of the country's most valuable export commodities in the country. Murang'a County government recognises agriculture as the backbone of the County's economy and for this reason it targets to modernise production and market accessibility of its farm produce (Murang'a County Government, 2025). Coffee farming, introduced during the colonial period, became a cornerstone of smallholder livelihoods, especially in central highland regions like Murang'a, in the 1970s and 1980s (Chelangat 2019, Karanja 2002). Kenyan coffee which is renowned for its high quality, has always enjoyed strong international demand and premium prices. In the coffee growing regions, cooperative societies were formed to support smallholder production. The rural economies in the coffee growing zones for a long time revolved around the tempos of the coffee harvest. The crop not only served

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as a critical source of income for many rural households but also greatly contributed to community investments in education, health, and infrastructure, particularly the rural feeder roads. However, insufficient support to coffee farmers in Kenya has led to a sharp decline in coffee production. Export volumes and revenue have been reported to be on a downward trajectory in recent decades due to policy mismatch and insufficient government support to farmers. In particular, depressing performance of coffee production is due to poor coffee prices, poor marketing channels, coffee financing, coffee regulations, cost of production, and poor management of cooperatives (Wanzala et al, 2022).

Murang'a County, situated in Kenya's central region, has historically stood out as a leading coffee-producing area. Its high-altitude terrain, rich volcanic soils, and favourable rainfall patterns made it ideal for growing Arabica coffee. Over generations, families in Murang'a invested heavily in coffee, viewing it as a long-term economic venture and cultural heritage. Coffee societies were once powerful institutions, controlling marketing, milling, and export logistics, while also providing a social safety net for members. However, this dominance has been significantly eroded over the past three decades.

The global coffee sector has undergone significant structural changes, and Kenyan farmers have felt the shockwaves. From the 1990s onwards, international coffee prices became increasingly volatile, and Kenyan smallholders faced falling returns for their produce (Wanzala and Obokoh, 2025). Deregulation of the sector, mismanagement within cooperative societies, delayed payments, and lack of transparency led to widespread disillusionment among the farmers. For many farmers in Central Kenya, coffee ceased to be economically viable. As frustration mounted, farmers began to uproot their coffee bushes in favour of more promising alternatives such as avocados and macadamia. The avocado is currently presented as a 'globalised fruit' that promises substantial profits, rents or incomes, promoted by a variety of private and public actors, and also as a 'superfood' due to its nutritional qualities (Racaud, 2025).

Against this backdrop of decline and uncertainty about coffee, avocados emerged as an increasingly attractive alternative for smallholder farmers in Kenya. In recent years, avocado farming, particularly the Hass variety, has become one of the most attractive alternatives to coffee (Kariuki, 2025). Encouraged by rising global demand, higher profits support from the private actors, and nutritional trends, smallholder farmers in central Kenya have rapidly shifted towards avocado cultivation (Graduate Farmer, 2025). Export companies, agronomists, and local leaders have promoted avocados as the "green gold" of the future, promising better incomes, fewer bureaucratic hurdles, and access to dynamic markets in Europe, the Middle East and in China. Unlike coffee which is produced solely for export, avocados are also consumed locally and they have many benefits. It is believed that there are many health benefits of avocados. For instance, phenolics found in avocado peels and seeds have antioxidant, anti-inflammatory and antimicrobial properties with many health benefits. The by-products of avocados contain high-value functional properties that are beneficial to human health, pharmaceutical and food industry, but they remain underutilised (Nyakang'i et al, 2023). Avocado seeds and peels are currently being used traditionally in the production of soaps, pharmaceuticals, and food products, including beverage products. Smallholder avocado farmers in the East African region have benefitted from marketing outlets that promise export standards, improved seedlings, and cooperative linkages (Kariuki, 2025; Kingu and Kinyondo, 2024). The comparative ease of management and lower labour requirements have further made avocados appealing, especially for the ageing farmers.

For many years prior to the recent increase in global coffee prices, farmers had experienced prolonged periods of poor and unstable coffee prices. Yet, since 2024 just as many farmers were ready to replace coffee farming with seemingly ‘better alternatives’ such as avocado cultivation, recent developments have brought new complexity to the picture. Global coffee prices have shown signs of recovery (Bermudez, et al 2022; Massrie, 2025). The Kenyan government has launched renewed efforts to revitalise the coffee sector through reforms, smallholder farmers’ education and direct market access for the bigger farmers. Prices paid to farmers have risen in many regions, with some factories reporting substantially higher per-kilo payments, making coffee again seem viable. But many farmers remain uncertain whether this rebound is sustainable, given previous cycles of boom and bust. The coffee producing regions of central Kenya such as Kiambu, Nyeri, Kirinyaga and Murang’a County have found themselves at crossroads. Farmers face a difficult decision: to double down on the avocado boom or to reinvest in coffee, hoping the rebound is sustainable. The result is a palpable sense of uncertainty and hesitation among farmers, many of whom now straddle both crops while awaiting clearer signals from the market and policy environment. The recent increase in global coffee prices has made farmers to reconsider coffee farming. This has created new crop choice dilemmas among the smallholder farmers in Kenya.

This paper seeks to explore the critical dilemma facing smallholder farmers in Murang’a: which direction should the smallholder farmers in Murang’a take, continue with avocados, return to coffee, or pursue a mixed approach? While avocados often yield higher short-term returns per unit land and involve lower minimum technical requirements (for certain varieties), coffee still holds attraction for farmers willing to invest in quality, who have access to reliable cooperatives, and who target specialty or export niches. Smallholder coffee farmers, however, face numerous social barriers, from education to access to knowledge networks to support implementation (Jones et al, 2025). This paper unpacks the competing incentives, risks, and trade-offs that farmers consider as they navigate this crop choice decision. It also examines how broader global and local trends are influencing the shifting dynamics between traditional and emerging cash crops in Kenya.

Globally, both coffee and avocados are shaped by complex supply chains and market forces. Coffee continues to be a staple of international commodity trade, but it remains susceptible to price shocks, climate variability, and geopolitical tensions (Wanzala and Obokoh, 2025). Meanwhile, the avocado market has seen exponential growth, driven by rising health consciousness and lifestyle shifts in consumer markets. However, avocado exports face challenges related to quality standards, oversupply risks, water use concerns, and occasional export bans. Locally, while some farmers have realised quick gains from avocado sales, others have encountered losses due to poor post-harvest handling, fluctuating buyer demand, and limited farmers’ bargaining power, quality concerns, and limited access to high-value export markets (Kariuki, 2025).

Several recent studies have sought to assess the economic viability of avocados under Kenyan conditions (Amare et al 2019; Kwizerimana et al, 2023; Kingu and Kinyondo, 2024). Analyses comparing input costs, yield potential, labour demands, and market accessibility suggest that avocados may offer higher short-term profitability than coffee, especially in well-managed systems, but coffee farming still remains more profitable than avocado farming (Graduate Farmer, 2025). However, coffee retains its potential as a high-value crop, particularly if value chain reforms and specialty market access are sustained. This makes the choice less straightforward than it might initially appear. Considering these complexities, this

paper argues that the decision between coffee and avocados is not merely a technical or economic one. It is deeply embedded in historical experiences, institutional legacies, shifting market dynamics, and personal risk assessments. By focusing on Murang'a as a case study, the paper aims to contribute to a broader understanding of how smallholder farmers in Kenya are navigating a rapidly changing agricultural landscape.

Statement of Purpose

The aim of this study was to examine the factors influencing smallholder farmers' decision to either return to coffee farming, remain in avocado production, or adopt a diversification strategy, in the context of the recent rise in coffee prices and challenges in avocado farming.

Objectives of the Study

The general objective of this study was to analyse the determinants of crop choice among smallholder farmers transitioning between coffee and avocado farming in Murang'a County, Kenya. The specific objectives were to:

1. Assess the influence of previous crop profitability on farmers' crop choice decisions regarding coffee and avocado farming.
2. Examine the role of market price trends in shaping farmers' crop choice decisions.
3. Determine how access to farming inputs affect farmers' crop choice decisions.
4. Evaluate how institutional support and trust affect farmers' crop choice decisions.

Theoretical Framework

This study adopted a dual theory approach integrating the Rational Choice Theory (RCT) and the Sustainable Livelihoods Framework (SLF). These two theories offer complementary perspectives on the choice between coffee and avocado farming among the smallholder farmers.

Rational Choice Theory (RCT)

The RCT has its roots in the work of classical thinkers such as Adam Smith (2005) and Jeremy Bentham (1789), and later Max Weber (1978) through his emphasis on purposive, means-ends social action. The theory posits that individuals are rational actors who make decisions based on available information by comparing the costs and the benefits of different options. In contemporary agricultural studies, the theory has been applied by scholars such as Gary Becker (1976), Jon Elster (1986) and James Coleman (1990) to explain economic behaviour, institutional decision-making and farmer responses to market incentives.

The RCT explains the initial shift from coffee to avocado farming in Murang'a as a rational response to sustained low coffee prices, unreliable payments and declining trust in the coffee cooperatives. Avocado farming, on the other hand, offered higher perceived returns making it the more utility-maximising option. The recent increases in coffee prices have altered these calculations, prompting farmers to reassess their choices. However, lingering risks, price volatility and institutional failures constrain a full return to coffee farming. This has made farmers to adopt cautious strategies such as partial reversion to coffee or crop diversification rather than wholesale change. Thus, according to this theory, smallholder farmers in Murang'a evaluated factors such as the expected returns from coffee

and avocados, market stability, input costs, and time to maturity (gestation period) before making planting decisions.

Sustainable Livelihoods Framework (SLF)

The SLF has its roots in the work of Amartya Sen (1981) and was later systematised by Robert Chambers and Gordon Conway (1991) and operationalised by the UK Department for International Development (DFID, 1999). It has been applied in studies such as that by Gudyani et al (2025). The SLF posits that households pursue livelihood strategies based on their access to five forms of capital, namely, human, natural, financial, physical, and social. These forms of capital are shaped by vulnerability (shocks, trends, and seasonality), institutions, and policies. Livelihoods decisions are therefore not driven by income alone, but by the need to sustain and protect assets, reduce risk, and enhance long-term resilience.

The initial shift from coffee to avocado farming in Murang'a County can be understood as a livelihood adaptation to declining financial returns from coffee and increased vulnerability of the farmers. Farmers reallocated land (natural capital) and labour (human capital) towards avocado farming, which promised quicker income flows and improved financial capital. The recent increase in coffee prices has altered the vulnerability and incentive context prompting farmers to reassess coffee as part of their livelihood portfolio. However, past institutional failures, market uncertainty and input constraints have made the smallholder farmers to diversify than to fully return to coffee farming. This reflects the SLF's emphasis on resilience and sustainability than short-term profit maximisation.

In this study, while the RCT explains the immediate economic calculations guiding farmers' crop choices, the SLF situates these choices within broader livelihood assets, risks, and institutional contexts. The RCT and SLF together show that farmers' decisions are not driven by price incentives alone but are shaped by the need to balance short-term economic gains with long-term livelihood security and resilience.

Conceptual Framework

The conceptual framework shows the interaction between market prices input availability, farmer perception, institutional support and the final decision of the farmers to choose either avocado cultivation or coffee farming. Independent variables are the previous crop profitability, the market price trends, access to farm inputs and institutional support which include agricultural extension services and cooperative performance, the intervening variables perception of the risk of growing either coffee or avocados, the house resource availability which include the land size and availability of family labour, and the support accorded by the government to the coffee and avocado farmers. The dependent variable is the farmer's current crop preference to either grow coffee or avocados or diversify into both crops.

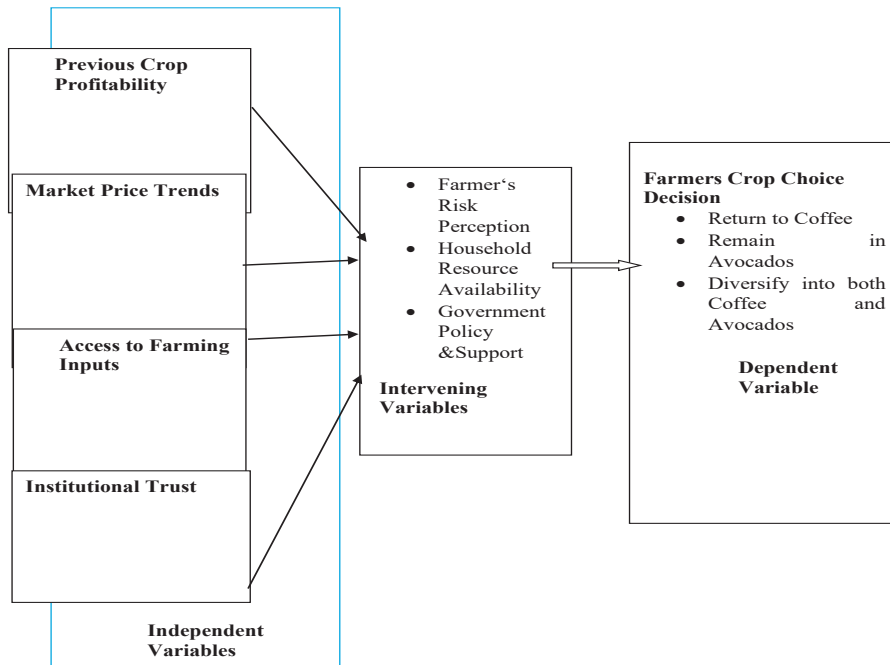


Fig. 1. Conceptual Framework Showing Factors Influencing Farmers' Crop Choice Decisions

Source: Author's own work.

Study Area and Methodology

Study area

This study was conducted in Murang'a County, located in the central region of Kenya, approximately 85 kilometers north of Nairobi. The County lies within the fertile highlands between the Aberdare Ranges and Mount Kenya, making it one of the country's most productive agricultural zones. Murang'a spans an area of about 2,558 square kilometres and is characterised by a mix of high-altitude terrain, well-drained volcanic soils, and a bimodal rainfall pattern that supports the cultivation of perennial crops. The average annual rainfall ranges from 1,000 to 1,500 mm, with temperatures averaging between 14°C and 28°C, conditions ideal for both coffee and avocado farming. According to the 2019 Kenya Population and Housing Census, the County had a population of 1,056,640 (KNBS, 2020). With a population growth rate of 1.2%, the County's population is projected to reach approximately 1,135,521 in 2025 (County Government of Murang'a, 2023). The population is projected to reach 1,149,196 in 2026; 1,163,103 in 2027 and 1,177,144 persons in 2028 (Murang'a County Government, 2025). By the end of 2025, the population density of the

County was estimated to be 444 persons per square km and is projected to grow to 460 persons per square km by the year 2026.

Administratively, the County is divided into several sub-counties, including Kangema, Kigumo, Mathioya, Kandara, and Gatanga. These regions have historically been strongholds of smallholder coffee production. The County has recently emerged as a leading producer of avocados. Many farmers continue to engage in farming of both coffee and avocados though given the small land sizes, they have to decide about which crop to devote a larger section of their land to depending on the economic returns. This study was carried out in Kigumo and Kangema sub-counties. These two were purposively selected because they represent Murang'a County's transitional farming zones where coffee and avocado farming co-exist. This allowed an in-depth examination of farmers who have shifted, retained or diversified between the two crops in response to the changing market conditions.

Methodology

The study used a mixed-methods research design utilising both quantitative and qualitative techniques. By integrating quantitative and qualitative methodologies, the researcher was able to understand the complexity of choices farmers had to make between coffee and avocado farming.

Target Population and Sampling

The target population for this study comprised smallholder farmers in Murang'a County who had transitioned from coffee to avocado farming either fully or partially. Hence, they provided insights into the drivers and constraints associated with the choice between the two crops. A sample of 116 smallholder farmers was selected using purposive sampling technique.

Data Collection Methods

Primary data for this study were collected in the months of November and December 2025. First, the study used a survey method whereby a questionnaire was administered to the 116 sampled smallholder farmers. Second, Key Informant Interviews (KIIs) were conducted with 11 participants who included two agricultural extension officers in the County government of Murang'a, two area chiefs, two leaders of cooperatives, two buyers of avocados and three village elders. In addition, to complement the primary data, secondary data were obtained through a review of County reports, policy documents, County Development Plans (CDPs) and published articles. The combination of these methods allowed for triangulation of the research findings and a deeper understanding of the factors that influenced choice between coffee and avocado farming in the County.

Measurement of Variables

The dependent variable was the farmers' crop choice decision. It was measured as a binary outcome. It was coded as 1 if the farmer intended to revert to coffee. It was coded as 0 if the farmer intended to continue with avocado farming. The previous crop profitability was measured using the farmers reported annual earnings (in shillings) from their preferred crop. Market price trends were measured using the farmers' perceptions of price stability and market performance. A Likert scale ranging from 1 (very unstable) to 5 (very stable) was used. Farmers' access to agricultural inputs was measured based on their ability to obtain farm related inputs such as fertilisers, agrochemicals and seedlings. It was coded as 1 if the

farmers had adequate access and 0 if there was inadequate access to the required inputs. Institutional support and trust were measured using the Likert scale depending on farmers' level of confidence in agricultural extension services and cooperatives.

Descriptive Statistics of Study Variables

Table 1 presents the descriptive statistics of the study variables. It includes the units of measurement, the maximum and minimum values, means and standard deviations.

Table 1. Descriptive Statistics of Study Variables (N = 116)

Variable	Unit of Measurement	Minimum	Maximum	Mean	Standard Deviation
Previous Crop profit	Ksh per year	41,000	720,000	169,400	111,340
Market Price Trends	Likert Scale (1=Very unstable, 5=Very stable)	1	5	3.16	1.01
Access to Agricultural Inputs	Binary (0=Adequate, 1=Inadequate)	0	1	0.46	0.50
Institutional Support and Trust	Likert Scale (1=very low confidence, 5=Very high confidence)	1	5	2.84	1.11
Land Size	Acres	0.50	5	1.79	1.06
Annual income	Ksh per year	71,000	840,000	229,215	122,450
Age of the Farmer	Years	24	81	50.40	12.40

Source: survey data.

As shown in Table 1, there was a considerable variation in crop profitability and household income among the smallholder farmers in Murang'a. Farmers reported moderate perceptions of market stability. They also reported low confidence in institutions. In this study, the variability across the variables necessitated the use of binary logistic regression to examine factors that influenced crop choice decisions among the farmers.

