Determinants and Constraints of Smallholder Vegetable Market Participation in Zuru Local Government Area Kebbi State, Nigeria

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Abstract
Transitioning smallholder farmers from subsistence to commercial agriculture requires a deep understanding of the factors driving market participation and the barriers hindering it. This study investigates the determinants and constraints of smallholder vegetable market participation in Zuru Local Government Area, Kebbi State, Nigeria. Using a multi-stage sampling technique, primary data were collected from 212 smallholder vegetable farmers. Data were analyzed using a binary logistic regression model and a five-point Likert scale. The binary logistic regression model was statistically significant (LR $\chi^2 = 36.815$, $df = 12$, $p < 0.001$, McFadden pseudo-$R^2 = 0.188$). Results indicate that access to market information is the strongest positive determinant of participation (Exp(B) = 4.114, $p < 0.01$), followed by household size ($p < 0.10$) and access to credit ($p < 0.10$). Conversely, distance to market exerts a significant negative influence (Exp(B) = 0.861, $p < 0.05$). Constraint analysis reveals that the high cost of inputs (Mean = 4.25), inadequate capital/lack of credit (Mean = 4.20), exploitation by middlemen (Mean = 4.13), and lack of storage facilities (Mean = 4.10) are the most severe bottlenecks. The study concludes that transaction costs, financial exclusion, and post-harvest infrastructural deficits heavily constrain commercialization. It is recommended that policymakers establish formal market information systems, expand targeted agricultural credit, rehabilitate rural roads, and invest in community-managed post-harvest storage facilities.

Keywords: *Market Participation, Binary Logistic Regression, Transaction Costs, Smallholder Farmers, Vegetable Marketing, Kebbi State.*

1. Introduction

Agriculture remains the cornerstone of the Nigerian economy, employing over 35% of the labour force and serving as the primary livelihood for the rural population (NBS, 2023). Within this sector, vegetable production has emerged as a vital activity for smallholder farmers due to its shorter growing cycles, high yields per unit area, and significant market value (Adebayo et al., 2021). Kebbi State, particularly Zuru Local Government Area (LGA), possesses favourable agro-ecological conditions and irrigation potential that make it a significant hub for year-round vegetable production (KSADP, 2020). Despite this production potential, a critical challenge facing smallholder farmers is limited and inefficient market participation. Market

participation—the decision to sell agricultural produce rather than consuming it entirely at home—is fundamental to generating cash income and escaping subsistence farming (Olukosi & Ogungbile, 2020). While the determinants of market participation have been studied in various parts of Nigeria (Bello & Abdullahi, 2019; Musa & Ibrahim, 2020), there is a distinct empirical void regarding the specific localized dynamics in Zuru LGA. Factors influencing market engagement are highly location-specific, dictated by unique infrastructural, institutional, and socio-economic realities.

Therefore, this study aims to bridge this geographical gap by specifically addressing two objectives:

1. To identify the factors that influence smallholder vegetable farmers' decisions to participate in the vegetable market in Zuru LGA.
2. To identify the constraints limiting smallholder vegetable farmers' participation in the vegetable market in the study area.

2. Theoretical Framework

This study is anchored on the Transaction Cost Theory (Coase, 1937; Williamson, 1975) and the Household Production Theory (Becker, 1965). Transaction Cost Theory posits that market transactions incur costs such as search, information, and transportation costs. When these costs are high—due to poor roads or information asymmetry—farmers are discouraged from market participation. Conversely, the Household Production Theory conceptualizes the farm household as both a production and consumption unit, where resource allocation (including family labour) dictates the marketable surplus. Together, these theories explain how institutional factors (information, credit) and household characteristics (size) interact with infrastructural barriers (distance) to shape market participation decisions.

