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ANALYSIS OF DETERMINANTS OF SMALLHOLDER FARMERS' PARTICIPATION IN VALUE CHAIN DEVELOPMENT PROGRAMME AMONG CASSAVA FARMERS IN SOUTH-EASTERN NIGERIA

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Abstract
This study analyzed determinants of participation in the Value Chain Development Programme (VCDP) among cassava farmers in South-eastern Nigeria. Using a multi-stage sampling procedure, a total sample size of 600 smallholder cassava farmers was selected (334 Value Chain Development Programme participants and 266 non-participants) across Anambra and Enugu States. Data were analyzed using descriptive statistics, independent t-test, binary Logit regression model, and the Weighted Mean Score (WMS) technique. The binary Logit model results showed that participation was significantly driven by institutional support mechanisms rather than demographic attributes. Specifically, cooperative membership, extension contact, and formal credit access increased participation probability by 16.03%, 10.30%, and 8.13%, respectively. The primary operational constraints for participants included delayed input delivery, and inadequate market linkages, while non-participants were primarily hindered by a lack of cooperative membership, limited credit access, and high transportation costs. The study concludes that smallholder integration into agricultural value chains in South-eastern Nigeria depends heavily on institutional delivery channels rather than individual household characteristics. To improve program coverage and efficiency, policy interventions should prioritize establishing decentralized input hubs, expanding public-private and digital extension models, strengthening micro-credit linkages, and facilitating commodity cluster formation in underserved rural areas.
***Keywords:** Analysis, Determinants, Value Chain, Development Programme, small holders.*

1.0 Introduction
Agriculture remains a critical driver of economic growth and poverty reduction in Sub-Saharan Africa, where smallholders dominate food production (FAO, 2023; World Bank, 2022). As the world's largest cassava producer, Nigeria relies on the crop as a dietary staple for over 100 million people, a driver of rural income, and an industrial raw material (FAO, 2023; Liverpool-Tasie et al., 2022). In South-eastern Nigeria, cassava cultivation is central to rural livelihoods due to its climate resilience and adaptability (NBS, 2023). However, smallholders face severe structural constraints, including land fragmentation, limited improved input access, high post-harvest losses, and weak market integration (Barrett et al., 2022).

Conventional production-centric interventions often fail because they ignore post-farmgate bottlenecks (Donovan et al., 2015). Consequently, agricultural policy has shifted toward the Value Chain Development approach (Reardon et al., 2009). By connecting input suppliers, producers, processors, and commercial off-takers, value chain initiatives promote value addition, lower transaction costs, and enhance competitiveness (Donovan et al., 2015; Reardon et al., 2009). To operationalize this approach, the Federal Government of Nigeria and the International Fund for Agricultural Development (IFAD) launched the Value Chain Development Programme (VCDP) across nine states, including Anambra and Enugu (IFAD, 2020). VCDP delivers an integrated

package: institutional capacity building, certified input provision, extension advisory, processing infrastructure, and off-taker linkages (IFAD, 2023).

Despite these opportunities, smallholder participation in VCDP remains uneven. Because participation is the primary gateway to program benefits, understanding its underlying drivers is critical (Becerril & Abdulai, 2010). This study analyzes the empirical determinants of participation in VCDP among smallholder cassava farmers in South-eastern Nigeria

2.0 Objectives of the Study

The broad objective of this study was to analyze determinants of smallholder farmers' participation in the Value Chain Development Programme (VCDP) among cassava farmers in South-eastern Nigeria.

The Specific Objectives of the study were to:

i. describe the socioeconomic characteristics of VCDP participants and non-participant cassava farmers in the study area.
ii. identify determinants influencing smallholder farmers' participation in the VCDP
iii. Identify constraints limiting smallholder farmers' participation in the programme.