Data Analysis and Presentation

Data collected from the 116 smallholder farmers were coded, cleaned and analysed using the Statistical Package for the Social Sciences (SPSS) version XX. Quantitative data were analysed using statistics such as frequencies and percentages. An inferential analysis was conducted using binary logistic regression to examine the influence of crop profitability, market price trends, access to farming inputs, and institutional support and trust on farmers' crop choice decisions. A binary logistic regression model was used because the dependent variable (farmers' crop choice decision) was dichotomous, coded as 1 for farmers intending to revert to coffee farming and 0 for those continuing with avocado farming. Regression results were presented in tabular form, reporting regression coefficients (β) standard errors,

odds ratios (Exp β), and p-values. Statistical significance was assessed at the 5 percent ($p < 0.05$) level. Model fitness was evaluated using the -2 Log Likelihood, Cox and Snell R², and Nagelkerke R² statistics. Qualitative data were analysed thematically according to the specific objectives of the study. KIIs and review of secondary data were used to augment the information from the smallholder farmers. Findings were discussed according to the study objectives and interpreted through the lenses of the RCT and the SLF.

Results and Discussion

Table 2 presents the background characteristics of the 116 smallholder farmers interviewed in this study. Majority (74.1%) of the farmers were male reflecting prevailing gender patterns in land ownership and cash crop production in the County. Most farmers comprising 69% were aged between 35-64 years, an indicator that crop choice decisions were largely made by economically active household heads. In terms of education, majority (81.1%) of the farmers had attained primary or secondary school education, while only 3.4% had no formal education. This means that farmers had adequate literacy levels for engaging with agricultural information, crop choices and markets. Most respondents (41.4%) owned between one and two acres of land confirming the dominance of smallholder farming systems. Household incomes levels were modest with 59.5% earning below Ksh 200,000 annually.

Table 2. Background Characteristics of the Smallholder Farmers in Murang'a County (N= 116)

Demographic Characteristic	Category	Frequency	Percentage (%)
Gender	Male	86	74.1
	Female	30	25.9
Age (Years)	Below 35	18	15.5
	35-49	42	36.2
	50-64	38	32.8
	65 and Above	18	15.5
Education Level	No Formal Education	4	3.4
	Primary Education	46	39.7
	Secondary Education	48	41.4
	Tertiary Education	18	15.5
Land Size (Acres)	Less than 1 Acre	34	29.3
	1-2 Acres	48	41.4
	Above 2 Acres	34	29.3
Main Source of Income	Farming Only	82	70.7
	Farming and off-farm Activities	34	29.3
Estimated Household Annual Income (Ksh)	Below 200,000	69	59.5
	200,000-500,000	30	25.9
	Above 500,000	17	14.6
Access to Extension Services	Yes	54	46.6
	No	62	53.4
Membership in a Cooperative Society	Yes	68	58.6
	No	48	41.4

Source: survey data.

This underscores the economic vulnerability of farming households in Murang'a County. Farming constituted the main source of income for all the respondents either solely or in combination with off-farm activities. While 58.6% of the farmers reported membership in cooperatives, access to extension services remained limited with 53.4% indicating that they did not have regular contacts with agricultural extension officers, an important factor that influenced farmers' ability to make crop choice decisions. Since farmers lacked regular contacts with agricultural officers, they did not have access to farm advisory services which is a major driver of innovation in agriculture (Laurent et al, 2022). Since agriculture is a devolved function in Kenya, this calls for the need to strengthen agricultural extension services by the Murang'a County government as a way of improving the ability of the farmers to make informed decisions.

Overview of Smallholder Farmers' Crop Choice Decisions

Out of the 116 farmers interviewed, 47.4% indicated an intention to return to coffee farming, while 52.6% preferred to continue cultivating avocados as their primary cash crop. This distribution reflects the uncertainty created by recent coffee price increases alongside persistent challenges in avocado farming (Kariuki, 2025). When the prices of coffee deteriorated, many coffee farmers switched to avocado farming without uprooting coffee. This clearly supports the view that farmers' crop decision making was influenced by market volatility. It is believed that coffee has double the income of Hass avocados, with consistent yearly returns once the trees mature (Graduate Farmer, 2025). However, coffee farming in Kenya had declined due to mismanagement, low farmer pays, and inefficiencies. However, recent government interventions are reversing the trend through debt waivers, cherry advance fund, a revamped Nairobi coffee exchange, direct marketing licenses, and coffee research and training (Graduate Farmer, 2025).

To examine the factors that influenced farmers' crop choice decisions in Murang'a County, the researcher employed a quantitative analytical approach based on a crop choice decision model. The dependent variable was farmers' crop choice decision which was operationalised as the current production decision regarding coffee, avocados or a combination of the two crops. The independent variables were previous crop profitability, market price trends, access to farming inputs, and institutional support and trust.

The empirical mode was specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

Y – farmers' crop choice decisions,

β_0 – constant term,

X1 – previous crop profitability,

X2 – market price trends,

X3 – access to farming inputs,

X4 – institutional support and trust,

ε – error term.

Table 3. Binary Logistic Regression Results for Farmers' Crop Choice Decisions (N=116)

Variable	B	S.E	Wald	Odds Ratio(Exp(B))	Sig. (p-value)
Previous Crop Profitability	0.842	0.312	7.27	2.32	0.007**
Market Price Trends	0.516	0.241	4.57	1.68	0.033*
Access to Farming Inputs	0.903	0.417	4.69	2.47	0.030*
Institutional Support and Trust	0.781	0.295	7.01	2.18	0.008*
Age	-0.018	0.014	1.65	0.98	0.199
Education Level	0.263	0.187	1.98	1.30	0.159
Land Size	0.344	0.152	5.10	1.41	0.024*
Cooperative Membership	0.629	0.308	4.16	1.88	0.041*
Access to Extension Services	0.571	0.286	3.99	1.77	0.046*
Constant	-3.214	1.102	8.49	-	0.004

Source: Author's own calculations.

Model diagnostics:

-2 log likelihood=124.6

Hosmer-lemeshow test: $X^2 = 6.18$, $p = 0.63$

Nagelkerke $R^2 = 0.41$

* $p < 0.05$; ** $p < 0.01$

Table 3 presents the results of the binary regression analysis examining the factors that influenced farmers' crop choice decisions. The regression results indicate that previous crop profitability had a positive and statistically significant effect on farmers' crop choice decisions ($OR = 2.32$). This suggests that farmers who experienced higher returns from coffee in the past were more than twice as likely to consider returning to coffee farming. Market price trends were also significant ($OR = 1.68$, $p < 0.05$), implying that perceptions of improved and stable coffee prices increased the likelihood of re-adoption.

Access to farming inputs significantly influenced crop choice ($OR = 2.47$, $p < 0.05$), indicating that farmers with adequate access to inputs were more likely to return to coffee farming. Similarly, institutional support and trust emerged as a strong predictor ($OR = 2.18$, $p < 0.01$) underscoring the importance of cooperatives and supportive institutions in shaping farmers' decisions.

Among the control variables, land size, cooperative membership and access to extension services were statistically significant. Age and education level were not statistically significant. The model demonstrated good fit, as indicated by a non-significant Hosmer-Lemeshow test and a Nagelkerke R^2 of 0.41, suggesting that the included variables explain a substantial proportion of variation in farmers' crop choice decisions.

Overall, the regression results support the study's theoretical argument that farmers' decisions were influenced by economic rationality and institutional conditions rather than price changes alone.

Influence of Crop Profitability on Farmers' Crop Choice Decisions Regarding Coffee or Avocados

The findings reveal that previous crop profitability was the strongest determinant of farmers' crop choice decisions. One of the farmers in Kigumo Sub-county who had planted avocados on one acre and coffee on half an acre had this to say:

When coffee prices were very low, I found it very difficult to educate my children because I have several of them. I decided like other farmers in this area to plant avocado trees. I cannot regret they have been giving me better returns than coffee until very recently. But coffee now is not bad only that it is more demanding to farm coffee than avocado trees".

Findings from the KI interviews support the finding that profitability was the driver of the crop choice among the farmers. A key informant who was an official of a coffee cooperative in Kangema Sub-county had this to say:

"In this area farmers were frustrated with coffee farming for many years. After deducting costs of labour for harvesting, pruning, tilling land, fertilisers and chemicals for spraying, farmers had very low incomes. This made many farmers to either uproot or neglect coffee and planted avocados instead".

Another key informant who was an assistant chief and an avocado farmer supported the growing of avocados because the crop had higher profit, and was therefore cautious about switching to coffee as he said:

"When we realised that avocados had better money, we abandoned coffee. But now that coffee has improved, we are considering going back to coffee, but we are careful because we have really suffered because of growing coffee for many years"

The findings of this study support the core assumption of the RCT that individuals act to maximise expected economic benefits. Prolonged low returns from coffee farming reduced its perceived utility, prompting farmers to rationally shift to avocado farming which promised higher income. The renewed interest in coffee farming following recent price increases reflects a recalibration of expected returns rather than an emotional or habitual attachment to coffee. From a SLF perspective, profitability directly affected financial capital. This explains why the smallholder farmers in Murang'a County prioritised income stability and the ability to meet household needs. Crop choice among smallholders was strongly shaped by farmers' past experiences of profitability. In making a choice between the two crops, a farmer who had largely shifted to avocado farming had this to say:

"I cannot eat coffee unlike avocados which my children eat with other foods like rice and githeri. When I take avocados to the nearest market I come back with money. For coffee, we have to take it to the factory, or it is bought by brokers who insist that we harvest it for them. Avocado buyers harvest the fruits themselves and then we count with them to know the money they will pay me".

This study indicated that smallholder farmers were ready and willing to switch to the crop that was more profitable. The decline in farmers' income due to low coffee prices and high costs of inputs reduced profitability and this encouraged farmers to farm other crops especially avocados. However, having earned good returns from coffee in the past, they were hesitant to abandon it completely even when avocado farming was more attractive. Recent resurgence in coffee earnings however reinforced the commitment to coffee farming among the

smallholder farmers in Murang'a County. The findings of this study contradict agricultural studies that have shown that although profit maximisation is important, farmers do not always prioritise profitability when choosing the crops to grow but instead balanced profit maximisation with environmental factors, farm characteristics, social and personal concerns (Ngeno, 2024). The findings of this study also contradict the arguments by Groeger & Zylberberg (2025) who contend that farmers in developing countries do not grow high-return crops due to clustered social networks that restrict diffusion of new technologies.

The findings of this study are, however, concurrent with other studies that have established that farmers switched to crops such as avocados and macadamia because earnings were more reliable, faster and more certain than from coffee (Rockle et al, 2019; Kariuki, 2025). The findings also concur with those of Boniphace et al (2023) who found that in Tanzania farmers had positive perceptions about effects of avocado farming on livelihoods and biodiversity. Hence, smallholder farmers viewed avocado farming as most profitable compared to other crops. Similar findings that farmers were driven by profit have been reported in Rwanda where farmers preferred avocado farming because it was economically more profitable than all other crops (Ntabakirabose et al, 2021). Recent studies by Yigezu et al (2026) on carrot farming among smallholder farmers in Ethiopia have equally found that profitability was positively and significantly important in crop choices and was influenced by yield and market price. Hence, we can argue that past coffee profitability kept farmers in Murang'a County cultivating the crop and it also acted as a benchmark that avocado earnings had to meet for farmers to switch crops. Farmers only switched to avocado farming when they felt that coffee was not as profitable as expected or when avocado profitability was higher.

Role of Market Price Trends in Shaping Farmers' Crop Choice Decisions

The sampled farmers were asked whether prices of coffee and avocados influenced their decision to grow coffee or avocados. Data analysis shows that Market price trends significantly influenced farmers' crop choices, though not in a linear manner. Market price trends were also significant (OR=1.68, $p<0.05$), implying that perceptions of better and more stable coffee prices increased the likelihood of re-adoption. While rising coffee prices increased the likelihood of reconsidering coffee, persistent price volatility in both coffee and avocado markets generated uncertainty. This finding is supported by a key informant who reported that:

"Farmers here are very sensitive to price changes. Farmers do not have confidence in coffee farming because of its low prices for many years. Although the prices have improved farmers are not sure if it will last or it is only manipulated for political reasons because as we approach elections farmers have to be made happy so that they vote for the current government in the 2027 elections. Avocado farming is better, but it has challenges because of changes in the export requirements and demand".

This study finding is in concurrence with the findings of Wanzala and Obokoh (2025) who found that price dynamics and volatility in coffee affected Kenya's competitiveness in the global coffee industry, highlighting the need to protect farmers from low coffee prices. These researchers make argument for market stabilisation strategies, including hedging tools, improved market access, and stable exchange rates, to protect producers from adverse price movements. It has been observed by Massrie (2025) that the global coffee market has

experienced “significant price volatility in recent years, with rising prices influenced by multiple factors, including climate change, supply chain disruptions, increased production costs, and growing demand”.

Price volatility in Murang’a County made many farmers to avoid full specialisation. This finding aligns with the RCT’s recognition of decision-making under uncertainty where actors may adopt risk-averse strategies. The SLF further explains the behaviour by highlighting farmers’ exposure to vulnerability contexts, including fluctuation of prices and unreliable markets. This vulnerability encouraged farmers to adopt diversification as a coping strategy for livelihood resilience rather than exclusive dependence on a single cash crop. Hence, this study found that market price trends of both coffee and avocados (both recent and anticipated) were crucial in shaping farmers’ expectations and hence the crop choice. For instance, as for coffee price, a farmer had this to say:

“How do you take your crop to the factory and you don’t know you are selling at what price, yet you have grown it and harvested it at your own cost and using your own and my family’s labour. That is modern slavery. I can never go back to coffee farming”.

Farmers in Murang’a County were aware that historically coffee experienced volatile international markets and price fluctuations which made them economically vulnerable. On the other hand, they thought that although avocados also faced price variations, they were more stable and could earn the farmer money immediately than coffee which took a long time before farmers were paid. Therefore, generally the market price trends of coffee and avocados in Murang’a County acted as a strong force that attracted the smallholder farmers towards the crop that had better prices and reliable income. These expectations in turn affected farmers’ decision on whether to grow coffee, switch to avocados or to grow both crops.

Effect of Access to Farming Inputs on Farmers’ Crop Choice Decisions

Farmers were asked to compare the access and affordability of farming inputs of coffee and avocados and whether the inputs had an influence on the crop they chose to grow. As shown in Table 3, access to farming inputs emerged as a significant factor shaping crop choice decisions. This implies that even where farmers wanted to make rational economic decisions, they were constrained by practical resource availability. One of the farmers pointed out that:

“I would want to grow coffee because it has higher returns, but coffee is for rich people who can afford manure, expensive pesticides, agrochemicals and high labour costs during pruning and harvesting. Avocados are much cheaper for me to grow at my age. I did not buy seedlings. I simply planted the seed and then paid Ksh 50 for grafting into Hass variety. For avocados, I don’t apply any chemical and buyers harvest without charging me any money for it”.

On farming inputs, a key informant who in Kangema Sub-county confirmed that coffee required more capital inputs than avocados:

“Coffee requires more inputs like fertilisers and agrochemicals than avocados. It also requires constant application of organic manure. You need to have dairy farming to keep your coffee farm fertile. Most farmers cannot afford the inputs and labour required in coffee farming. Avocados are attractive to the smallholder farmer because once trees have matured the farmers’ work is only to till the land. Unfortunately, there are many avocados’ thieves. Most farmers cannot be able to return fully to farming of quality coffee as it was in the past due to high costs of inputs”.

Thus, even when coffee prices improved, farmers lacking access to fertilisers and pesticides were less likely to return to coffee farming. This finding concurs with the RCT which assumes that choices are made within existing constraints. According to the SLF, access to inputs represents physical and financial capital without which livelihood strategies cannot be effectively pursued. Limited access to agricultural inputs restricted the smallholder farmers' ability to respond to favourable markets signals. In addition, rising cost of inputs such as fertilisers and labour, put more pressure on coffee producers (Massrie, 2025). Farmers in Murang'a County reported that compared to avocados, coffee required more regular inputs for pruning, disease control, fertiliser, and labour. Generally, smallholder farmers struggled to get these inputs due to their high costs which ate into their income. Moreover, smallholder farmers did not have access to credit facilities to enable them buy inputs. Although some coffee farmers sometimes accessed fertilisers through coffee cooperatives, the supply was not guaranteed and sometimes came too late. If the inputs were cheaper, and available on credit, it would make farmers more attracted to the crop. Coffee farmers in Murang'a reported that in the past cooperatives supported them through cheaper inputs but that support had disappeared and this negatively affected coffee farming. In contrast, some avocado producers reported that they benefitted from seedling supply and better market linkages. One way of reducing costs of inputs will be to encourage and educate smallholder farmers on the importance of embracing use of organic manure. As it has been pointed out by Jones et al (2025), "volatile prices, climate change, rising input costs, and pressure to decrease carbon footprints represent key challenges for farmers. Regenerative soil management and the use of organic management as an alternative to conventional mineral fertilisers offer one potential solution to address these challenges".

Influence of Institutional Support and Trust on Farmers' Crop Choice Decisions

The fourth objective of this study was to evaluate how institutional support and trust affected farmers' crop choice decisions. The finding was that institutional support and trust significantly affected farmers' willingness to return to coffee farming. For instance, a farmer in Kangema who had totally abandoned his coffee trees for many years said:

"I lost trust in our coffee cooperative when payments were delayed for a long time. They twice refused to pay for the coffee we delivered as they said that the coffee was stolen in the factory. Even when they paid, the payment was very low that it was difficult for me to pay the workers. At my age, I cannot try to go back to coffee farming. When I had young children, they assisted a lot in providing labour but they have now migrated into different towns. Without support by our coffee cooperative like they used to give us fertiliser and spraying chemicals in the past, most of us in this area cannot afford to back to coffee farming".