3. Methodology

3.1 Study Area and Sampling

The study was conducted in Zuru LGA, Kebbi State. A multi-stage sampling technique was employed to select respondents. Stage one involved the purposive selection of six wards based on vegetable farming concentration. Stage two selected two villages per ward, yielding 12 villages. Stage three utilized purposive sampling to select farmers based on proportionate allocation. The sample size was determined using the Yamane (1967) formula, yielding a target of 212 smallholder vegetable farmers after adjusting for a 10% attrition/non-response rate. Primary data were collected via structured, face-to-face interviews administered in the local language.

3.2 Analytical Techniques

Binary Logistic Regression: Objective 3 was achieved using a binary logistic regression model, appropriate for a dichotomous dependent variable (Market Participation: 1 = participates, 0 = does not participate). The model is specified as: $\text{Logit}(MP)=\beta0+\beta1(AGE)+\beta2(GEND)+\beta3(EDUC)+\beta4(HHSZ)+\beta5(EXP)+\beta6(FARMSZ)+\beta7(DIVERS)+\beta8(CREDIT)+\beta9(EXT)+\beta10(COOP)+\beta11(MKTINFO)+\beta12(DIST)+\varepsilon$ $Logit(MP)=\beta0+\beta1(AGE)+\beta2(GEND)+\beta3(EDUC)+\beta4(HHSZ)+\beta5(EXP)+\beta6(FARMSZ)+\beta7(DIVERS)+\beta8(CREDIT)+\beta9(EXT)+\beta10(COOP)+\beta11(MKTINFO)+\beta12(DIST)+\varepsilon$ Where MPMP is market participation, X1 to X12 are the independent variables, β0 is the constant, β1 to β12 are coefficients, and ε is the error term.

Likert Scale Rating: Objective 4 was achieved using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to rate the severity of constraints. Mean scores were calculated, where a mean of 3.67–5.00 indicated a high/severe constraint.

4. Results and Discussion

4.1 Determinants of Market Participation

The binary logistic regression model was statistically significant (LR $\chi^2 = 36.815$, df = 12, $p < 0.001$), with a McFadden pseudo-R^2 of 0.188 and an overall classification accuracy of 83.5%.

Table 1: Binary Logistic Regression Estimates of Determinants (N = 212)

Variable	B	S.E.	Wald	Sig.	Exp(B)	95% CI Lower	95% CI Upper
Constant	-2.434	1.743	1.950	0.163	0.088	0.003	2.672
Age	0.011	0.058	0.036	0.850	1.011	0.903	1.132
Gender	-0.182	0.506	0.130	0.719	0.833	0.309	2.248
Education	0.229	0.162	2.003	0.157	1.257	0.916	1.725
Household size	0.121	0.066	3.307	0.069*	1.128	0.991	1.285
Farming experience	0.029	0.057	0.263	0.608	1.030	0.921	1.152
Farm size	0.202	0.240	0.713	0.399	1.224	0.765	1.959
Diversification	0.214	0.182	1.390	0.238	1.239	0.868	1.768
Credit access	0.822	0.458	3.218	0.073*	2.275	0.927	5.586
Extension contact	0.670	0.431	2.413	0.120	1.953	0.839	4.547
Cooperative membership	0.366	0.418	0.765	0.382	1.442	0.635	3.273
Market information	1.414	0.428	10.919	0.001***	4.114	1.778	9.518
Market distance	-0.149	0.068	4.818	0.028**	0.861	0.754	0.984

****, **, and * denote significance at 1%, 5%, and 10% levels, respectively.*

Discussion of Determinants:

- **Access to Market Information:** This emerged as the strongest positive determinant (B = 1.414, $p < 0.01$). Farmers with access to market information had 4.11 times higher odds of participating in the market. This strongly validates Transaction Cost Theory, as information drastically reduces search costs and mitigates the risk of exploitation (Zakari et al., 2023).
- **Distance to Market:** Distance exerted a significant negative effect (B = -0.149, $p < 0.05$). Each unit increase in distance reduced the odds of participation by approximately 13.9%. This reflects the high transportation costs and post-harvest risks associated with moving highly perishable vegetables over poor rural roads (Opata et al., 2020).
- **Household Size & Credit Access:** Both were positive determinants significant at the 10% level. Larger households provide the necessary family labour for harvesting and marketing (aligning with Household Production Theory), while credit eases the liquidity constraints required for commercial production (Manda et al., 2020).
- **Insignificant Variables:** Notably, human capital variables (education, experience) and

institutional variables (extension, cooperatives) were not statistically significant. This suggests that in Zuru LGA, immediate informational, infrastructural, and financial barriers are far more binding constraints to market entry than long-term human capital development.