3.0 Methodology

The study was conducted in Anambra and Enugu States, South-eastern Nigeria. Anambra State covers 4,844 km² (5°40′–6°47′ N; 6°36′–7°21′ E) with mean temperatures of 26°C–28°C (Anambra State Government, 2023). Enugu State covers 7,161 km² (5°56′–7°06′ N; 6°53′–7°55′ E) with distinct wet and dry seasons (Enugu State Government, 2023). Both states feature favorable agro-climatic conditions for cassava production (NBS, 2023)..

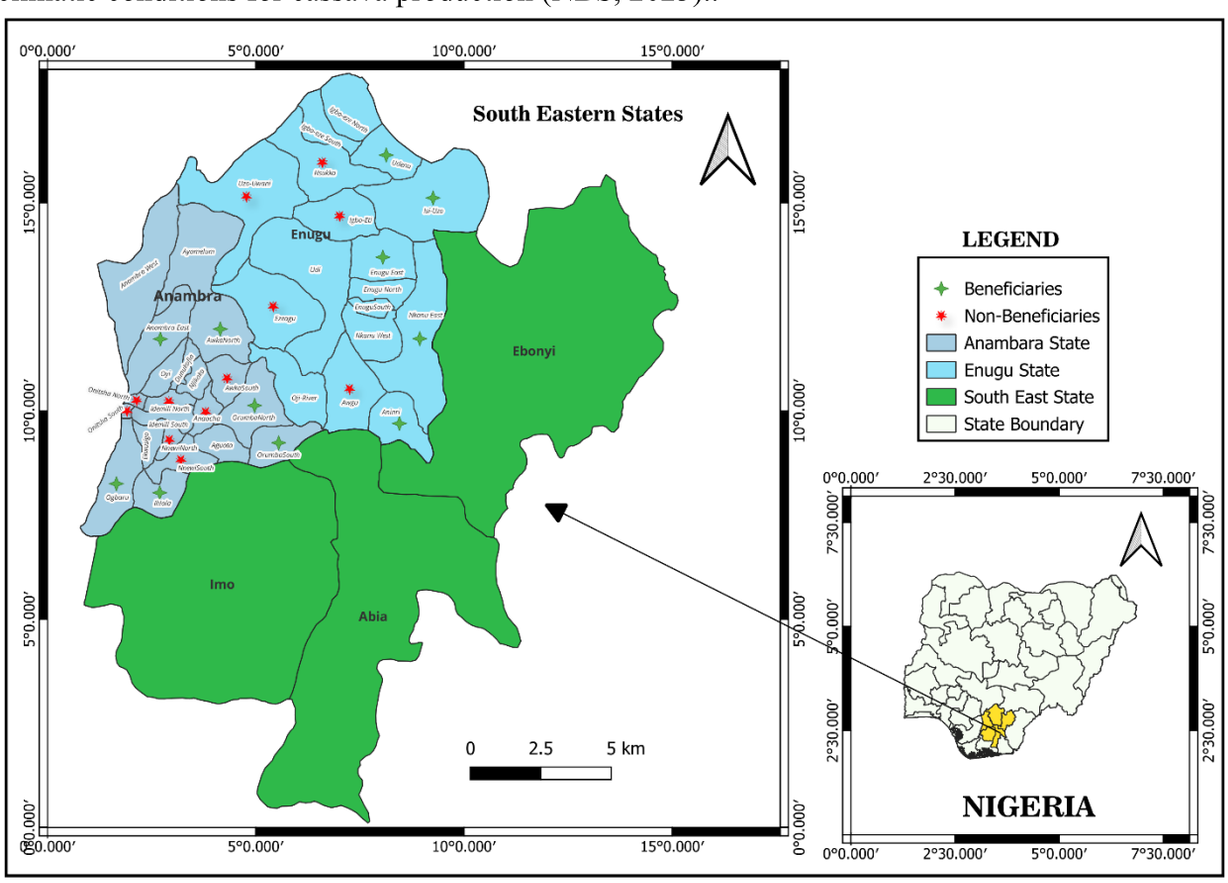


Figure 1: *Map of Southeast Nigeria showing the study area*
Source: Office of the Surveyor-General of the Federation (OSGOF)*, 2018; IFAD, 2020.*