This study underscores the central role that institutions played in shaping agricultural decision-making among the smallholder farmers. A conducive institutional environment fosters the ability of entrepreneurs to discover business opportunities. Access to credit and farming implements offers financial freedom for farmers who are entrepreneurial (Osei & Zhuang, 2024). Farmers' attitudes towards participation in collective marketing through cooperatives is dependent on the knowledge they have about cooperatives. Knowledge is a critical factor that positively influences attitudes, and therefore the importance of informed decision-making in the cooperative movement cannot be gainsaid (Iyioku, 2024). One way of empowering farmers is by supporting and encouraging collective marketing of crops through farmers' cooperatives. It has been shown that farmers who participate in collective

marketing benefit from increased production and better sales. For instance, it has been found that participation in avocado collective marketing increased farmers' incomes by an average of 32.9% and participants produced significantly higher avocado fruits and fetched better prices compared to non-participants (Kwizerimana et al, 2023). Weak trust in cooperatives and delayed payments reduced the perceived benefits of coffee farming even in the context of higher prices. This reinforces the RCT's emphasis on expected outcomes rather than nominal prices. From the SLF perspective, institutions constitute a critical mediating structure that shapes access to markets, information and services.

Apart from trusted cooperatives, farmers require agricultural extension officers to offer farm advisory services, and reliable buyer and exporter firms. Trust in supportive institutions is important to the farmers in that it can promote farmers participation and shape their behaviour (Wang & Ma, 2025; Li & Gao, 2023). If the farmers are dealing with credible institutions, they are likely to commit fully to the crop that has support from these institutions. In Murang'a, coffee cooperatives were older and well established compared to avocado farming. Coffee cooperatives were better structured. Apart from a few instances where farmers sold cherry directly to coffee brokers, farmers in Murang'a County largely delivered their crop to cooperatives for processing and marketing. Farmers, however, reported that cooperatives faced challenges ranging from poor management, lack of transparency in pricing of coffee and delayed payments for the delivered cherry in contrast to avocado buyers who paid promptly.

The support by the government is crucial in the choice of the crop that farmers grow. Farmers in Murang'a reported that the government had recently started to be supportive to the coffee farmers by strengthening management of coffee cooperatives and having better prices and this was making coffee farming more attractive. In addition, compared to avocados, there was a lot of promises of better returns of coffee by politicians. The county government was also said to be very supportive of the avocado farmers. Although farmers were earning good income from avocados, they complained of exploitation by brokers, lack of buyers who could guarantee them timely collection and payment during bumper harvest, and too much insistence on quality standards which led to high rejection rates. These challenges threatened avocado farming even with its great potential. Farmers' access to information about prices, markets, buyers, quality requirements, as well as transparency in cooperative accounting and pricing of crops, heavily shape their trust (Codjoe et al, 2025; Ørtenblad & Larsen, 2026). Where cooperatives are opaque, or where brokers exploit farmers, this negatively affects the crop. Farmers reported to have moved to avocados partly due to perceived better reliability of payment and more trusted buyers. Farmers are more attracted to growing the crop when institutions support them to have better prices, provide them with extension services, help them to manage pests and diseases, and guarantee them market for their crops.

Conclusion and Recommendations

Choosing between coffee and avocados among the smallholder farmers is a response to economic rationality and livelihood considerations. Previous crop profitability, market price trends, access to farming inputs, and institutional support significantly influenced whether smallholder farmers returned to coffee or continued with avocados farming. While improved coffee prices created incentives for crop switching, the rebound in prices was too recent to

guarantee price stability. In addition, persistent risks, limited inputs, and weak institutional support by the government made farmers to choose cautiously, and to diversify rather than to fully revert to coffee farming. Smallholder farmers in Murang'a lacked proper guidance and support from extension officers that would enable them to make the best crop choices. Farmers were uncertain on whether to continue with avocados or revert to coffee. These findings highlight the importance of integrating market, resource and institutional factors when analysing agricultural decision-making.

Based on the research findings, the study makes the following recommendations:

1. The national and the County government and cooperative societies should improve cooperative governance, ensure timely and reliable payments including Guaranteed Minimum Returns (GMR) on the two crops, and implement trust-building programs to enhance farmers' confidence in institutional arrangements
2. The County government agricultural officers, input suppliers and NGOs should facilitate availability and affordability of quality seedlings, fertilisers and pesticides and encourage farmers to use organic manure. The government should also provide credit facilities to coffee and avocado farmers.
3. Extension officers, agricultural research institutions and farmers associations should regularly disseminate market information such as price trends, crop management practices and risk-mitigation strategies to enable farmers make informed, rational crop choices.
4. Since agriculture is a devolved function, the county government and development partners should devise crop diversification strategies. They should encourage farmers to adopt mixed cropping and intercropping practices that balance coffee and avocado farming. This will reduce farmers' vulnerability to price fluctuations and ensure long-term livelihood resilience.

Suggestions for Further Research

1. Further studies should examine the role of the youth in the future of cash crop farming in Kenya
2. Future studies should examine the environmental implications of shift from coffee to avocado farming in Kenya
3. Further studies should explore how participation of women in agricultural decision-making affects the adoption of coffee or avocado farming.

Ethical Considerations

Several ethical considerations were factored in when conducting interviews that generated data used in this study. Required authorisations were sought. The researcher and his three research assistants visited the area administrators and informed them that they were conducting interviews with farmers for a study on coffee and avocado farming. Before the start of every interview, researchers took time to explain to the farmers and the selected key informants what the study entailed and ensured that respondents voluntarily consented.

Questionnaires were anonymous and all the respondents were assured that they were free to discontinue the interview if they were not comfortable with the questions.

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Conflict of Interest

This study was conducted for academic purposes without any conflict of interest.

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Local Brands in Rural Development: Strategic Implications from a Comparative Analysis of Poland and Portugal

Abstract. Local brands are increasingly recognised as instruments supporting rural development, territorial identity, and regional competitiveness. The aim of this study is to compare the potential for the development of local brands in Poland and Portugal in the context of European Union geographical indication systems and rural development conditions. The research adopts a comparative and exploratory approach based on desk research, analysis of strategic documents, European Commission databases (eAmbrosia and GIview), Eurostat data, and scientific literature. The results show that Poland and Portugal represent two distinct models of local brand development. Portugal is characterised by a mature geographical indication system, a strong wine sector, and close links between branding, tourism, and exports. Poland demonstrates strong organisational and bottom-up potential supported by an extensive network of Local Action Groups. The study concludes that successful local brand development depends not only on the number of protected products but also on effective governance, institutional support, and the integration of branding with tourism and market developments.

Keywords: local brands, rural development, geographical indications, territorial branding

JEL Classification: Q13, R11, Z32, R58

Introduction

Local brands and regional promotional labels currently constitute an important element of development strategies for rural areas and small towns, combining economic, social, and cultural dimensions. They serve as tools for building a recognisable place identity and for promoting its unique assets, closely linked to local heritage, traditions, history, and natural resources (definition based on the methodology of O. Gałek (<http://lgd.malopolska.pl/produkt-lokalny/>)). In practical terms, a local brand most often functions as a verbal-graphic sign identifying a group of products or services that share common quality characteristics and values important both for consumers and for their

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creators – producers, farmers, or service providers (Albaladejo-García et al., 2025; Răcășan & Egresi, 2019). At the same time, a local brand goes beyond a purely marketing function, becoming a carrier of emotional attachment to place as well as a symbol of community and local pride (Manzo & Devine-Wright, 2014). Regional products, which often constitute the core of local brands, refer to the geographical and cultural specificity of a given area. Their significance is not limited solely to the economic dimension. They represent an element of protecting and promoting culinary, craft, and natural heritage, as well as a tool for activating local communities (Sieczko, 2008; Owczarek, 2020). In many cases, local promotional labels function as a form of certificate of quality and origin, increasing the trust of recipients - consumers, tourists, and institutional partners - in the products and services offered. In this way, they contribute to strengthening regional competitiveness, fostering entrepreneurship, and building territorial capital (Sieczko 2014; Domański & Bryła, 2013).

Available case studies conducted in Poland and Portugal indicate that public awareness of local brands is sometimes limited, even within the regions where such labels operate (Sieczko, 2008; Mędrzyk, 2015; Piva & Prats, 2021). These challenges highlight the need for deeper academic reflection on the functioning of local brands as complex socio-organisational systems. A local brand, particularly of the umbrella type, can serve as an integrator of activities undertaken by various actors, including producers, local leaders, cultural institutions, local governments, and social organisations. When properly managed and communicated, it becomes a platform for cooperation, knowledge transfer, and social education, strengthening intergenerational ties and a sense of identity. In this sense, regional products and local brands should be perceived not only as promotional tools but also as instruments of socio-economic development, supporting the preservation of cultural heritage and the sustainable activation of rural areas (Krajnović, Bosna & Jašić, 2013; Malek & Costa, 2014).

Despite the growing number of studies, the literature indicates a lack of comparative analyses covering different European contexts. Existing studies most often focus on individual regions or selected aspects of branding, such as identity, tourism, or marketing (Piva & Prats, 2021; Brańka, 2025). Recent comparative explorations of local brands in Poland and Portugal have primarily concentrated on tourism-related aspects and selected case-study regions rather than broader institutional and governance dimensions (Bailoa et al., 2025). There is still a lack of systematic analyses of local brand management models operating within different institutional and cultural structures (Chudzyńska, 2021).

In light of the above findings, it is justified to undertake a comparative analysis of Poland and Portugal that considers both identity and cultural dimensions, as well as governance structures, stakeholder participation, and links with tourism and entrepreneurship. Such an approach makes it possible not only to deepen the understanding of the mechanisms underlying the functioning of local brands, but also to identify good practices that may be transferred between regions with different institutional contexts. The aim of this article is therefore to analyse the potential for building and developing local brands in Poland and Portugal in the context of the European Union's geographical indication systems and the institutional and socio-economic conditions supporting the development of regional products. In particular, the study attempts to compare the scale and structure of protected products, the institutional infrastructure supporting the development of local

brands, and their links with tourism and entrepreneurship in rural areas in Poland and Portugal. To achieve the research objective, the following research questions were formulated:

RQ1: What are the differences between Poland and Portugal in terms of the scale and structure of geographical indication systems (PDO, PGI, TSG, and GI for spirit drinks)?

RQ2: How do institutional, socio-economic, and market conditions influence the development of local brands in rural areas of Poland and Portugal?

RQ3: Which factors create the greatest potential for the development of local and umbrella brands in the analysed countries, and how do these factors differ between the two development models?

Literature review

Interest in local brands as instruments for rural development has been steadily increasing in international literature. Contemporary research approaches indicate that local brands go beyond traditionally understood marketing tools and should be perceived as complex socio-territorial mechanisms embedded in the context of place identity, governance structures, and participatory processes (Albaladejo-García, et al. 2025; Răcășan & Egresi, 2019). From this perspective, a local brand becomes an element of place-based development strategies, integrating cultural, natural, and social resources to strengthen the competitiveness and resilience of rural regions.

The literature and practice activities emphasise the strong relationship between local brands and place identity (Gałek, 2022). Răcășan and Egresi (2019) indicate that brands of local (traditional and regional) products are deeply rooted in the specificity of space and local cultural heritage, carrying values of authenticity and tradition. A similar perspective is presented by Piva and Prats (2021), who define local brands as regional identity constructs created from the bottom up through community engagement rather than imposed administratively. Criticism of the administrative delineation of tourism brand boundaries is also expressed by Krajnović, Bosna, and Jašić (2013), who argue that an effective brand should reflect genuine geographical and cultural realities rather than merely institutional divisions.

From a psychological and sociocultural perspective, the concept of place attachment is of particular importance, describing the emotional bonds between residents and their surroundings (Manzo & Devine-Wright, 2014). In the context of rural areas, regional products - such as traditional recipes, plant varieties, crafts, or cultural landscapes - constitute elements that build both the cultural identity and the commercial potential of a region (Król et al., 2022). A local brand, therefore, performs the function of protecting and promoting heritage, counteracting its marginalisation under conditions of globalisation.

Increasingly, local brands are analysed as governance systems integrating the activities of various stakeholders. Guzal-Dec (2015) points to the role of local governments in creating branded products in areas of high natural value, emphasising the importance of institutional coordination. Similarly, Delovieres et al. (2025) highlight the role of public administration

and marketing instruments in stimulating the growth of local brands. In a broader public policy perspective, Zhou, et al. (2023) demonstrate that the effectiveness of territorial branding depends on the coherence of government interventions and their long-term strategic orientation. Local brands should be treated as long-term strategic assets that generate competitive advantages, particularly through higher levels of consumer trust, authenticity, and stronger relationships with local communities (Schuiling & Kapferer, 2004). Their flexibility and closer alignment with local market conditions make them especially effective in territorially embedded development processes. Moreover, the development of local products and brands is closely linked to the efficiency of food supply chains. As noted by Nowakowska-Grunt and Kielbasa (2017), improving and shortening supply chains enhances the competitiveness of local producers, supports regional promotion, and increases the value retained within local economies.

In the Polish context, the role of local brands in rural development is also emphasised through the lens of tourism and local entrepreneurship. Balińska (2017) points out that network tourism products, based on cooperation between local actors, constitute an important form of entrepreneurial activity in rural areas, enabling the integration of dispersed resources and the creation of coherent, market-oriented offers. At the same time, Guzal-Dec (2015) highlights the significant role of local governments in initiating and supporting the development of branded tourist products, particularly in areas of high natural value, where institutional coordination and strategic management are essential. These findings underline that the development of local brands depends not only on endogenous resources, but also on the effectiveness of multi-actor cooperation and the involvement of public institutions.

In the European context, strategic documents are also important, such as the European Agenda for Tourism 2030 (Council of the European Union, 2022) or the Regulation (EU) 2024/1143 of the European Parliament and of the Council of 11 April 2024, which highlight the need to integrate branding activities with sustainable development goals. The literature also emphasises the importance of a multi-level approach to rural development (Apostolopoulos et al., 2020), in which a brand can serve as a link between regional policy, entrepreneurship, and social activity.

One of the key elements in building local brands is community involvement. Malek and Costa (2014) indicate that involving residents in tourism planning fosters the development of solutions characterised by social innovation. In a similar vein, Kartani, et al. (2024) analyse the importance of public policies supporting the SME sector, emphasising the role of empowering local actors. In the Polish literature, local brands are highlighted as tools for socio-economic activation (Brańka, 2025; Pater, 2024). Research by Mędrzyk (2015) indicates that the perception of a regional brand depends on the degree to which residents identify with the region and on their trust in certification systems. Thus, the effectiveness of a brand is conditioned by the level of social capital and the capacity for cross-sectoral cooperation.

A significant part of the literature focuses on the relationships between local brands and rural tourism. Albaladejo-García et al. (2025) analyse territorial brands in protected areas, pointing to their role in creating social demand for local products. Rizzo, et al. (2024) emphasise the importance of culinary routes and regional products in rural development

policies. In turn, Chung (2024) indicates that branding can act as a catalyst for sustainable local revitalisation.

The economic dimension of local brands includes stimulating entrepreneurship, diversifying income sources, and creating jobs. For instance, in the context of small wineries in Poland, Wójcik (2024) shows that marketing activities and coherent visual identity strengthen the competitiveness of small producers. In turn, Saari, et al. (2017) demonstrate that eco-branding strategies positively influence consumer perception and support the achievement of sustainable development goals.

The literature also highlights the important role of geographical indications (GIs) in managing (Kuzniar & Witek, 2016) and promoting local brands and tourism (e.g. Grębowiec, 2017). According to Bérard and Marchenay (2006), the protection of local and traditional products through the geographical indications can help conserve biodiversity across multiple levels, including domestic animal breeds, plant varieties, microbial ecosystems, landscapes and also it provides a formal mechanism for preserving shared knowledge and practices, which form the foundation of the protected resources. In the study of Pamukçu et al. (2021), it was concluded that local foods, and products registered with geographical indications, influence the development of gastronomy tourism. Also, Hazarhun and Tepeci (2018) concluded that regional products and dishes with geographical indications can contribute to the development of gastronomy tourism.

Dharmojirao and Devaraja (2024) refer that adopting geographical indications as a branding strategy provides several benefits, including improved product identification, quality assurance, protection of reputation, and enhanced regional visibility. They also support rural development, cultural heritage preservation, agrotourism, fair trade practices, and the protection of local producers. According to Zhang et al. (2023), GI brands usually have a positive image and reputation for quality, which increases consumers' intention to purchase. Consumer identification with the brand, especially when connected to their hometown or local identity, plays a key role in encouraging purchases. In their study, Zhang et al. (2023) found that consumers tend to have a higher purchase intention for hometown GI brands than non-hometown GI brands, an effect mediated by consumer identification with the brand and strengthened when psychological ownership is high. Chandra et al. (2025) findings indicate that U.S. consumers place considerable value on the geographic origin of wines, beyond the influence of brand and varietal information, as shown by their marginal willingness to pay.

According to ACERTIFICA (2025), GIs allow the protection and safeguard of the cultural and productive heritage of regions and the promotion of economic competitiveness, local development, sustainability, and the preservation of local identity. To Aslan (2024), protecting geographical indications goes beyond exclusive naming rights, as it also involves creating economic value through product differentiation, enabling market access and competitive advantages for producers. The author highlights that geographical indications significantly enhance agribusiness, strengthen local economies, and increase the value of the agricultural sector. The study of Crescenzi et al. (2023) found that regions with geographical indications attract more agri-food foreign direct investment, generating job creation and positive spillovers for local employment, particularly in areas with lower institutional quality.

ACERTIFICA (2025) highlights that the successful implementation of GIs depends on the willingness and engagement of local political actors in a joint effort among producers, local associations, municipalities, and national entities to provide resources for the study and documentation of local artisanal traditions. Aslan (2024) also indicates that improving collaboration among stakeholders can strengthen the protection of geographical indications while ensuring a balance between effective protection, innovation, and economic growth. According to Aslan (2024), public initiatives should establish the regulatory framework, support infrastructure development, and implement appropriate policies, while private initiatives contribute through innovation, entrepreneurship, and investment.

According to Aslan (2024), GIs also contribute to environmental sustainability by promoting biodiversity, preserving landscapes, and ensuring sustainable land use practices. The author states that integrating sustainability into economic development strategies can attract environmentally conscious consumers and investors. Achieving this requires collaboration among governments, businesses, non-profit organisations, and local communities to promote sustainable practices and support balanced regional development.

Data and Research Methods

The study has a comparative and exploratory character. The aim of the research was to identify and compare the potential of Poland and Portugal in the creation and development of local brands, with particular emphasis on regional products covered by quality schemes and the institutional conditions of their functioning. A desk research method was applied, combined with an analysis of strategic documents and a comparative analysis. The analysis was conducted based on:

- The eAmbrosia register maintained by the European Commission (PDO, PGI, TSG for agri-food products, wines, and spirit drinks),
- EU strategic documents (including quality policies and the Tourism Agenda 2030),
- National reports concerning quality schemes,
- Data on the functioning of Local Action Groups (LEADER),
- Scientific literature concerning territorial branding and rural development.

