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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 9040'N and 100345'E; and longitude 18040'N and 9050'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):

$$M.M = P2 - P1 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

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):

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

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):

$$G = 1 - \Sigma x_i Y_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where:
X_i – percentage of traders in the ith class;
Y_i – percentage of trader's gross income in the ith class;
i – ith 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):

$$Y_i = \beta o + \beta_i X_i + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where:
Y_i – market margin (₦/kg);
β_0 – 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):

$$Y = \beta o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots (5)$$

Where:
Y – marketing margin [₦ (Naira) /100kg bag];
β_0 – intercept;
β_1 – β_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.

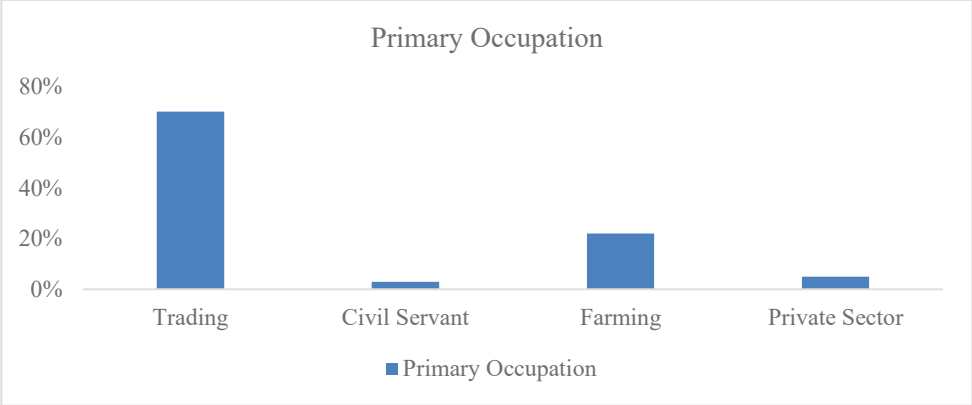


Fig. 1. Distribution Based on Primary Occupation

Source: field survey.

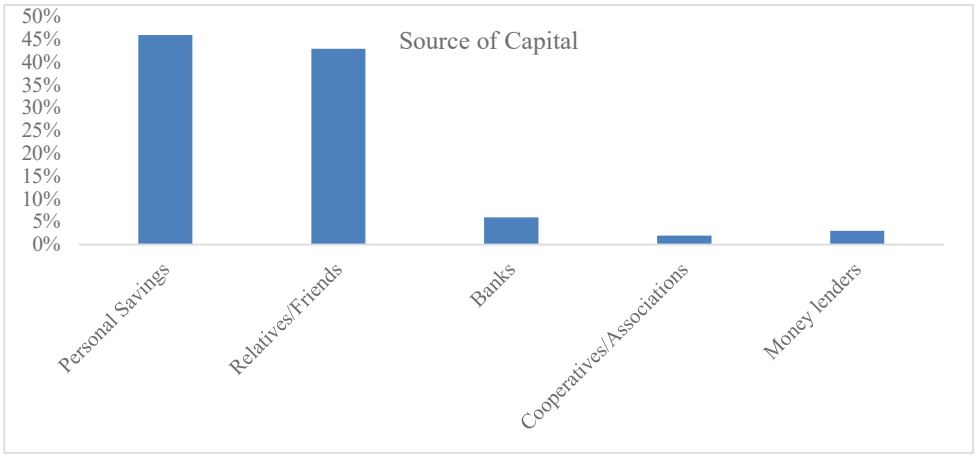


Fig. 2. Distribution Based on Source of Capital

Source: field survey.

Fig. 3. Distribution Based on Membership of Trade Association

Source: field survey.

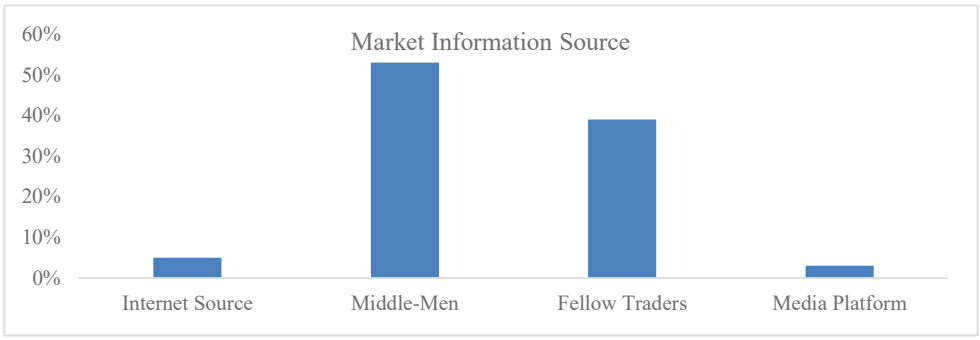


Fig. 4. Distribution Based on Source of Market Information

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)	∑XY
≤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

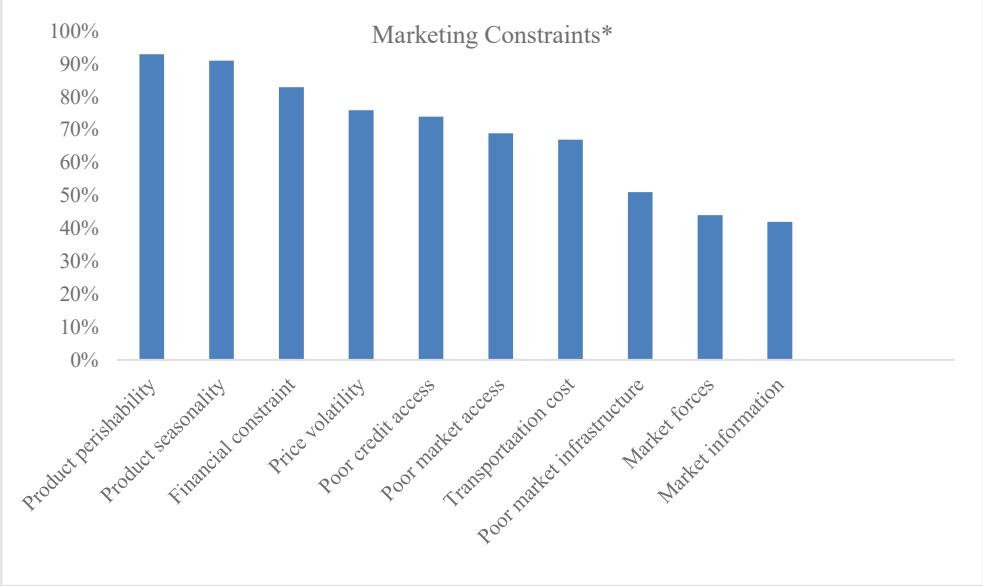
The hypothesis test examined the relationship between marketing cost and market margin among bell pepper traders using the regression result presented in Table 6. The coefficient of marketing cost was positive and statistically significant ($\beta = 0.284$; $p < 0.05$), indicating that marketing costs 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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