A multi-stage sampling technique was used to select 600 smallholder cassava farmers (334 VCDP participants and 266 non-participants). Anambra and Enugu States were purposively selected due to active VCDP implementation and cassava intensity. Participating LGAs, communities, and farmer groups were selected, followed by random sampling of individual farmers from beneficiary registers and adjacent non-beneficiary lists. Primary data were collected using structured questionnaires administered by trained enumerators

Data were analyzed using descriptive statistics, binary Logit regression, and Weighted Mean Score (WMS) rankings

Binary Logit Regression

Participation choice ($Y_i = 1$ if participating, 0 otherwise) is specified as (Gujarati & Porter, 2009; Wooldridge, 2020):

$$P_i = P(Y_i = 1|X_i) = \frac{1}{1+e^{-Z_i}} = \frac{e^{Z_i}}{1+e^{Z_i}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ 1$$

$$Z_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \sum_{k=1}^{11} \beta_k X_{ki} + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ 2$$

Where: Y = Participation in VCDP (1 or 0 if otherwise)

β_0 = constant

X_1 = Age (years)

X_2 = Sex (male = 0, female =1)

X_3 = Household size (number of people)

X_4 = Formal Education status in years

X_5= Access to Extension Services (Number)

X_6 = Membership to cooperative (Yes =1, No = 0)

X_7 = Household Income (₦)

X_8 = Access to credit (₦)

X_9= Farming experience (years)

X_{10} = Distance to market (km)

X_{11} = Farm size (hectares)

μ = error term

Weighted Mean Score (WMS)

The weighted mean score for each constraint was computed as:

$$\text{WMS} = \frac{\sum_{i=1}^{5} f_i w_i}{N} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ 5$$

Where: WMS = Weighted Mean Score , f_i= Frequency of responses for category *I,* ,w_i= Weight assigned to category *I,* N= Total number of respondents

The computed mean scores were ranked in descending order, with higher mean values indicating more severe constraints to programme participation.

4.0 Results and Discussion

4.1 Socio-economic Characteristics of Respondents

The socioeconomic characteristics in Table 1 indicate that VCDP participants and non-participants were broadly similar in their demographic characteristics. Most respondents were within the economically active age groups, particularly 41–50 years (35.33% of participants and 30.45% of non-participants), followed by 31–40 years (23.65% and 26.32%, respectively) and 51–60 years (24.85% and 22.93%). The majority were male (66.77% of participants and 69.55% of non-participants) and married (92.22% and 90.60%, respectively). Farm holdings were predominantly smallholder in nature, with 99.40% of participants and 98.87% of non-participants cultivating 1–6 hectares. Farming experience was also concentrated in the 11–20-year category (63.17% of participants and 58.27% of non-participants). The more noticeable differences were institutional, particularly in cooperative membership, credit access and extension contact. Cooperative

membership was reported by 100.00% of participants compared with 33.08% of non-participants, while access to credit was reported by 56.29% and 30.45%, respectively. Extension contact also differed substantially: 53.59% of participants received 7–12 extension visits, compared with only 0.75% of non-participants, while 40.42% of participants and 99.25% of non-participants were in the 1–6 visit category. These differences suggest that institutional linkages may be more important for programme participation than basic demographic characteristics, consistent with evidence that access to institutional support, productive resources and market services influences farmers' engagement with agricultural interventions (Abdulai & Huffman, 2014; Barrett et al., 2022; FAO, 2023).