The empirical data used in the study were collected between January and March 2025. Information on geographical indications (PDO, PGI, TSG and GI for spirit drinks) was obtained from the European Commission eAmbrosia and GIview databases. The databases were accessed between 15 and 20 March 2025. Socio-economic, agricultural, trade and tourism indicators were obtained from the Eurostat database and downloaded between February and March 2025. Data were used in the most recent versions available at the time of collection.

The scope of the analysis included agri-food products, wines, and spirit drinks, which made it possible to capture the full potential of geographical indication systems in both countries. The analysis included all geographical indications registered in the European Union quality schemes for Poland and Portugal, namely PDO (Protected Designation of Origin), PGI (Protected Geographical Indication), TSG (Traditional Speciality Guaranteed), and GI for spirit drinks. Products were included if they were officially registered and active

in the eAmbrosia or GIview databases at the time of data collection. Applications under examination, cancelled registrations, products originating from countries other than Poland and Portugal, and duplicate entries across databases were excluded from the analysis.

The purpose of the EU quality policy is to ensure the protection of certain product names and to promote their distinctive qualities, which are closely linked to their geographical origin and the traditional knowledge and practices used in their production. According to the European Commission, the product names may receive a geographical indication (GI) when they demonstrate a clear connection to the location where they are produced. This recognition intends to allow consumers to identify and trust high-quality products, while also supporting producers in promoting and marketing their goods more effectively (Crescenzi et al., 2023). The European Commission defines geographical indications as conferring intellectual property rights on specific products whose distinctive qualities are directly associated with their area of production, including the following types:

- PDO – Protected Designation of Origin

It applies to products such as food, agricultural products, and wines, as every stage of their production, processing, and preparation must take place within the specific region and because of that are those that have the strongest links to the place in which they are made (Fig. 1).



Fig. 1. PDO – Protected Designation of Origin

Source: https://agriculture.ec.europa.eu/farming/geographical-indications-and-quality-schemes/geographical-indications-and-quality-schemes-explained_en#pdo.

- PGI – Protected Geographical Indication

It applies to products such as food, agricultural products, and wines, with most products requiring that at least one stage of production, processing, or preparation occurs within the designated region, while for wine, at least 85% of the grapes used must originate exclusively from the geographical area where the wine is produced. It highlights the connection between a product's name and its specific geographic region, reflecting the fact that certain qualities, reputation, or other distinguishing characteristics are fundamentally derived from its place of origin (Fig. 2).



Fig. 2. PGI – Protected Geographical Indication

Source: https://agriculture.ec.europa.eu/farming/geographical-indications-and-quality-schemes/geographical-indications-and-quality-schemes-explained_en#pdo.

– GI – Geographical Indication

It applies to spirit drinks, with most products requiring that at least one stage of distillation or preparation occurs within the designated region, although the raw materials do not need to originate from that region. It intends to protect the name of a spirit drink produced in a specific country, region, or locality, where its distinctive quality, reputation, or other characteristic is fundamentally linked to its geographical origin.

– TSG - Traditional Speciality Guaranteed

It applies to food and agricultural products and emphasises the traditional aspects of a product, such as its method of production or composition, without reference to a specific geographical area, and registration of a product name as a TSG protects it against falsification and misuse (Fig. 3).



Fig. 3. TSG - Traditional Speciality Guaranteed

Source: https://agriculture.ec.europa.eu/farming/geographical-indications-and-quality-schemes/geographical-indications-and-quality-schemes-explained_en#pdo.

To illustrate the practical significance of geographical indication systems in the analysed countries, it is justified to present their scale and structure. Data on the number of products covered by EU quality schemes (PDO, PGI, TSG, and GI for spirit drinks) make it possible to capture differences in the level of development and use of these instruments in Poland and Portugal. This overview is complemented by selected institutional indicators, in particular those related to the functioning of Local Action Groups (LAGs), which play an important

role in the bottom-up development of rural areas and the creation of local brands. The presented data allow not only for a comparison of the scale of geographical indication systems, but also for their placement within a broader context of the organisational and demographic potential of both countries, which provides a basis for further analysis of the opportunities for developing local and regional brands. The indicators presented in Tables 1-6 were selected purposively to capture the main dimensions influencing the development of local brands. Table 1 includes socio-economic, agricultural and institutional indicators describing the structural context of rural development. Table 2 presents the scale and structure of geographical indication systems. Tables 3 and 4 contain indicators related to production capacity and trade performance, which reflect the economic potential and market competitiveness of local products. Table 5 focuses on tourism indicators because tourism constitutes an important channel for the promotion and consumption of local brands. Finally, Table 6 integrates the previous results into a synthetic comparative framework, enabling the assessment of organisational, institutional and market potential for local brand development in both countries. Several indicators presented in the tables are expressed as ranges or approximate values. This approach was adopted where exact and fully comparable data were not available for both countries in the same reference year. In such cases, the most recent Eurostat statistics, national reports, and European Commission sources were triangulated to ensure comparability.

Research Results

The comparative analysis of Poland and Portugal begins with an overview of key socio-economic and agricultural indicators, presented in Table 1. These variables provide an essential background for understanding the structural conditions influencing the development of local brands and geographically indicated products in both countries. The data reveal that Poland and Portugal differ significantly in terms of scale, economic structure, and agricultural specialisation. Poland, with a population of 37.7 million, represents a larger and more demographically extensive economy compared to Portugal (10.6 million). Despite this difference, Portugal achieves a higher GDP per capita, indicating a relatively higher level of economic development and productivity. At the same time, both countries show similar employment rates, suggesting comparable labour market participation. In the agricultural context, Poland is characterised by a larger share of agricultural land and a higher proportion of employment in the agricultural sector. This reflects a more extensive and labour-intensive model of agriculture, which is also associated with a relatively higher contribution of agriculture to GDP. The structure of production is dominated by staple and volume-based products such as cereals, poultry, and apples. These features indicate a system oriented towards scale and supply capacity, rather than specialisation in high-value products.

In contrast, Portugal presents a more specialised and quality-oriented agricultural model. Although the overall agricultural output is lower, the sector is focused on products with high added value, particularly wine and olive oil. The significantly larger vineyard area and the number of vineyards highlight the importance of the wine sector in the Portuguese economy.

This specialisation is further supported by a higher share of organic farming, which reflects a stronger orientation towards quality, sustainability, and differentiation. The comparison also points to important differences in institutional capacity and rural development structures. Poland has a substantially higher number of Local Action Groups, which indicates a well-developed bottom-up governance framework supporting local initiatives and brand creation. However, when adjusted for population size, both countries show a similar density of LAGs, suggesting comparable levels of territorial coverage of LEADER structures. Overall, the data presented in Table 1 illustrate two distinct development patterns: Poland represents a model based on scale, institutional support, and grassroots initiatives, while Portugal reflects a model driven by specialisation, product differentiation, and stronger integration with market mechanisms such as tourism and export-oriented sectors. These structural differences form the basis for further analysis of the role and potential of local brands in both countries.

Table 1. Socio-economic overview (2023-2024) on Poland and Portugal

Indicator	Poland	Portugal
GDP per capita (€)	24,600	28,400
Population (million)	37.7	10.6
Urbanisation rate (%)	60	66
Employment rate (%) (20-64)	77	75
SME contribution (% employment)	67	78
Employment in agriculture (% total employment)	8-9	5-6
Utilised agricultural area (% of country area)	50	40-45
Agricultural share in GDP (%)	3-4	2-3
Agricultural labour productivity (trend)	+33% in 2025	-10% in 2025
Agricultural output value (billion €)	~39.5	~10-12
Organic farming (% of agricultural land)	~3-4	~10
Main agricultural product	cereals, poultry, apples	wine (grapes), olive oil
Number of vineyards (holdings)	~500	~170,000-180,000
Vineyard area (ha)	~750	~182,000
Local Action Groups (LAGs)	~300	~90
LAGs per 1 million inhabitants	~8	~8-9

Source: Eurostat Database (dataset codes: nama_10_pc, demo_pjan, lfsi_emp_a, agr_r_accts, ef_lus_main), European Commission LEADER database (2024), accessed March 2026.

Table 2 highlights clear differences in the scale and structure of geographical indications between Poland and Portugal. Portugal has a total of 218 EU scheme-registered products, compared to only 49 in Poland, confirming a significantly higher level of development of the GI system. This advantage is particularly visible in the wine sector, where Portugal has 31 PDO and 14 PGI designations, while Poland has none. In the agri-food category, Portugal

also clearly dominates, with 95 PDO and 73 PGI products, compared to 10 and 26, respectively, in Poland. This reflects a stronger tradition of origin-based certification and product differentiation. In contrast, Poland shows a relatively higher number of TSG products (11 vs 1), indicating a greater emphasis on traditional recipes rather than geographically embedded branding. These differences reflect a more mature and market-oriented GI system in Portugal, while in Poland, the system remains less developed, with growth potential within EU quality schemes.

Table 2. Regional and protected products – Poland vs Portugal (2025)

Category (EU Scheme)	Poland	Portugal	EU total
PDO (Protected Designation of Origin) - food	10	95	1,850
PGI (Protected Geographical Indication) - food	26	73	1,400
TSG (Traditional Speciality Guaranteed) - food	11	1	65
PDO (Protected Designation of Origin) - wine	0	31	1,100
PGI (Protected Geographical Indication) - wine	0	14	1,200
GI (Geographical Indications) - spirit drinks	2	4	260
Total Geographical Indications (food + wine + spirits)	49	218	4,000

Source: European Commission, eAmbrosia – EU Geographical Indications Register and GIview Database. Data extracted on 20 March 2026. The analysis includes active registrations only (PDO, PGI, TSG and GI for spirit drinks) and excludes pending applications, cancelled registrations and duplicate entries.

The analysis shows that Poland and Portugal represent two distinct models of rural and agricultural development, shaped by differences in scale, specialisation, and institutional structures. Poland is characterised by a larger, more labour-intensive agricultural sector focused on volume production and supported by strong grassroots institutions such as Local Action Groups, which are more numerous in absolute terms, although their density per population is similar to Portugal's. In contrast, Portugal demonstrates a more specialised and market-oriented model, based on high-value products such as wine and a well-developed system of geographical indications, with 218 registered products compared to 49 in Poland. The absence of wine appellations (PDO/PGI) in Poland, alongside their strong presence in Portugal, further highlights the structural differences, suggesting that Portugal's advantage lies in product differentiation and international recognition, while Poland's development potential is rooted in institutional capacity and the expansion of quality-based branding systems.

Table 3 highlights clear differences in the production capacity underlying the development of local brand products in the analysed countries. Poland demonstrates a higher overall production potential, reflected in the greater value of agri-food output, a larger number of SMEs, and higher total value added, which indicates a strong capacity for scaling local brand production. In contrast, Portugal, despite its smaller absolute scale, shows a relatively higher share of employment in the food sector, suggesting greater specialisation

and a stronger orientation towards quality-based production. These findings are consistent with the broader patterns identified in the article, where Poland represents a volume- and capacity-driven model, while Portugal follows a more specialised and value-oriented trajectory. Consequently, both countries exhibit significant but structurally different abilities to produce local brand goods, reinforcing the argument that production capacity can support local branding through either scale or specialisation.

Table 3. Production capacity of the local brand product sectors in Poland and Portugal

Indicator	Poland	Portugal
Agri-food production value (billion €)	40	12
Employment in food sector (%)	2.5-3	3-4
Number of food SMEs	18,000	12,000
Value added in food sector (billion €)	15	8

Source: Eurostat (2024, 2025), Economic accounts for agriculture (EAA); Structural Business Statistics (SBS); Employment by industry (NACE Rev. 2), accessed February 2025.

Table 4 illustrates significant differences in the trade performance of agri-food products, reflecting distinct patterns of competitiveness and brand value in the analysed countries. Poland demonstrates a higher export volume and faster growth, indicating a strong position in large-scale, price-competitive markets. In contrast, Portugal, despite lower overall export values, shows a relatively higher orientation towards extra-EU markets, which suggests a stronger international positioning of niche, high-value products. These results confirm that Poland's export model is primarily volume-based, while Portugal relies more on differentiation and the added value associated with branded, origin-linked products. In the context of the article, this supports the argument that the development of local brands is closely linked not only to production capacity but also to the ability to position products in international markets through quality and specialisation.

Table 4. Trade performance of local brand products in Poland and Portugal

Indicator	Poland	Portugal
Export of food products (billion €)	45-50	8-10
Export growth (%)	8-10	6-8
Share of agri-food exports (%)	15-16	10-12
Intra-EU vs extra-EU exports (%)	~74% intra-EU / ~26% extra-EU	~70% intra-EU / ~30% extra-EU

Source: Eurostat: International trade in goods (COMEXT database); Trade in agricultural products statistics; calculations based on Eurostat data, accessed March 2025.

Table 5 highlights the role of tourism as a key mechanism linking local products with actual consumption and brand exposure in the analysed countries. Although Poland records

a higher number of tourist nights, the economic significance of tourism remains lower, which translates into a more limited impact on the commercialisation of local products. In contrast, Portugal demonstrates a stronger integration of tourism with the economy, reflected in a higher contribution to GDP and a greater share of tourist expenditure on food, indicating a more developed link between gastronomy and territorial branding. In the context of the article, this supports the argument that the effectiveness of local brand development depends not only on supply-side factors, but also on the ability to embed products within tourism-driven consumption systems.

Table 5. Tourism and consumption of local products in Poland and Portugal

Indicator	Poland	Portugal
Tourist expenditure on food (%)	25-30	30-35
Nights spent by tourists (million)	90-100	75-85
Tourism contribution to economy (% GDP)	4-5	8-10

Source: Eurostat tourism datasets (tour_occ_nim, tour_occ_ninat), Tourism satellite accounts; calculations based on Eurostat data and EU reports, accessed March 2025.

In the next table (Table 6), a synthetic comparison of the potential for the development of local brands in Poland and Portugal is presented, considering key structural, institutional, and market-related dimensions. The table integrates the previously analysed factors, providing a comprehensive overview of the conditions shaping local brand development in both countries.

Table 6 confirms the two distinct models of local brand development identified earlier in the article, resulting from structural, institutional, and market differences between the analysed countries. In particular, the complementarity of potentials is evident: Poland is characterised by a strong organisational and bottom-up base, while Portugal holds an advantage in terms of the maturity of the geographical indication system and its commercialisation. The comparison also demonstrates that the number of protected products alone is not a sufficient determinant of success; rather, their effective linkage with tourism, export activities, and international recognition play a crucial role. At the same time, the data presented in the table support the broader argument of the article that the development of local brands requires the integration of endogenous resources with effective governance and public policy frameworks.

Table 6. Potential for the development of local brands – a comparative analysis of Poland and Portugal

Dimension of Potential	Poland	Portugal	Comparative Interpretation
Number of registered GI products (food + wine + spirits)	approx. 45-50	approx. 180-220	Portugal has 4-5 times greater “critical mass” of protected products, which supports the development of strong umbrella brands
Share of the wine sector in the GI system	low	very high	In Portugal, wine constitutes a strong foundation for territorial branding and exports
Maturity of the appellation system (PDO/PGI)	relatively young	centuries-old tradition	Portugal has a well-established culture of origin labelling
Number of Local Action Groups (LEADER)	high (nationwide LAG network)	lower density of grassroots structures	Poland has a strong institutional base for developing bottom-up local brands
Degree of formalisation of local brands (certification, regulations)	high in many regions (LAGs, promotional labels)	diversified; strong in wine, weaker in other sectors	Poland – structural model; Portugal – sectoral model (wine)
Link between branding and tourism	moderate, regional	strong, integrated (wine tourism, slow tourism, agritourism, rural tourism, gastronomic tourism)	Portugal integrates product branding with place branding
Export orientation of regional products	limited	high (wine, olive oil, cheese)	Portugal uses GI as a tool for internationalisation
Cultural capital and culinary heritage	high, strongly regionally diversified	very high, internationally recognisable	Both countries have high cultural potential
Integration of brands with public policy	strong links with CAP rural programs and LEADER	strong links with the agri-wine sector and tourism	Different institutional logic
Potential for creating new local brands	high – due to an extensive LAG network and grassroots initiatives	high – due to product recognition and the strong position of wine	Poland – organisational potential; Portugal – market potential

Source: based on the data of the European Commission. (2025). eAmbrosia – The EU geographical indications register, <https://ec.europa.eu/agriculture/eambrosia/geographical-indications-register/>; European Union Intellectual Property Office & European Commission. (2025). GIview – Geographical indications database, <https://gi-view.ec.europa.eu>. Data accessed between February and March 2026. The comparative assessments (e.g. “high”, “moderate”, “strong”) represent qualitative interpretations derived from the quantitative indicators presented in Tables 1-5 and the reviewed literature.

Conclusions and Strategic Implications

The comparative analysis reveals substantial differences in the potential for local brand development in Poland and Portugal, resulting from distinct institutional, sectoral, and historical conditions. Portugal has a significantly larger number of products protected under EU quality schemes and a well-established appellation system, particularly in the wine sector, where geographical indications are closely linked with tourism and exports. Poland, despite having fewer registered geographical indications and a shorter tradition of origin protection, benefits from a strong organisational base supported by Local Action Groups and LEADER initiatives. The findings suggest that local brand development may be driven both by a high number of protected products and by strong institutional infrastructure and stakeholder cooperation. The analysis also indicates that local brands perform broader functions than quality certification alone, contributing to place identity, stakeholder integration, and territorial development. These findings provide a basis for several broader comparative conclusions regarding the mechanisms, determinants, and strategic directions of local brand development in both countries:

- Poland represents a bottom-up institutional model, whereas Portugal represents a sectoral appellation-based model of building local brands, reflecting two distinct strategic pathways of rural development based on either organisational capacity or market-driven product recognition;
- The potential for building umbrella brands may result from both from strong cooperation infrastructure (Poland) and a high number of protected names and their market recognition (Portugal); this indicates that local brands can emerge either as outcomes of coordinated governance systems or as extensions of historically embedded product reputation;
- Effective development of the regional products market requires the integration of three elements: quality schemes, brand management, and links with tourism and exports, which together form a strategic framework for enhancing the competitiveness and visibility of rural areas;
- Both countries have significant development potential; however, their structure and mechanisms of utilisation differ, suggesting that there is no single universal model of local brand development, but rather context-dependent strategies shaped by institutional, cultural, and sectoral conditions;
- From a strategic management perspective, the findings highlight that local brands should be treated as long-term territorial assets requiring coordinated governance, stakeholder engagement, and integration with broader development policies, rather than as isolated marketing tools;
- Consequently, the comparative analysis demonstrates that effective local brand development depends on the ability to align endogenous resources (heritage, products, social capital) with strategic management practices, including brand positioning, institutional coordination, and market-oriented integration with tourism and export activities;

- From an economic perspective, the comparison confirms that Poland's volume-based production and export model contrasts with Portugal's specialisation- and value-driven approach, highlighting that local brand competitiveness can be built either through scale efficiency or through quality-based differentiation and market positioning.