4.2 Constraints to Market Participation

The Likert scale analysis revealed an overall high perception of constraints (overall mean = 3.96). Financial, institutional, and infrastructural barriers dominated the rankings.

Table 2: Likert Scale Ranking of Constraints to Market Participation (N = 212)

Constraint	Mean	SD	Rank
High cost of inputs	4.25	0.792	1
Inadequate capital / lack of credit	4.20	0.924	2
Exploitation by middlemen	4.13	0.893	3
Lack of storage facilities	4.10	0.933	4
Seasonal price fluctuations	4.01	1.012	5
Post-harvest losses	3.97	0.995	6
Lack of cooperative membership	3.89	0.991	7
Low price offered by buyers	3.87	1.006	8
Poor road condition	3.86	1.055	9
Lack of market information	3.83	1.007	10
Lack of extension contact	3.82	1.005	11
Long distance to market	3.79	1.167	12
High market taxes/fees	3.75	1.040	13

Discussion of Constraints: The high cost of inputs (Mean = 4.25) and inadequate capital/lack of credit (Mean = 4.20) were ranked as the most severe constraints, reflecting severe liquidity challenges that prevent farmers from scaling operations. Crucially, exploitation by middlemen (Mean = 4.13) and lack of storage facilities (Mean = 4.10) were ranked critically high. The absence of storage forces farmers into distress sales immediately after harvest when prices are depressed, increasing their vulnerability to predatory intermediary pricing (Mabuga et al., 2025). Interestingly, while poor roads and distance were statistically significant in the regression model, they ranked slightly lower in the Likert scale (9th and 12th). This indicates that while infrastructural deficits are recognized, the immediate financial bottlenecks and institutional exploitations are perceived as more paralyzing by the farmers on a day-to-day basis.

5. Conclusion

Vegetable farming in Zuru LGA is actively transitioning toward commercialization, but this trajectory is heavily bottlenecked by transaction costs, financial exclusion, and post-harvest vulnerabilities. Market information acts as the most critical catalyst for participation, while geographical distance and lack of capital act as severe deterrents. The marketing environment remains highly intermediated; the lack of storage facilities forces immediate, distress sales, leaving farmers highly vulnerable to exploitation by middlemen. Ultimately, improving market participation in Zuru LGA requires shifting policy focus from basic production training to addressing transaction costs, financial inclusion, and post-harvest infrastructure.

6. Recommendations

Based on the empirical findings, the following actionable recommendations are proposed:

1. **Establish Formal Market Information Systems:** Given that market information is the strongest predictor of participation, the Kebbi State Agricultural Development Programme (KSADP) should deploy localized, Hausa-language price bulletins, SMS alerts, and radio programs to reduce search costs.
2. **Expand Targeted Agricultural Credit:** To address the severe capital constraint, microfinance institutions and the Central Bank of Nigeria should design low-interest, flexible loan products tailored to the vegetable production cycle, including group-lending options for farmers lacking formal collateral.
3. **Invest in Post-Harvest Storage Facilities:** To mitigate the pressure of immediate, depressed-price sales and reduce middlemen exploitation, government and development partners should invest in community-managed cold storage and improved post-harvest handling facilities.
4. **Rehabilitate Rural Road Infrastructure:** Since market distance significantly reduces participation odds, State and Local Governments must prioritize the maintenance of rural roads connecting vegetable-producing communities to major markets to reduce transport costs.
5. **Regulate Intermediary Activities:** The Ministry of Trade and Commerce should explore transparent price-setting mechanisms and encourage contract farming arrangements to protect farmers from predatory practices by middlemen.

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