Table 1: Socio-economic Characteristics of Respondents by VCDP Participation (n=600)

Variables	Category	Participants n (%)	Non-participants n (%)
Age (years)	21–30	27 (8.08)	25 (9.40)
	31–40	79 (23.65)	70 (26.32)
	41–50	118 (35.33)	81 (30.45)
	51–60	83 (24.85)	61 (22.93)
	61–70	27 (8.08)	29 (10.90)
Sex	Female	111 (33.23)	81 (30.45)
	Male	223 (66.77)	185 (69.55)
Marital Status	Single	12 (3.59)	7 (2.63)
	Married	308 (92.22)	241 (90.60)
	Divorced/Widowed	14 (4.19)	18 (6.77)
Farm Size (ha)	1–6	332 (99.40)	263 (98.87)
	7–12	2 (0.60)	1 (0.38)
Education	Non formal	6 (1.80)	2 (0.75)
	Primary	57 (17.07)	66 (24.81)
	Secondary	191 (57.19)	145 (54.51)
	Tertiary	80 (23.95)	53 (19.92)
Household Size	1–6	59 (17.66)	37 (13.91)
	7–12	257 (76.95)	211 (79.32)
	13-18	18 (5.39)	18 (6.77)
Farming Experience	1–10 yrs	48 (14.37)	47 (17.67)
	11–20 yrs	211 (63.17)	155 (58.27)
	31–40 yrs	57 (17.07)	45 (16.92)
	41–50 yrs	18 (5.39)	19 (7.14)
Cooperative Membership	No membership	**0 (0.00)**	178 (66.92)
	Membership	**334 (100.00)**	88 (33.08)
Credit Access	No	146 (43.71)	185 (69.55)
	Yes	188 (56.29)	81 (30.45)
Extension Visits	1–6	135 (40.42)	264 (99.25)
	7–12	179 (53.59)	2 (0.75)

Variables	Category	Participants n (%)	Non-participants n (%)
	13-18	20 (5.99)	0 (0.00)
Total		334 (100)	266(100)

n= number of respondents; figures in bracket are percentages.
Source: Field survey (2026).

4.2 Logit Regression and Marginal Effects Results on Determinants of Participation in the Value Chain Development Programme (VCDP)

The Logit model was statistically significant (LR $\chi^2 = 489.70$; $p < 0.001$), with a Pseudo R^2 of 0.5943, indicating substantial explanatory power and goodness of fit of the model. Cooperative membership, credit access and extension visits were positive and statistically significant determinants of VCDP participation. Cooperative membership had the largest effect (OR = 6.331; $p < 0.001$), increasing the probability of participation by 16.03 percentage points. This finding is consistent with Wossen et al. (2017), who found that cooperative membership significantly enhanced technology adoption and household welfare among rural Nigerian farmers. Credit access also increased the likelihood of participation (OR = 2.549; $p = 0.001$), with a marginal effect of 8.13 percentage points. This agrees with evidence that access to formal credit strengthens the benefits of cooperative and extension services among Nigerian smallholders (Wossen et al., 2017). Extension visits were likewise significant (OR = 3.275; $p < 0.001$), with an additional visit associated with a 10.30 percentage-point increase in the probability of participation. This finding is supported by evidence from Southeast Nigeria showing that extension access significantly improves agricultural productivity and income (Nwaekpe et al., 2024). In contrast, age, gender, education, household size, farming experience, distance to market and farm size did not have statistically significant effects on participation. Thus, the findings suggest that institutional support and access to agricultural services were more important determinants of VCDP participation than demographic and farm characteristics.

Table 2: Logit Regression and Marginal Effects Results on Determinants of VCDP Participation

Variables	Odds Ratio	Marginal Effect (dy/dx)	Std. Err.	p-value
Age	0.971	−0.0025	0.0442	0.524
Sex	0.804	−0.0190	0.2395	0.463
Education years	1.026	0.0023	0.0389	0.495
Household size	1.074	0.0062	0.0827	0.357
Farming experience	1.031	0.0027	0.0450	0.484
Cooperative membership	6.331	0.1603	1.9006	0.000***
Credit access	2.549	0.0813	0.7201	0.001***
Extension visits	3.275	0.1030	0.3458	0.000***
Distance to market (km)	0.978	−0.0019	0.0723	0.767
Farm size (ha)	1.089	0.0074	0.1523	0.544
Constant	0.004		0.0060	0.000
Observations	600			
LR chi² (10)	489.70			

Prob > chi²	0.0000
Pseudo R²	0.5943

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level.
Source: Author's computation from field survey data (2026).