The results indicate that Poland possesses considerable potential for the further development of local and umbrella brands. This potential is associated with extensive cooperation networks, grassroots initiatives, and experience gained through rural development programmes. At the same time, the relatively limited number of geographical indications may constrain the international visibility of local products. Greater integration of promotional activities, wider recognition of quality schemes, and stronger links between local products, tourism, and regional branding could support the continued professionalisation of the sector. Portugal's experience highlights the advantages of combining geographical indications with tourism, exports, and territorial branding. The strong position of the wine sector and the large number of registered products provide a solid foundation for market recognition and international competitiveness. Future opportunities may be associated with extending successful branding approaches to other product categories and strengthening cooperation mechanisms that support local development beyond traditionally dominant sectors.

This study has an exploratory character and is based on secondary data aggregated at the national level. Therefore, the findings should be interpreted as indicative rather than conclusive and do not allow direct assessment of the economic effectiveness of individual local brands. Future research could focus on regional and local case studies, comparative analyses of specific branding systems, and empirical investigations of the economic and social impacts of local brands on rural competitiveness, entrepreneurship, and sustainable development.

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Socioeconomic and Perceptions Statuses: A Case Study of the Agri-Silviculture Community Growers in KwaZulu Natal Province, South Africa

Abstract. Agroforestry holds significant importance in South Africa as a sustainable land-use approach that tackles essential environmental and economic issues, such as climate change adaptation, food security, and the enhancement of rural livelihoods. By combining trees with crops and livestock, it improves soil health, boosts biodiversity, and offers varied income sources, including timber, fruit, and nuts, alongside agricultural products. However, the uptake of agroforestry in South Africa is progressing slowly due to such challenges as limited land availability, water scarcity, and insufficient technical knowledge, as well as misinformation and negative attitudes, particularly among smallholder farmers. Numerous authors have also pointed out that most of the agroforestry research has been conducted from a biophysical standpoint, yet socioeconomic factors related to farmers' perceptions require greater focus. Therefore, there exists a strong willingness among rural households to embrace these practices if provided with adequate support, highlighting the necessity for more effective integration into national policy. The current study aimed to assess the status of agri-silviculture practices concerning socioeconomic factors and community perceptions. The primary objectives included: (1) Identifying and describing the socioeconomic characteristics of selected agri-silviculture community growers, and (2) Evaluating the perception status of these growers. Therefore, this study contributes to the promotion of agroforestry, as it presents the opportunity to boost production and subsequently elevate community income. Identifying and addressing socioeconomic and perceptual factors related to agroforestry practices is crucial for the adoption of agroforestry, which encompasses both economic and sociological aspects. A purposive sampling method was employed to select 90 community growers involved in agri-silviculture (specifically Groundnuts and Eucalyptus Trees). The research employed both qualitative and quantitative methods concurrently and they were applied with the aim on establishing the limitations, balance, and strength of the data. Furthermore, the methods included participatory action research as the community growers and stakeholders benefitted while the research was ongoing. Data collection methods included site observations, past research, and web and governmental reports. The study involved a closed and open-ended questionnaire with the following sections: socioeconomics, food security, sustainability, perceptions, market information, and observations. The results indicated that most of the communities concurred and held a favourable view regarding the competitiveness of agroforestry practices in fulfilling their fundamental requirements for fuel wood, fruits, fodder, timber, vegetables, and more. They also recognised that the adoption of agri-silviculture practices was essential for the community, thereby enhancing its economic, social, and environmental welfare. It is thus recommended that the agri-silviculture practice be intensified throughout South Africa, as it contributes significantly to food security, market access, and sustainable livelihoods.

Keywords: agri-silviculture community growers, agroforestry, groundnuts and eucalyptus trees, rural economic development, sustainable development and income generation

JEL Classification: Q00, Q15

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Introduction

Agroforestry is a land use system that incorporates the combination of woody perennial plants, agricultural crops, and livestock to foster beneficial ecological and economic interactions for the production of food, fibre, and livestock. Furthermore, agroforestry is defined by the direct integration of trees and crops on the same land, either spatially or temporally, as outlined by Nair (1985). In contrast, an alternative method involves a "coarse-level mixing" of trees and crops across separate parcels (Price, 1995) or within designated "compartments" (Odum, 1969) on a farm, which is referred to as a "farm mosaic" or mixed farming. A well-managed agroforestry system offers numerous advantages and enhances livelihoods and income generation. In addition, agroforestry systems are tailored to specific areas and climates; therefore, it is essential to develop agroforestry systems that are relevant to local conditions and take into account the biophysical and socioeconomic contexts on an individual basis.

Furthermore, agroforestry significantly contributes to improving food security by providing a diverse range of products and benefits to farmers. These benefits include food, fodder, and shade for livestock, in addition to timber and renewable wood energy (Paul et al. 2017). It boosts agricultural productivity by fostering soil conservation, enhancing soil water retention, increasing soil organic matter, improving soil fertility, and delivering various ecosystem services (Aynekulu et al. 2019). This land use strategy holds substantial potential for mitigating climate change through carbon sequestration. Agroforestry, which involves the cultivation of trees alongside crops, is advocated as a suitable and sustainable alternative to conventional agriculture, as it fulfils the needs of landholders for food, income, and timber products. Agroforestry systems should also comply with the 4 I's (Integration, Intention, Interconnected & Intensive) and the 4 F's (Firewood, Fertiliser, Food & Fodder) (Paul et al. 2017).

Agroforestry offers a sustainable, on-farm solution to the collection of firewood from natural forests, thereby mitigating deforestation while enhancing household income and energy security. Integrating trees into agricultural land – through methods such as alley cropping, live fences, and woodlots – can fulfil up to 65% of a household's firewood requirements. As noted by Sibelet et al. (2019), wood fuel is essential for energy supply in sub-Saharan Africa (SSA) and is expected to continue being a major component of the energy mix for the population in the future. The researchers also highlighted that the improved agroforestry system accounted for 65% of the firewood, in contrast to just 7% from traditional cropping systems.

A research study carried out in the Limpopo and Mpumalanga Provinces of South Africa by Maponya et al. (2020) examined the indicators of the food security index: (1) Availability (Sufficient) (2) Accessibility (Physical, Social & Economic Access) (3) Utilisation (Dietary Needs, Safe & Nutritious) (4) Stability (Short Term) (5) Sustainability (Environmental, Social & Economic) (6) Agency (People & Food Preferences). The study employed standardised questions to inquire about participants' food security status (percentage food secure/insecure) and levels (Severe, Mild & Moderate). It was determined that the food security status of respondents prior to the interventions, which included land allocation,

provision of production inputs, and stipend payments, revealed a food insecurity percentage of over 65%. Following the intervention, which occurred after the growers had harvested groundnuts, Bambara nuts, maize, and vegetables (integrated with Moringa in the Vhembe District of Limpopo), it was observed that the majority of growers utilised their harvest for household consumption, while some were able to sell their produce in informal markets such as tollgates, pension pay points, and areas outside towns within their villages. According to Maponya et al. (2020), the incorporation of crop production played a significant role in reducing the food insecurity curve and enhancing the livelihoods of the community, as the final food insecurity percentage decreased to 20%, with most community growers categorised as mild and moderate.

Moreover, one of the benefits of specific agroforestry systems is the sustained production of high-value timber products, while also achieving immediate economic benefits from the livestock and forage components. In addition, grass-fed livestock generally fetch higher prices in the marketplace compared to their grain-fed equivalents. This scenario will be beneficial for the communities whose livestock graze within the plantations, providing a significant source of income. Agroforestry can also serve as an ecological substitute for chemical fertilisers by utilising "fertiliser trees" – nitrogen-fixing species (such as *Gliricidia* and *Faidherbia*) that enhance soil fertility, increase organic matter, and improve crop yields. Smallholder farmers gain from elevated and more stable yields without incurring the high expenses associated with chemical fertilisers.

In addition, agri-silviculture represents a system that integrates both crops and trees within the same landscape. As noted by Bentrup et al. (2019) and Maponya et al. (2022), the primary benefits of the agri-silviculture system include: (1) The production of various products such as food, vegetables, fruits, fodder, and forage essential for livestock, as well as fuel wood, timber, and leaf litter for organic manure production. (2) The enhancement and sustainability of crop productivity, which subsequently increases farmers' income levels. (3) The improvement of the nutritional value of animal feed through the provision of green fodder. (4) The practice serves as an effective method for soil nutrient recycling, thereby reducing the need for chemical fertilisers. (5) The enhancement of farm site ecology by mitigating surface runoff, soil erosion, nutrient loss, gully formation, and landslides. (6) The improvement of the local micro-climate, which boosts the productive capacity of the farm. (7) The alleviation of pressure on community forests and other natural forests for fodder, fuel wood, and timber. (8) The contribution to the beautification of surrounding areas.

South Africa is acknowledged as a semi-arid country that faces challenges related to water scarcity, particularly drought. As noted by Zerihun et al. (2014), Maponya et al. (2018), and Maponya et al. (2019), agroforestry practices are not significantly developed in South Africa. Zerihun et al. (2014) also highlighted those Southern African nations, including Malawi, Namibia, Tanzania, Zambia, and Zimbabwe, that reaped benefits from the Southern African Development Community (SADC) – International Centre for Research in Agroforestry (ICRAF) Zambezi Basin Agroforestry Project since the mid-1990s. In contrast, South Africa has not engaged in such institutional collaborations or national initiatives aimed at advancing agroforestry within smallholder farming systems. Nevertheless, in the tree-abundant savannah regions of South Africa, including areas of the Eastern Cape, Northern Natal, the Lowveld and Bushveld in the Northern Province, and the Kalahari where livestock

farming occurs, trees are preserved to provide additional fodder during drought seasons, serve as fencing material and firewood, stabilise soil, offer shade, and contribute to overall environmental conservation (Zerihun et al. 2014).

Nevertheless, the adoption of agroforestry in South Africa is advancing at a sluggish pace due to obstacles such as restricted land availability, water shortages, and a lack of technical expertise, in addition to misinformation and negative perceptions, especially among smallholder farmers. Numerous researchers have noted that the majority of agroforestry studies have been approached from a biophysical perspective; however, there is a pressing need to address the socioeconomic aspects related to farmers' perceptions. Consequently, there is a significant willingness among rural households to adopt these practices if they receive sufficient support, underscoring the importance of more effective incorporation into national policy.

Hence, the primary socioeconomic premise of agroforestry hypothesis that the incorporation of trees into agricultural systems enhances the livelihoods, economic resilience, and food security of rural families more efficiently than traditional monoculture, especially in areas that are degraded or susceptible to climate change. Furthermore, agroforestry systems are believed to boost overall farm productivity per unit area by utilising resources in a complementary manner and promoting diversification, thereby reducing financial risk and offering both immediate (crops) and prolonged (timber/fruit) income sources.

This research reiterates that farmer and community perceptions are defined as the subjective preferences of farmers, which are essential traits that can influence decision-making processes (Adesina and Baidu-Forson, 1995). These perceptions are shaped by a range of previous behaviours, experiences, and observations, along with future aspirations. Additionally, they are affected by various external factors, such as individual and household characteristics, institutions, socioeconomic conditions, and environmental factors (Jha, Kaechele and Sieber, 2019). Over time, farmers' and community perceptions may evolve as new information emerges and previous perceptions are adjusted (Meijer, Catacutan, Ajayi, Sileshi, and Nieuwenhuis, 2019). It is important to note that farmer/community impressions may not necessarily align with the reality. Consequently, to prevent biased outcomes, the study considers all farmer/community impressions, regardless of whether they accurately reflect reality or not.

In the present study, research was conducted with the overall aim to determine the status of the agri-silviculture practice in terms of socioeconomics, perceptions and food security. The major objectives were: (1) To identify and describe the socioeconomic characteristics of the selected agri-silviculture community growers. (2) To determine the perception status of the agri-silviculture community growers.

Methodology

Study Area

According to ARC (2017), the KwaZulu-Natal Province enjoys a reliable and consistent rainfall pattern, coupled with fertile soils, which have made its agricultural sector notably productive and esteemed for its specialised skills across diverse farming types. KwaZulu-Natal has a total of 6.5 million hectares allocated for agricultural purposes, with 82% of this area being ideal for extensive livestock farming, while the remaining 18% is classified as arable land (KZNDARD, 2020). At the heart of these innovative initiatives, there is the advancement of agriculture and a commitment to promoting the integrated development of sustainable rural enterprises that can further bolster the province's agricultural sector. The forestry industry in KwaZulu-Natal covers around 740,000 hectares, representing 8.2% of the province's overall area. Out of this, 560,000 hectares have been planted, while an additional 190,000 hectares of land, owned by forestry companies, remain unplanted.

A sampled 90 agri-silviculture community growers participated in the study and were spread as follows: The agri-silviculture community growers were spread on the Mondi Group plantation as indicated in Figure 1.

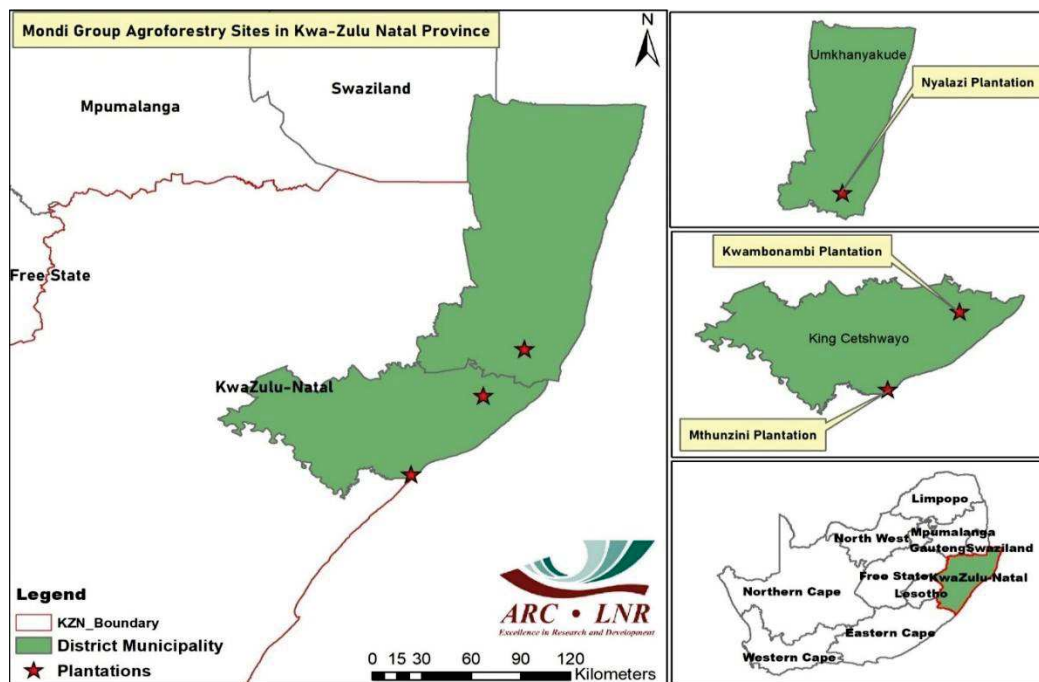


Fig. 1. Mondi Group Agroforestry Sites in KwaZulu Natal, South Africa

Source: ARC – NRE, 2024.

Study Design

The research employed both qualitative and quantitative methods concurrently and they were applied with the aim on establishing the limitations, balance, and strength of the data. Furthermore, the methods included participatory action research as the community growers and stakeholders benefitted while the research was ongoing. Data collection methods included site observations, past research, web and governmental reports. The study involved a closed and open-ended questionnaire with the following sections: socioeconomics, food security, sustainability, perceptions, market information, and observations. The closed-ended questions provided a question immediately, asked participants to choose from a list of possible responses, and were quantitative in nature, allowing the researcher to gather numerical data for statistical analysis. It took maximum 20 minutes to interview each community grower. On the other hand, the open-ended questions provided the participants with an allowance to construct their own response about the subject matter. The latter also included focus group discussions and field observations. The Mondi Group team conducted face-to-face interviews with the same 100 community growers who were interviewed in their native language for better understanding. The Mondi Group team were presented and trained on the PAR (Participatory Action Research) approach and data collection and analysis.

Sampling Procedure and Analytical Technique

A purposive sampling technique was used on selected 90 agri-silviculture community growers out of estimated 500 community growers. A rule of thumb was applied: the minimum selection of 10% of the population (estimated 500 agri-silviculture community growers), which is considered as a good sample size. These agri-silviculture community growers were spread on the 300 ha Mondi Group land and each agri-silviculture community grower was allocated an area of land, and the sample size was agreed with the stakeholder. The eucalyptus trees were then integrated with Groundnuts.

Data was captured and analysed using the software package for social sciences (SPSS version 20). Descriptive Analysis was used to describe data, while Univariate Regression Analysis was conducted to demonstrate the relationship and association of variables. Furthermore, Univariate Linear Regression is generally considered a simple linear regression when it refers to a model with one dependent variable and one independent variable. Hence, Univariate Regression Analyses were used to test the association of one explanatory variable at a time with the outcome without worrying about other variables or confounders (unconditional association). This is essential to shortlist variables for multivariable analysis, especially if there are a large number of explanatory variables. It also excluded the variables from further analysis that do not show any significant association with the outcome. Results of univariate logistic regression analyses included Wald, likelihood ratio, chi-square test statistics and P-values, parameter estimates and standard errors, and odds ratios and their confidence limits. For logistic regression, values of parameter estimates are not very intuitive as they are calculated on a log scale.

Therefore, odds ratios are examined, which are calculated after exponentiating parameter estimates. An odds ratio of <1 indicated negative association, whereas values >1 indicated positive association of the tested variable with the outcome.

The following econometric model was used to determine association of variables (Greene, 2003):

$$W_i = B_0 + B_1 * X_i + E_i \dots\dots\dots(1)$$

W_i is the dependent variable value for person i ;

X_i is the independent variable value for person i ;

B_0 and B_1 are parameter values;

E_i is the random error term;

The parameter B_0 is called the intercept or the value of W when $X = 0$;

The parameter B_1 is called the slope or the change in W when X increases by one.

The assessment tool variables predicted a 90% ($R\text{-squared} = 0.90$) variation in the dependent variable was explained by the independent variables. Prediction accuracies were assessed based on the coefficient of determination ($R\text{-squared}$). The coefficient of determination $R\text{-squared}$ was used to explain the total proportion of variance in the dependent variable explained by the independent variable (Table 1). The $R\text{-squared}$ removes the influence of the independent variable not accounted for in the constructs. $R\text{-squared}$ is always between 0 and 100%. In general, the higher the $R\text{-squared}$, the better the model fits the data.

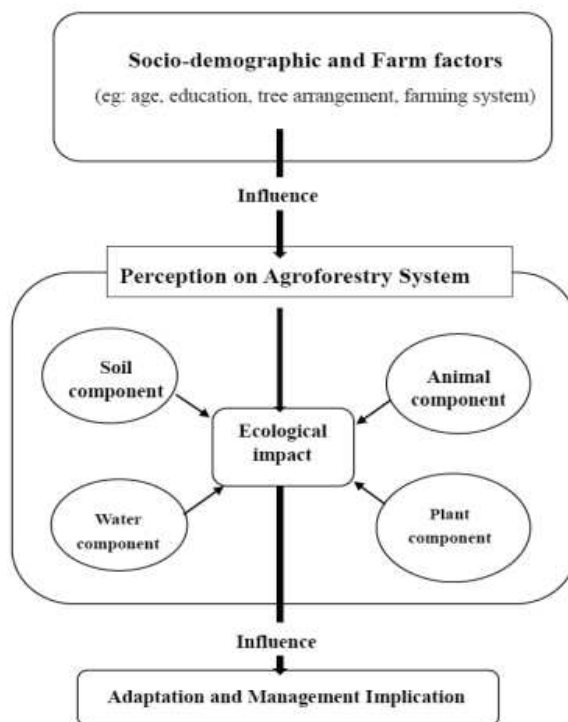


Fig. 2. Communities/ Farmers Perception Conceptual framework

Source: Ahmad et al. 2021.

In the current study, the social and economic factors play a crucial role in determining access to resources, as they fundamentally influence daily life and opportunities. These factors are inherently and significantly linked to outcomes such as community perceptions, among others. Additionally, socioeconomic factors are intrinsically connected and often encompass the collective impact of multiple variables at once, thereby enhancing the predictive power.

Table 1. Socioeconomic Factors Affecting Communities Perceptions

Variable	Coding system	Category	Signs
Dependant variable			
Community Perceptions	1 If causing decrease, 0 no decrease	Dummy	
Independent variable			
GEND	0 If male, 1 Female	Dummy	+
AGE	Age of the community member in years	Continuous	+
EDL	0 If have primary, 1 Otherwise	Dummy	-
FAR	Farming experience of the community member	Continuous	+
TRA	0 If Yes, 1 If No	Dummy	-

Source: Author's own work.

A detailed framework is required to illustrate the interaction of various factors in perception. In our research, we employed an analytical framework that includes both sociodemographic and agricultural factors influencing perceptions regarding the ecological effects of agroforestry (Fig. 2). This framework was developed to demonstrate that farmers' perceptions of the ecological impacts of agroforestry, categorised under four themes (soil, water, plant, and animal), arise from individual mental processes and are influenced by sociodemographic and agricultural factors. Numerous studies conducted globally have shown that sociodemographic and agricultural factors significantly impact respondents' perceptions (Sileshi et al. 2008; Sharmin and Rabbi, 2016; Fleming et al. 2019). Consequently, sociodemographic factors such as age, education level, and farming experience, along with agricultural factors like the origin of tree species, the type of agroforestry system, and the arrangement of tree planting, were integrated into the framework.

In addition, the respondents were asked on their perceptions on seven factors, namely: (1) Production (2) Demand (3) Related & Supporting Industries (4) Government Support (5) Organisational Strategy, Structure & Rivalry (6) Market, and (7) Chance. A 5-point Likert-type scale was used to assess the respondents' attitudes toward various agroforestry practices. The respondents were expected to select one of the options available for each statement/item. The responses of the sample households were then analysed using percentages because the Likert scale was measured on a scale of 1 to 5 (1 = strongly disagree, 5 = strongly agree, and 3 = not sure).

Research Results

Agri-silviculture Community Growers Selected Socioeconomic Characteristics

As shown in Table 2, the community growers originated from various districts, local municipalities, plantations, and villages throughout the KwaZulu Natal Province. The majority of the agri-silviculture community growers interviewed were female. According to Table 2, 92% of the interviewees were women, while only 8% were men. Regarding educational qualifications (Table 2), 96% of the growers had education below grade 7, whereas 4% had completed matric. A small percentage (14%) of community growers reported having received training in various aspects of agriculture and forestry, which has led some to engage in vegetable gardening. Furthermore, the community growers stated that they primarily relied on their indigenous knowledge system (IKS) for agroforestry practices. The findings on land acquisition (Table 2) revealed that the growers were provided land by Mondi Group for agricultural production. The age distribution among the growers indicated that most were over 56 years old (49%). As noted in Table 2, youth involvement is at 2%, with those aged 36-45 making up 14% and those aged 46-55 accounting for 35%. The farming experience of the agri-silviculture community growers is distributed as follows: 1-5 years (30%), 6-10 years (29%), 11-20 years (21%), and over 21 years (20%).

Table 2. Agri-silviculture Community Growers Selected Socioeconomic Characteristics

Variables	Community Growers	Structure, %	Variables	Community Growers	Structure, %
Province			Marital Status		
KwaZulu-Natal	90	100	Single	70	78
Districts			Married	20	22
uMkhanyakude	42	47	Age Categories		
King Cetshwayo	36	40	18-35	2	2
iLembe	12	13	36-45	13	14
Local Municipalities			46-55	31	35
Mandeni	12	13	>55	44	49
Umfolozzi	36	40	Level of Education		
Mtubatuba	42	47	Less Grade 7	86	96
Plantations			Matric	4	4
Kwa Mbonambi	36	40	Land Acquisition		
Mthunzin	12	13	Mondi Group Land	90	100
Nyalazi	42	47	Agroforestry Experience		
Villages			1-5	27	30
Slovo	36	40	6-10	26	29
Mbizimbelwe	12	13	11-20	19	21
Shikishela	42	47	>20	18	20
Gender			Training Provided		
Female	83	92	Yes	14	16
Male	7	8	No	76	84

Source: Author's own work.

Agri-silviculture Community Growers Perceptions

Perceptions were asked on seven factors namely: (1) Production (2) Demand (3) Related & Supporting Industries (4) Government Support (5) Organisational Strategy, Structure & Rivalry (6) Market and (7) Chance. A 5-point Likert-type scale was used to assess respondents' attitudes toward various agroforestry practices. Respondents were expected to select one of the options available for each statement/item. The responses of the sample households were then analysed using percentages because the Likert scale was measured on a scale of 1 to 5 (1 = strongly disagree, 5 = strongly agree, and 3 not sure).

The results indicated that the following 2/12 production factors (Table 3) do cause the most decrease in agri-silviculture system competitiveness: cost of production and labour, while the following 2/12 do not cause the most decrease in agri-silviculture system competitiveness: lack of knowledge and insufficient source of water. This is true as the community growers indicated that for agroforestry practice, they relied mostly on their indigenous knowledge system (IKS) that was passed from one generation to another. And insufficient water is not a challenge as the plantation area's high rainfall (+750mm per annum) hence the community growers indicated that they had moved to the plantation area due to its good climate.

Table 3. Production factors causing decrease / no decrease in agri-silviculture system community growers' competitiveness

Views The following production factors causing decrease / no decrease in agri- silviculture system community growers' competitiveness	Responses (90 Agri-silviculture system permit holders)					
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	%
Cost of production	37	8	8	7	40	100
Labour	11	4	37	37	11	100
Cost of unskilled labour	20	27	31	12	10	100
Quality of unskilled labour	20	30	24	17	9	100
Availability of unskilled labour	12	30	35	14	9	100
Cost of skilled labour	9	29	28	25	9	100
Availability of skilled labour	14	32	38	15	1	100
Administration cost associated with labour matters	21	23	31	15	10	100
Insufficient source of water	8	43	15	19	15	100
Infrastructure	11	32	20	21	16	100
Lack of knowledge	11	56	12	11	10	100
Lack of technology	10	28	25	23	13	100

Source: Author's own work.

The results indicated that most of the demand factors (Table 4) did cause a decrease in agri-silviculture system competitiveness: The five most influential demand factors included:

Distance to market (79%), Market information (64%), Cost to the market (65%) and quality of product (50%). However, 69 % of the community growers disagreed that market for agroforestry do cause decrease in agri-silviculture system competitiveness.

Table 4. Demand factors causing decrease / no decrease in agri-silviculture system community growers' competitiveness

Views The following demand factors causing decrease / no decrease in agri-silviculture system community growers' competitiveness	Responses (90 Agri-silviculture system permit holders)					
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	%
Distance to market	6	7	8	29	50	100
Market information	11	15	10	29	35	100
Cost to the market	7	17	11	54	11	100
Quality of products	6	35	9	44	6	100
Market for agroforestry	32	37	9	11	11	100

Source: Author's own work.

The results indicated that the electricity suppliers (58%) (Table 5) did not cause decrease in agri-silviculture system while the financial institutions (53%) caused the most decrease in agri-silviculture system competitiveness. The lack of funding/support from financial institutions to purchase production inputs like seeds remains a huge challenge for the community growers. These findings are in line with Kerr et al. (2019), who concluded that there was more research needed on perceptions so that California's Central Valley became renowned not only for its agricultural output, but also for its diverse and sustainable perennial cropping systems. This also includes the role of financial institutions in supporting agroforestry practice.

Table 5. Related and supporting industries causing decrease / no decrease in agri-silviculture system community growers' competitiveness

Views The following related and supporting factors causing decrease/no decrease in agri- silviculture system community growers' competitiveness	Responses (90 Agri-silviculture system permit holders)					
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	%
Financial institutions	11	17	19	46	7	100
Research institutions	19	28	20	22	11	100
Suppliers	26	15	26	21	12	100
Electricity suppliers	29	29	28	7	7	100

Source: Author's own work.

The results indicated that poor interaction and support between government (59%) and indirect support (52%) (Table 6) did not cause a decrease in agri-silviculture system competitiveness. Furthermore, among the six government factors, Land reform policy (87%) was perceived as the most important factor causing a decrease in agri-silviculture system competitiveness. This is not surprising as the community growers indicated that they were constrained by the unavailability of land in their villages hence the plantations offered more land for production.

Table 6. Government support causing decrease / no decrease in agri-silviculture system community growers' competitiveness

Views The following government support causing decrease / no decrease in agri-silviculture system community growers' competitiveness	Responses (90 Agri-silviculture system permit holders)					
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	%
Poor interaction and support between Government	30	29	3	12	26	100
Indirect support	41	11	7	11	30	100
Trade policy	1	30	36	22	11	100
Land reform policy	6	3	1	67	23	100
Labour policy	9	12	43	26	10	100
Fiscal policy	9	12	39	27	13	100

Source: Author's own work.

The results indicated that the pricing strategy (53%) (Table 7) did not cause decrease in agri-silviculture system while most of the communities were not sure. This is consistent with the researchers' observations because community growers determine their own prices at the informal market. Therefore, they have the freedom to use their own pricing strategies without any interference from the agents etc. These findings hold significant importance as one of the motivations for conducting agroforestry research in South Africa's inland and coastal regions stems from the variations in the socioeconomic and cultural challenges faced by different communities. While certain communities favour the integration of trees with groundnuts or beans, others opt for the integration of trees with grass, trees with bees, or trees with mushrooms.

Table 7. Organisational strategy, structure, and rivalry causing decrease / no decrease in agri-silviculture system community growers' competitiveness

Views The following organisational strategy, structure and rivalry causing decrease / no decrease in agri-silviculture system community growers' competitiveness	Responses (90 Agri-silviculture system permit holders)					
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	%
Adaptability	6	26	49	8	11	100
Culture	23	12	46	9	10	100
Structure	14	13	26	20	27	100
Flexibility	11	24	22	13	30	100
Pricing strategy	14	39	22	20	5	100

Source: Author's own work.

The results indicated that the following market factors (Table 8) did cause a decrease in agri-silviculture system: Market power of suppliers (69%) and Market power of buyers (69%). Community growers who had some market power over some have created a lot of uncertainties in some agroforestry sites in South Africa. According to Maponya et al. (2022), some community growers tried to use bargaining marketing approach which only benefitted a few. In addition, the power of buyers sometimes resulted in low prices for their groundnuts.

Table 8. Market factors causing decrease / no decrease in agri-silviculture system community growers' competitiveness

Views The following market factors causing decrease / no decrease in agri-silviculture system community growers' competitiveness	Responses (90 Agri-silviculture system permit holders)					
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	%
Market power of suppliers	2	14	15	52	17	100
Market power of buyers	15	9	7	54	15	100
Threat of substitutes	10	22	35	22	11	100
Threat of new substitutes	26	20	31	20	3	100

Source: Author's own work.

The results indicated that out of 9 chance factors (Table 9), crime (51%) caused a decrease in agri-silviculture system. Other chance factors like AIDS (44%) and Drought (47%) do also cause significant decrease in agri-silviculture system. In addition, Maponya et al. (2022) emphasised that crime, e.g. poaching, was a challenge as the result of lack of fencing and again community growers moved to the plantation area due to its good rainfall as compared to their villages, which are dry.

Table 9. Chance factors causing decrease / no decrease in agri-silviculture system community growers' competitiveness

Views The following chance factors causing decrease / no decrease in agri-silviculture system community growers' competitiveness	Responses (90 Agri-silviculture system permit holders)					
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	%
Economic stability	7	28	38	19	8	100
AIDS	7	22	27	34	10	100
Political stability	9	17	45	16	13	100
Price stability	11	18	48	19	4	100
Crime	7	27	15	40	11	100
Drought	10	32	11	32	15	100
Floods	11	36	16	28	9	100
Fires	13	33	19	27	8	100
Frost	9	12	51	15	13	100

Source: Author's own work.

The results (Tables 3–9) highlighted that most community members perceived production factors, demand conditions, related and supporting industries, government support, and chance as causes for a decrease in agroforestry competitiveness. Furthermore, most community members indicated that firm strategy, structure, and rivalry were not causing a decrease in agroforestry competitiveness as many community members strongly disagreed and disagreed or not sure. The identified community growers' perceptions are in line with some of the researchers' field observations. Identifying and addressing the primary perceptions and elements that influence the competitiveness of farmers in agroforestry practices is crucial for the adoption of agroforestry, which encompasses both economic and sociological aspects.

The Socioeconomic Factors Affecting Perceptions of Agri-Silviculture Community Growers

As shown in Table 10, there is a positive significant level among the following variables: age, gender, farming experience, and community perceptions. The estimated values support this observation, as they exceed 1 within the 95% confidence interval. Age did have a significant impact on the community's grower's knowledge and perceptions. The agroforestry practice is dominated by older community growers. This situation is concerning and highlights the urgent need to attract the younger generation to agroforestry as a critical priority. However, observations from various provinces in South Africa indicate that youth are more involved in the marketing phase of agroforestry practices rather than in soil preparation and production. A similar trend of youth participation was noted in the Limpopo, Mpumalanga, Eastern Cape, and Western Cape Provinces (Maponya et al. 2022). Recent research carried out in the Indus River Basin of Pakistan and Bangladesh has indicated that younger farmers exhibit a greater interest in adopting agroforestry practices compared to

their older counterparts. This trend is attributed to their enhanced understanding of the advantages associated with the implementation of advanced agricultural technologies in agroforestry practices (Mahmood and Zubair, 2020). The agri-silviculture system in KwaZulu Natal is also dominated by women as most men have migrated to the cities in search of work.

Table 10. Univariate Analysis Determining Socio Economic Factors Affecting Communities Perceptions

Variable	Odds Ratio	Intervals
Age	1.399	[0.32 – 40.1]
Education Levels	0.79	[0.2 – 66.9]
Gender	1.22	[0.06 – 0.68]
Farming Experience	1.25	[0.20 – 2.79]
Training Provided	0.58	[0.15 – 10.7]

OR= Odds Ratio; 95%CI = 95% Confidence Intervals; 1< = No Association; 1> = Association

Source: Author's own work.

Furthermore, while both men and women participate in the management of trees cultivated on farms, existing literature indicates that women predominantly carry out most of the work, particularly during the initial phases of tree establishment. Research conducted by Epahra (2001) in Tanzania and by Gerhardt and Nemarundwe (2006) in Zimbabwe revealed that more than 60% of women in Tanzania are tasked with the management of tree species planted on farms. It is also not surprising that there is a positive significant level between farming experience and community perceptions. The communities expressed that it is through prolonged experience that they can effectively manage their designated plots. Consequently, they predominantly depended on their indigenous knowledge system (IKS) for agroforestry practices rather than formal training. As noted by Jose (2009) and Rao et al. (1997), the years of experience within the communities show a significant and positive correlation in perception studies. Thus, farmers with greater experience have noted improvements in these variables compared to those with less experience.

The above findings emphasised that the age of individuals significantly influenced the knowledge and perceptions of growers within the community. Older growers predominantly dominate the agroforestry practice. This scenario raises concerns and underscores the pressing necessity to engage the younger generation in agroforestry as a vital priority. Nevertheless, observations from different provinces in South Africa reveal that young people are more engaged in the marketing aspect of agroforestry practices rather than in soil preparation and production. A comparable trend of youth involvement was observed in the Limpopo, Mpumalanga, Eastern Cape, and Western Cape Provinces (Maponya et al. 2022).