4.3 Constraints to VCDP participation

Table 3 shows that delayed input delivery was the most (mean = 3.55) serious constraint among VCDP participants, followed by inadequate market linkages (mean=3.42), inadequate quantity of inputs supplied (mean=3.41), and irregular extension visits (mean=3.37). Unfavourable output prices (mean=3.31) and limited processing facilities (mean=3.26) were also notable constraints. These findings indicate that, despite participation in VCDP, beneficiaries continue to face input, extension, processing, and market-related challenges that may limit the programme's potential to translate increased production into higher income. The irregularity of extension visits is particularly important because extension contact was a significant determinant of participation, suggesting that both access to and quality of extension delivery require strengthening. The findings are consistent with Moses et al. (2024), who identified transportation, storage, and other implementation challenges among VCDP-supported cassava farmers.

Table 3: Constraints Encountered by VCDP Participants (n=600)

Variables	Mean	SD	Rank
Delayed delivery of inputs	3.55	0.83	1st
Inadequate market linkages	3.42	0.89	2nd
Inadequate quantity of inputs supplied	3.41	0.88	3rd
Irregular extension visits	3.37	0.88	4th
Unfavorable output prices	3.31	0.84	5th
Limited processing facilities	3.26	0.90	6th
Inadequate storage/aggregation facilities	3.14	0.87	7th
Weak farmer-organization coordination	3.05	0.89	8th

Source**:** Author's computation from field survey data, 2026

4.4 Constraints among Non-participants

Table 4 shows that lack of cooperative membership was the most severe constraint to VCDP participation (mean = 3.38), followed by limited credit access and high transportation costs (3.34 each). Distance to programme locations (3.31) and inability to meet counterpart contributions (3.14) were also important constraints. These findings indicate that institutional, financial, and accessibility barriers are major obstacles to programme participation. Cooperatives can facilitate access to information, credit, markets, and development programmes (World Bank, 2013), while limited rural finance remains a major constraint to smallholder agricultural participation (FAO, 2020; IFAD, 2024).

Lack of information (2.98), poor road infrastructure (2.96), and lack of awareness (2.90) were comparatively lower-ranked but still relevant constraints. Poor infrastructure and distance increase transaction costs and limit farmers' access to programme services and markets (Ellis, 2000; FAO, 2022). Similarly, information gaps and limited extension coverage can restrict farmers' participation in agricultural interventions (Markelova et al., 2009). Overall, the findings indicate that institutional and financial constraints are the most binding barriers, while transportation, infrastructure, and information constraints further limit the inclusion of eligible non-participants (Barrett et al., 2022; World Bank, 2024).

Table 4: Constraints to Participation in VCDP among Non-Participants (n=600)

Variables	Mean	SD	Rank
Lack of Cooperative Membership	3.38	0.80	1st
Limited Access to Credit	3.34	0.86	2nd
High Transportation Cost	3.34	0.88	3rd
Distance to Programme Locations	3.31	0.87	4th
Inability to Provide Counterpart Contribution	3.14	0.88	5th
Lack of Information	2.98	0.96	6th
Poor Road Infrastructure	2.96	0.97	7th
Lack of Awareness of Programme	2.90	0.93	8th

Source**:** Field survey data (2026).

5.0 Conclusion and Recommendations

5.1 Conclusion

This study demonstrates that smallholder participation in VCDP across South-eastern Nigeria is primarily driven by institutional channels—specifically cooperative membership, advisory extension contact, and credit access—rather than demographic profile. However, delayed input supply schedules and weak off-taker integration inhibit participant efficiency, while structural non-membership in cooperatives excludes non-participants.

5.2 Recommendations

i. Decentralized Input Distribution: Establish localized input centers managed jointly with farmer associations to eliminate delivery delays.
ii. Cluster Mobilization: Expand group formation initiatives in underserved communities to remove the primary barrier to entry for non-participants.
iii. Pluralistic Extension & Rural Credit: Complement physical extension with digital tools and establish dedicated credit windows in partnership with microfinance channels.

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