Conclusions and Recommendations

Agroforestry, which involves the deliberate incorporation of trees and shrubs into agricultural and livestock farming systems, serves as a sustainable land-use approach that connects agriculture with forestry. This practice is being increasingly embraced to tackle issues such as climate change, food insecurity, and the decline of biodiversity. The advantages of agroforestry encompass the following:

Environmental Sustainability

- **Soil Health & Conservation:** Trees play a crucial role in minimising soil erosion, preventing landslides on inclines, enhancing water retention, and boosting fertility through the process of nutrient cycling.
- **Climate Change Mitigation/Adaptation:** Agroforestry systems can sequester a substantial amount of carbon (33%–73% more than traditional systems) within soil and biomass. Additionally, they serve as windbreaks and alter microclimates, resulting in a temperature reduction of 2–5°C, which alleviates heat stress on crops.
- **Biodiversity Enhancement:** These systems foster habitats for a variety of flora and fauna, including pollinators and beneficial insects that contribute to natural pest management.

Economic & Social Benefits

- **Diversified Income:** Offers various sources of revenue (such as fruits, timber, fodder, and medicinal products), ensuring stability in the face of market volatility.
- **Improved Food Security:** Strengthens nutrition and livelihoods for smallholder farmers, particularly in developing areas.
- **Reduced Inputs:** Leguminous trees have the ability to fix nitrogen, which can decrease the reliance on synthetic fertilisers by as much as 75%.

However, agroforestry has also some weaknesses/challenges which includes:

- **Economic Barriers:** The substantial initial investment costs and the prolonged, often delayed returns on investment are due to the time required for trees to mature.
- **Technical Complexity:** There is a necessity for specialised expertise to choose compatible species, manage intercropping effectively, and address potential competition for light, water, and nutrients.
- **Operational Constraints:**
 - **Reduced Flexibility:** The establishment of perennials entails a long-term commitment, which can hinder farmers' ability to swiftly adjust to evolving market conditions.
 - **Land Tenure Issues:** Ambiguities surrounding land and tree tenure rights frequently discourage long-term investments in trees.
 - **Crop Competition:** Trees that are not managed properly may excessively shade crops or compete for water, which could lead to a decrease in yields.

Hence, recognising and tackling main perceptions and factors that determine the competitiveness of the communities in agri-silviculture practices is relevant to the agroforestry adoption. The respondents were asked about their perceptions on seven factors, namely: (1) Production (2) Demand (3) Related & Supporting Industries (4) Government

Support (5) Organisational Strategy, Structure & Rivalry (6) Market and (7) Chance. A 5-point Likert-type scale was used to assess the respondents' attitudes and perception toward various agri-silviculture practice. Most of the communities accepted and had a positive perception of agroforestry practices in terms competitiveness to meet their basic needs regarding fuel wood, fruits, fodder, timber, vegetables, and so on, as well as accepted that agri-silviculture practice was critical for the community to adopt, thus benefiting the economic, social, and environmental well-being of the community. In conclusion, the identified community perceptions are in line with some of the researcher field observations and it is thus recommended that stakeholders should take note of the perceptions identified by the communities and the positive significant levels among the following variables: age, gender, farming experience, and community perceptions to increase agri-silviculture system competitiveness in South Africa.

The following areas for further research are recommended:

- Site-Specific Modelling: Creating models aimed at optimising tree-crop combinations tailored to local soil, slope, and climatic conditions.
- Economic Valuation & Policy: Engaging in further research to assess the value of non-market ecosystem services (such as carbon and biodiversity) and formulating financial incentives for their adoption, including payments for ecosystem services (PES).
- Long-Term Impact Studies: Implementing extensive soil sampling and longitudinal studies to gain a deeper understanding of carbon sequestration potential, as short-term studies may obscure variability.
- Technological Integration: Employing precision agriculture and remote sensing technologies to enhance the management and monitoring of agroforestry systems.
- Social and Gender Dimensions: Investigating the contributions of women, youth and smallholders in management, along with the sociocultural factors that facilitate or impede adoption.

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Market Performance: Market Margin, Efficiency, and Income Inequality among Bell Pepper (*Capsicum annuum*) Traders in Jos-North, Plateau State, Nigeria

Abstract. Bell pepper (*Capsicum annuum*) is a high-value vegetable in Nigeria, but its marketing is hindered by perishability, inefficiency and income inequality among traders. This study examined the socioeconomic characteristics of bell pepper traders, market channels, marketing margins, efficiency, income distribution, inequality, and determinants of market margins in Jos-North Local Government Area (LGA), Plateau State. Primary data were collected from 120 randomly selected traders using structured questionnaires and analysed with descriptive statistics, market margin and efficiency analysis, Gini coefficient, and Ordinary Least Square (OLS) regression. Findings indicate that most traders are middle-aged, literate, predominantly female, and primarily engaged in trading. Six marketing channels were identified, with bulk transactions through commission agents and wholesalers dominating. Market margin analysis reveals that trading is profitable, with inefficiency index (M.E.I = 0.33), and a high level of income inequality among traders. Regression results show that education, marketing experience, quantity sold and marketing costs significantly affect marketing margins. Policy recommendations include improving access to credit, investing in storage facilities, enhancing market information flow, and promoting cooperative marketing structures. The study provides empirical insights for enhancing efficiency, equity, and profitability in vegetable marketing across sub-Saharan Africa.

Keywords: bell pepper marketing, income inequality, market efficiency, Nigeria, vegetable trade

JEL Classification: Q12, D63, L11

Introduction

Bell pepper (*Capsicum annuum*) is a globally significant agricultural commodity due to its high economic, nutritional, and medicinal value, recognised as a rich source of natural pigments, antioxidants, and essential micronutrients such as vitamin C, vitamin A, and carotenoids (FAOSTAT, 2022). Globally, bell pepper ranks among the most important fruit vegetables after tomatoes, contributing substantially to household nutrition, agroprocessing industries, and international vegetable trade (Zohoungbogbo et al., 2025). Its global production has expanded steadily, driven by increased awareness of its health benefits and rising demand for fresh and processed vegetables in both domestic and export markets (FAOSTAT, 2022; USDA, 2020).

Agricultural marketing systems play a critical role in determining the distribution of value along commodity supply chains. Marketing margin theory explains the price spread between producers and final consumers as a function of marketing costs, value addition, and market structure (Ismail et al., 2014). Inefficient and competitive markets margins largely reflect the cost of services such as transportation, storage, sorting, and processing. However,

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in imperfect markets characterised by weak infrastructure, information asymmetry, and market concentration, excessive margins may indicate inefficiencies and unequal distribution of benefits among market actors (Liverpool-Tasie et al., 2025; USDA, 2020). Similarly, the Structure–Conduct–Performance (SCP) framework suggests that market structure influences trader conduct and ultimately affects market performance outcomes, including efficiency, profitability, and income distribution.

In Africa, Nigeria remains the leading producer of bell pepper, contributing approximately 50% of the continent's output, largely from the northern regions (Zohoungbogbo et al., 2025). Despite this production advantage, inefficiencies in vegetable marketing systems continue to constrain equitable income distribution among market participants. Bell pepper marketing is characterised by high perishability, poor storage facilities, inadequate transport infrastructure, price volatility, and dependence on multiple intermediaries (Mosisa, 2018; Bukar et al., 2015). These conditions increase transaction costs, reduce marketing efficiency, and may widen income disparities among traders operating at different scales.

Bell pepper marketing in Nigeria commonly involves producers, assemblers, wholesalers, retailers, and commission agents operating through multi-layered channels (Liverpool-Tasie et al., 2025; Mosisa, 2018). Although intermediaries facilitate product movement and market coordination, excessive intermediation may reduce operational efficiency and disproportionately concentrate marketing benefits among dominant actors within the supply chain. Consequently, differences in access to capital, market information, storage facilities, education, and bargaining power often translate into unequal income outcomes among traders (Onuwa et al., 2022; Ogunniyi et al., 2021).

Income inequality within agricultural marketing systems has important implications for inclusive growth, investment capacity, and livelihood sustainability. The Gini coefficient is widely used to assess the degree of income concentration among market participants and provides insight into the equity dimension of market performance (Onuwa, 2024; Katharina & Stefan, 2011). High inequality in agricultural markets may limit participation of small-scale traders, weaken market competitiveness, and reduce the effectiveness of value-chain interventions (Adejonu et al., 2022; Ogunniyi et al., 2021).

Existing empirical studies on vegetable marketing in Nigeria have largely focused on market channels, profitability, or marketing efficiency independently, with limited integration of income inequality into market performance analysis (Onuwa, 2024; Haruna et al., 2012). Moreover, few studies have empirically linked trader characteristics, marketing costs, and market structure to distributional outcomes within bell pepper markets. This study addresses this gap by integrating market channel analysis, marketing margin, marketing efficiency, and income inequality assessment within a unified analytical framework. The study therefore contributes to current discourse on efficient and inclusive agri-food marketing systems by examining how market structure and marketing practices influence both profitability and income distribution among bell pepper traders.

Therefore, the broad objective of this study is to evaluate market performance and income inequality among bell pepper traders in Jos-North Local Government Area, Plateau State, Nigeria. Specifically, the study seeks to describe the socioeconomic characteristics of traders; map marketing channels and commodity flow; evaluate marketing margins and efficiency; compute the Gini index to assess income inequality; identify determinants of marketing margins using econometric analysis; and examine constraints affecting bell pepper

marketing. To guide the empirical analysis, the study tests the null hypothesis that there is no significant relationship between marketing costs and market margin.

Methodology

This study was carried out in Jos-North LGA of Plateau State. The LGA has coordinates between latitude 9°40'N and 10°345'E; and longitude 8°40'N and 9°50'E. It has an average temperature of between 18°C – 30°C, with an altitude of about 1500 metres above sea level and annual rainfall of between 1300 mm – 1500 mm per annum. Jos North LGA has an area of 291 km² (National Bureau of Statistics [NBS], 2010). The LGA has one district (Gwong district) and thirteen wards, namely: Naraguta A, Naraguta B, Abba na Shehu, Ibrahim Katsina, Ganagare, Vandepuye, Tudun-Wada, Jenta, Garba-Daho, Tafawa-balewa, Jos Jarawa, Ali Kazaure, and Sarkin Arab ward. It has an upland area with undulating hills, mountains, forest reserves, rivers, settlement, and fertile agricultural land for dry and rainy season farming (NBS, 2010).

Data

The primary data were collected in 2022 through the administration of structured questionnaires to bell pepper traders in Jos-North Local Government Area (LGA), Plateau State. The questionnaire elicited information on the respondents' socioeconomic characteristics, marketing activities, costs and returns, sources of market information, marketing constraints, and income distribution. A multi-stage sampling technique was employed. First, Jos-North LGA was purposively selected because it is one of the largest urban commercial hubs for agricultural produce marketing in Plateau State and serves as a major aggregation and distribution centre for bell pepper traded within the state and neighbouring regions.

Although the study was limited to a single LGA, Jos-North was considered appropriate due to its strategic role in the bell pepper marketing system, high concentration of traders, diverse market participants, and extensive market linkages, making it a suitable case study for understanding bell pepper marketing dynamics in the state. However, the findings should be interpreted primarily within the context of Jos-North LGA and similar urban marketing environments. Second, six major vegetable markets; Jos-Jarawa, Farin-Gada, Kabong (Gada-Biu), Satellite, Chobe, and Terminus, were purposively selected based on the volume and intensity of bell pepper trading activities. These markets account for a substantial proportion of bell pepper transactions within the LGA and collectively capture variations in trader characteristics, market size, and trading operations. Third, a simple random sampling technique was used to select respondents from a compiled sampling frame of registered and identifiable traders obtained with the assistance of market leaders, local enumerators, and extension agents, thereby ensuring that each trader had an equal chance of being selected.

Table 1. Sample Frame and Size Distribution

S/N	District	Commodity Market		Sample Frame	Sample Size (0.35)
1	Gwong	i.	Farin-Gada	75	26
		ii.	Jos-Jarawa	60	21
		iii.	Terminus	48	17
2	Kabong	iv.	Satellite	86	30
		v.	Gada-biu	47	16
3	Laranto	vi.	Chobe	30	10
Total:				346	120

Source: field survey.

The sampling frame comprised 346 bell pepper traders distributed across the selected markets. A sample size of 120 respondents, representing approximately 35% of the total population, was selected using the constant proportionality sampling approach (Table 1). The relatively large sampling fraction was adopted to enhance representativeness, reduce sampling bias, and adequately capture heterogeneity in trader characteristics and marketing practices across the selected markets. Furthermore, the sample size was validated using the Raosoft sample size calculator at a 95% confidence level and a 10% margin of error, confirming its adequacy for statistical analysis and inference within the study area. Consequently, while the study does not claim statistical representativeness for all bell pepper traders in Plateau State, the combination of a large sampling proportion, coverage of the principal bell pepper markets, and random selection of respondents provides a robust basis for drawing reliable conclusions about bell pepper marketing in Jos-North LGA.

Methods Applied

The study employed a combination of descriptive, analytical, and econometric techniques to evaluate market performance and income inequality among bell pepper traders. Descriptive statistics such as frequencies, percentages, means, and tables were used to analyse traders' socioeconomic characteristics, marketing channels, and marketing constraints. Marketing margin and marketing efficiency analyses were employed to evaluate profitability and operational efficiency within the bell pepper marketing system. The Gini coefficient was used to assess the degree of income inequality among traders and determine the extent of income concentration within the market structure (Onuwa, 2024; Katharina & Stefan, 2011).

To further explain variations in trader profitability, Ordinary Least Squares (OLS) regression analysis was employed to estimate the determinants of market margin, with particular emphasis on marketing cost, education, experience, cost price, and quantity sold. Although the regression model does not directly estimate inequality determinants, it provides insight into the market-related factors influencing trader earnings and margin differentials, which contribute indirectly to income disparities within the marketing system. These analytical approaches are widely applied in agricultural marketing and market performance studies due to their suitability for evaluating profitability, efficiency, and distributional outcomes (Greene, 2002; Wooldridge, 2000).

Model Specification

Market Margin

Market margin represents the difference between selling and purchase prices and reflects value addition within the marketing chain (Greene, 2002). It is expressed as presented in equation (1):

$$M.M = P_2 - P_1 \dots\dots\dots (1)$$

Where:

M.M – market margin between level 1 and 2 in [₦ (Nigerian Naira) /kg];

P₁ – price at market level 1 (cost price and marketing costs), in (₦/kg);

P₂ – price at market level 2 (selling price) in (₦/kg).

Marketing Efficiency

Marketing efficiency is defined as the ratio of marketing margin to marketing cost. It measures the ability of marketers to maximise returns relative to operational costs incurred during product exchange and distribution (Sreenivasa et al., 2023). In this study, marketing efficiency is expressed as presented in equation (2):

$$M.E. = \text{Marketing margin (profit)} \div \text{Marketing Cost} \dots\dots\dots (2)$$

According to the decision rule, a value of M.E. = 1 indicates breakeven efficiency, M.E. < 1 indicates low marketing efficiency, while M.E. > 1 suggests relatively higher operational efficiency. Marketing costs considered in this study include transportation, handling, market charges, commission fees, loading/offloading, storage, packaging, grading, and sorting activities.

Gini Coefficient

The Gini coefficient (G) measures income inequality among traders and ranges between 0 (perfect equality) and 1 (perfect inequality). This measure is widely applied in agricultural income distribution studies (Ogunniyi et al., 2021; Adejonu et al., 2022). The Gini Coefficient (G) is presented in equation (3):

$$G = 1 - \sum X_i Y_i \dots\dots\dots (3)$$

Where:

X_i – percentage of traders in the *i*th class;

Y_i – percentage of trader's gross income in the *i*th class;

i – *i*th class of traders.

Ordinary Least Square (OLS) Regression

OLS is used to estimate the relationship between market margin and its determinants (Greene, 2002; Wooldridge, 2000). The implicit form is expressed in equation (4):

$$Y_i = \beta_0 + \beta_i X_i + \varepsilon_i \dots\dots\dots (4)$$

Where:

Y_i – market margin (₦/kg);

β₀ – intercept;

X_i – vector of the predictors (independent variables);

β_i – vector of the estimated parameters;

ε_i – error term.

In its explicit form, the model is presented in equation (5):

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i \dots\dots\dots (5)$$

Where:

Y – marketing margin [₦ (Naira) /100kg bag];

β_0 – intercept;

$\beta_1 - \beta_5$ – coefficient of parameters to be investigated;

X_1 – education (years spent in school);

X_2 – marketing experience (years);

X_3 – cost price (₦);

X_4 – quantity sold (kg);

X_5 – marketing cost (₦);

ε_i – error term.

Results and Discussion

Socioeconomic Characteristics of the Respondents

The study reveals that bell pepper marketing in Jos-North LGA is predominantly driven by economically active individuals aged 30–49 years (58% of respondents, mean age: 33 years). Female traders slightly outnumber males (54% vs. 46%), which highlights women's central role in agricultural trade. Married respondents constitute 53%, and 72% have completed secondary education. Household size averages five members, with mean marketing experience of 6.1 years. Most respondents (70%) engage in trading as their primary occupation. Regarding financing, 46% use personal savings and 43% depend on relatives/friends, while only 6% access formal bank credit. Trade association membership is very low (9%) and market information is largely obtained through informal channels (53% from middlemen, 39% from fellow traders). These findings indicate that while traders are commercially oriented, structural constraints such as limited formal credit, low cooperative participation, and reliance on informal information impede efficiency and income equity (Table 2 and Figures 1-4) (FAOSTAT, 2022; Onuwa et al., 2017; Sanusi & Ayinde, 2013; Udegbe et al., 2012).

Table 2. Socioeconomic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)	Mean
Age	≤ 29	45	38	33 years
	30–49	70	58	
	≥ 50	5	4	
Gender	Female	65	54	–
	Male	55	46	
Marital Status	Married	63	53	–
	Single	57	47	
Education Level	Primary (≤6 years)	4	3	–
	Secondary (7–12 years)	86	72	
	Tertiary (≥13 years)	30	25	
Household Size	≤ 9	116	96	5 people
	10–19	3	3	
	≥ 20	1	1	
Marketing Experience	≤ 9 years	90	75	6.1 years
	10–19 years	20	17	
	≥ 20 years	10	8	

Source: field survey.

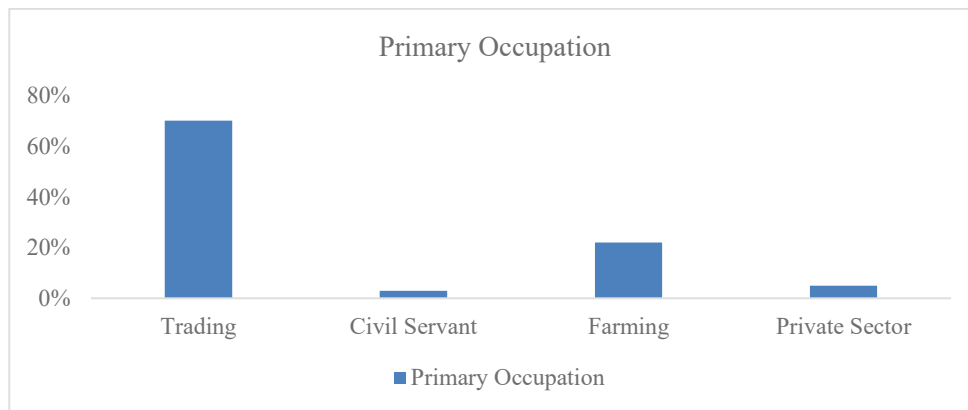


Fig. 1. Distribution Based on Primary Occupation

Source: field survey.

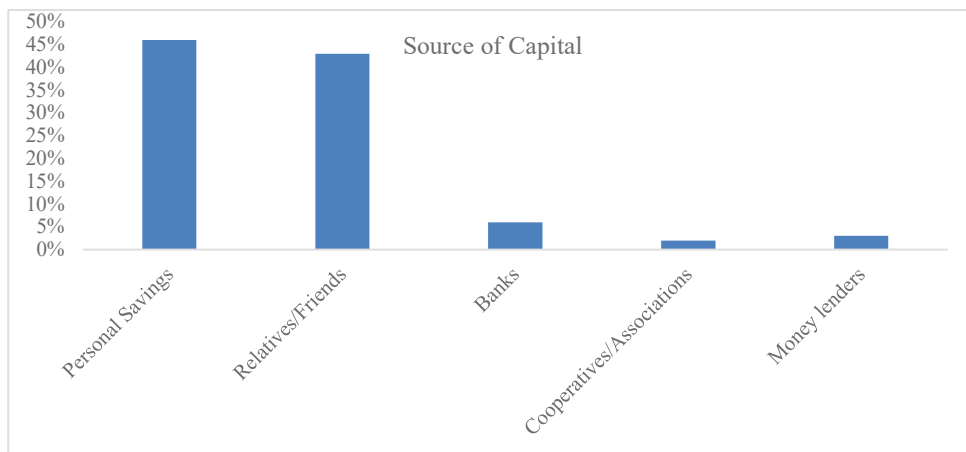


Fig. 2. Distribution Based on Source of Capital

Source: field survey.



Fig. 3. Distribution Based on Membership of Trade Association

Source: field survey.

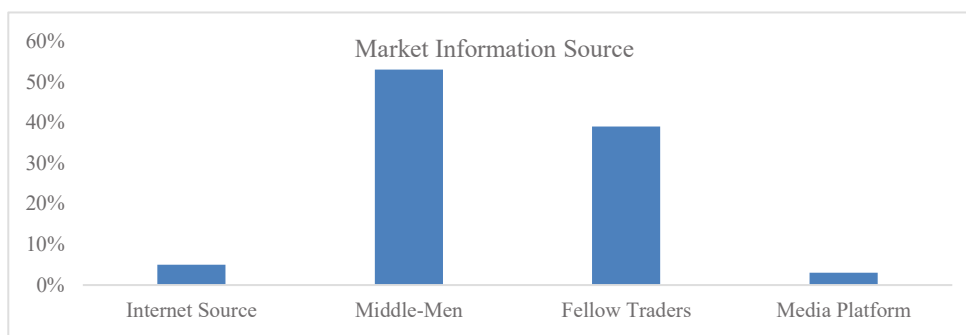


Fig. 4. Distribution Based on Source of Market Information

Source: field survey.

Market Channels

The dominance of intermediary-based marketing channels in the study area reflects patterns typical of developing economies, where multiple actors facilitate the movement of produce from farmers to consumers (Mosisa, 2018). While intermediaries reduce transaction costs and improve market coordination, they also capture a significant share of marketing margins (Ismail et al., 2014). The study identifies six distinct bell pepper marketing channels in Jos-North LGA, differing in length and level of intermediation, with implications for efficiency, price transmission, and income distribution (Table 3). The dominant channel (36%) – Producers → Commission Agents → Wholesalers → Retailers → Consumers – highlights the central role of commission agents in aggregation and market linkage, as well as the limited direct market access for producers, who depend on intermediaries for pricing and coordination (FAOSTAT, 2022).

The second most common channel (21%) – Producers → Commission Agents → Retailers → Consumers – bypasses wholesalers and may improve price transmission, yet still reflects producer reliance on commission agents due to poor market information, transport challenges, and weak bargaining power. Channels involving wholesalers, such as Producers → Wholesalers → Consumers (18%) and Producers → Wholesalers → Retailers → Consumers (15%), emphasise their role in aggregation and distribution. Shorter channels help reduce losses, while longer one's support bulk and urban supply. However, the least used channels (6% and 4%) indicate limited direct marketing due to infrastructural and institutional constraints. Overall, the prevalence of intermediary-heavy channels reduces efficiency, increases transaction costs, and creates information asymmetry, concentrating market power among key actors and limiting producers' income share. Strengthening direct linkages, cooperatives, infrastructure, and market information systems could improve efficiency, transparency, and equity within the marketing system.

Table 3. Bell Pepper Marketing Channels Flowchart

Channel	Marketing Pathway	Share (%)
1	Producers → Retailers → Consumers	4
2	Producers → Wholesalers → Consumers	18
3	Producers → Wholesalers → Retailers → Consumers	15
4	Producers → Commission Agents → Wholesalers → Retailers → Consumers	36
5	Producers → Commission Agents → Retailers → Consumers	21
6	Producers → Commission Agents → Wholesalers → Consumers	6

Source: field survey.

Market Margin and Efficiency of Bell Pepper

Table 4 presents the marketing margin and efficiency analysis. Average sales revenue per 15 kg basket is ₦3,400. Total marketing costs amount to ₦2,550 (75% of revenue), with procurement cost (₦1,750) as the largest component, followed by sorting/packaging/handling (₦350), transportation (₦300), and market/union charges (₦150). The marketing margin per basket is ₦850. The Marketing Efficiency Index (MEI) of 0.33 indicates inefficiency, consistent with findings in similar vegetable markets (Sreenivasa et al., 2023; FAOSTAT, 2022). This finding indicates that although traders realise positive margins, high transaction and handling costs reduce overall efficiency and limit net returns. The low efficiency ratio may be attributed to poor transportation infrastructure, multiple intermediary activities, high handling costs, and post-harvest losses associated with perishability. The result supports previous findings that vegetable markets in developing economies are often characterised by profitability alongside low operational efficiency due to structural and institutional constraints (Sreenivasa et al., 2023; Grema et al., 2015). Improving road and transport infrastructure, investing in post-harvest storage and handling facilities, facilitating access to affordable credit, and reducing intermediary layers could enhance efficiency, increase traders' net returns, and improve overall performance of the marketing system (Grema et al., 2015; Henri-Ukoha et al., 2012).

Table 4. Market Margin and Efficiency of Bell Pepper

Variables	Cost (₦/15kg)
(A) Sales revenue:	
i. Selling price	3,400
Total sales revenue	3,400
(B) Marketing cost:	
ii. Cost price	1,750
iii. Transportation cost	300
iv. Market/union charges	150
v. Sorting, Packaging and handling cost	350
(C) Total marketing cost	2,550
(E) Marketing margin (profit) (A-C)	850
(F) Marketing efficiency Index (M.E.I) (E/C)	0.33

Source: field survey.

Income Distribution and Inequality Among Bell Pepper Traders

The income distribution pattern among bell pepper traders in Jos-North LGA reveals substantial disparities in earnings (Table 5). The results show that 54.2% of traders earn ≤₦49,999 (contributing 45.5% of total market income), 30% earn between ₦50,000–₦99,999 (contributing 30.4% of total income). In contrast, traders earning ≥₦100,000 represented only 15.8% of the respondents (contributing 24.1% of total income), which suggests income concentration among a smaller group of traders. The estimated Gini coefficient of 0.64 indicates a high level of income inequality among bell pepper traders. Generally, Gini values above 0.50 suggest substantial inequality in income distribution

(Adejonu et al., 2022; Ogunniyi et al., 2021). The result implies that earnings within the bell pepper marketing system are unevenly distributed, with relatively few traders controlling a disproportionate share of market income.

The observed income inequality may be associated with differences in marketing costs, unequal access to capital, bargaining power, education, marketing experience, trade association membership, and access to market information. Traders with stronger financial capacity and better market linkages are more likely to purchase larger quantities, access profitable channels, and negotiate favourable prices. Conversely, smaller traders operating with limited capital and weak institutional support tend to earn relatively lower returns. Addressing these disparities requires targeted interventions and policies aimed at improving access to affordable credit and finance, strengthening cooperative participation, enhancing market information systems, enhanced direct market linkages, and reducing transaction costs could contribute to more inclusive income distribution and improved market performance (Onuwa, 2024; Mataveia et al., 2023; FAOSTAT, 2022).

Table 5. Income Inequality among Bell Pepper Traders

Income class (₦)	Frequency	% (X)	Gross income (₦)	% Gross income (Y)	ΣXY
≤49,999	65	54.2 (0.54)	381,600	45.5 (0.45)	0.23
50,000-99,999	36	30.0 (0.30)	254,800	30.4 (0.30)	0.09
≥100,000	19	15.8 (0.15)	202,900	24.1 (0.24)	0.04
Total	120	100	839,300		0.36
Gini coefficient: 0.64					

Source: field survey.

Determinants of Market Margin

The multiple regression analysis presented in Table 6 explains approximately 69.6% of the variation in market margin ($R^2 = 0.696$). The F-ratio of 4.513 ($p < 0.05$) confirms the overall statistical significance of the regression model. The result indicates that the selected explanatory variables jointly influence variations in trader market margins. Market margin differentials contribute to variations in trader earnings; these selected variables also influence the observed income inequality within the bell pepper marketing system. Education has a positive significant effect on market margins (0.576, $p < 0.05$). Traders with higher formal education levels are likely to possess enhanced numeracy, record-keeping, and negotiation skills, enabling informed purchasing and selling decisions. This aligns with findings by Sanusi and Ayinde (2013) and Emam (2015) which underscore the role of education in improving efficiency and profitability in agro-commodity marketing. Market experience has a negative significant effect on market margins (-0.422, $p < 0.05$), which suggests that more experienced traders may operate in competitive segments where per-unit margins are constrained despite larger trade volumes, consistent with observations by Reddy (2013).

Conversely, Cost price positively affects margins (0.371, $p < 0.01$), which shows that higher purchase prices are associated with greater per-unit profits, likely because traders apply markup strategies to cover operational costs and risks (Onuwa et al., 2022; Sanusi and Ayinde, 2013). Quantity sold has a negative significant effect on market margins (-0.610,

$p < 0.01$), which suggests that higher sales volumes may reduce per-unit margins due to competitive pricing in bulk transactions, a trend observed in Nigerian vegetable markets (Onuwa et al., 2017). Marketing cost has a positive significant effect on market margins (0.284, $p < 0.05$), which indicates that transport, packaging, and union fees strongly affect margins, likely because traders transfer part of these costs to consumers through price markups. These findings suggest that interventions aimed at improving trader education and market information, promoting fair competition, and supporting efficient cost management could enhance inclusive income distribution, improved market performance, and sustainability in bell pepper marketing (Onuwa, 2024; Emam, 2015).

Table 6. Determinants of Market Margin Among Bell Pepper Traders

Variable	Coefficient	Standard Error	t-Statistic	Significance
Constant	4.133	1.625	2.543	$p < 0.05$
Education (X_1)	0.576	0.218	2.640	$p < 0.05$
Market Experience (X_2)	-0.422	0.158	-2.670	$p < 0.05$
Cost Price (X_3)	0.371	0.092	4.033	$p < 0.01$
Quantity Sold (X_4)	-0.610	0.150	-4.070	$p < 0.01$
Marketing Cost (X_5)	0.284	0.110	2.580	$p < 0.05$
$R^2 = 0.696$				
F-Ratio = 4.513 ($p < 0.05$)				

Source: field survey.

Hypothesis Test Result

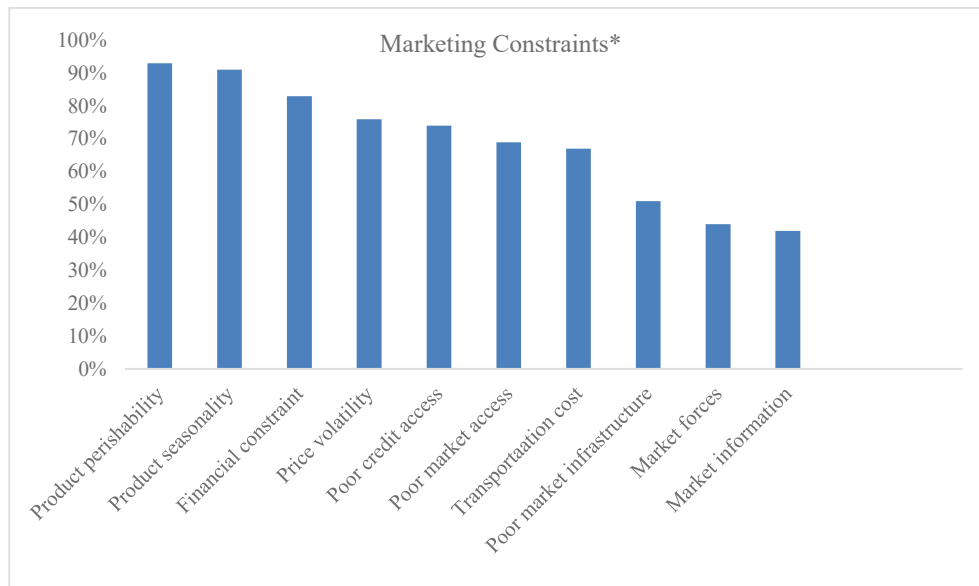
The hypothesis test examined the relationship between marketing cost and market margin among bell pepper traders using the regression result presented in Table 6. The coefficient of marketing cost was positive and statistically significant ($\beta = 0.284$; $p < 0.05$), indicating that marketing costs significantly influence market margin of bell pepper traders in the study area. Therefore, the null hypothesis (H_0) stating that there is no significant relationship between marketing costs and market margin is rejected. This suggests that variations in transaction costs and marketing expenditures, such as transportation, packaging, handling, and market charges, play an important role in determining traders' profitability and market performance.

Constraints Associated with the Marketing of Bell-Pepper

The results in Figure 5 highlight the significant constraints affecting bell pepper marketing in Jos-North Local Government Area. Product perishability emerged as the most critical challenge, affecting 93% of the respondents, followed closely by product seasonality (91%), reflecting the highly perishable nature of bell pepper and the need for efficient handling, storage, and timely market access to avoid post-harvest losses (Onuwa et al., 2017; Reddy, 2013). Financial constraints were reported by 83% of traders, indicating that limited

capital restricts the ability to purchase, store, and transport bell pepper effectively, consistent with findings from other studies in sub-Saharan Africa where access to finance remains a major barrier for smallholder vegetable traders (Udegbe et al., 2012; Sanusi & Ayinde, 2013). Other notable constraints include commodity price volatility (76%) and poor access to agricultural credit (74%), which increase the risk of losses and reduce profitability.

Poor access to agro-commodity markets (69%) and high transportation costs (67%) further exacerbates these challenges, particularly in rural areas with inadequate infrastructure. Market infrastructure deficits (51%), market forces (44%), and lack of market information (42%) indicate systemic inefficiencies that hinder the effective functioning of bell pepper marketing channels. Limited access to accurate market information and poor infrastructure can result in asymmetric pricing, exploitation by middlemen, and suboptimal marketing margins, corroborating findings by Emam (2015).



* - Multiple responses

Fig. 5. Constraints Affecting Bell Pepper Marketing

Source: field survey.

Overall, perishability, finance, and infrastructure constraints dominate, consistent with literature (Ogunniyi et al., 2021; Bukar et al., 2015; Udegbe et al., 2012). Poor market information exacerbates inefficiencies (Onuwa et al., 2017; Reddy, 2013). Thus, highlighting the need for targeted interventions such as improved storage facilities, strengthened market linkages, access to finance, and real-time market information systems to enhance efficiency and profitability (Mataveia et al., 2023; Onuwa, 2024).

Conclusion and Recommendations

This study analysed bell pepper marketing in Jos-North LGA, Plateau State, examining trader profiles, market channels, margins, income inequality, determinants of margins, and constraints. Most traders were middle-aged (30–49 years), female, married, with secondary education, average household size of five, and six years of marketing experience. Trading was their main occupation, funded mainly through personal savings and relatives, with low trade association membership. Marketing involved multi-tiered channels, dominated by commission agent-based pathways. The average marketing margin was ₦850 per 15 kg, with inefficiency index (MEI = 0.33), and income inequality was high (Gini = 0.64). Regression results indicated that education, cost price, quantity sold, and marketing experience significantly influenced margins. Major constraints included perishability, seasonality, financial limitations, price volatility, and poor access to markets, credit, and information. Based on these findings, the following recommendations are made:

1. Improve access to finance through cooperatives, microfinance institutions, and government programs to reduce reliance on informal sources.
2. Invest in storage and post-harvest facilities (e.g., cold storage) to reduce losses due to perishability and seasonality.
3. Strengthen market information systems through digital platforms and local networks to reduce information asymmetry.
4. Encourage trade association membership to enhance bargaining power, collective marketing, and access to credit.
5. Provide capacity-building programs on business management, marketing, and financial literacy, leveraging traders' existing educational levels.
6. Promote direct market linkages (e.g., producer-trader contracts) to reduce dependence on commission agents and improve income distribution.
7. Support policies focused on infrastructure development (roads, market facilities) and market regulation to enhance competitiveness.

Implementing these measures can increase efficiency, profitability, and equity in bell pepper marketing, ultimately contributing to local economic growth and food security (Onuwa, 2024; Adejonu et al., 2022; USDA, 2020).

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