

Cooperative Resources and Cassava Value Addition among Smallholder Farmers in Edo State, Nigeria

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Abstract

Original Research Article

Cassava is an important smallholder crop in Nigeria, but the economic value generated from cassava depends not only on production but also on processing, storage, market coordination, and access to value-added markets. Agricultural cooperatives may help farmers overcome some of these constraints by providing collective access to processing facilities, technical support, market information, credit, and related services. This study assessed smallholder farmers' perceptions of cassava value addition and the cooperative resources and organisational characteristics associated with value-addition benefits in Edo State, Nigeria. A cross-sectional descriptive survey design was used. A multistage sampling procedure was adopted, and 382 questionnaires were administered; 344 usable questionnaires were returned, giving a 90.1% response rate. Data were analysed using frequencies, percentages, means, and standard deviations. Respondents generally expressed favourable perceptions of cassava value addition, particularly with respect to product quality, market value, product diversification, and economic benefits. Cooperative market information and processing tools received the strongest perceived benefit ratings, while perceived access to cooperative raw materials was low and perceptions of financial resources were mixed. Respondents also viewed larger cooperatives and longer membership duration favourably in relation to processing and value-addition support. The findings indicate perceived institutional support rather than causal effects. The study concludes that cooperatives can serve as important channels for processing-related information, equipment, technical assistance, collective action, and market coordination, while recommending stronger provision of working capital, raw materials, equipment maintenance, and market linkages.

Keywords: agricultural cooperatives; cassava; value addition; cooperative resources; smallholder farmers; Edo State; Nigeria.

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1. Introduction

Cassava occupies a central position in Nigerian agriculture and food systems. Smallholder farmers produce cassava for household consumption, local markets, industrial uses and

informal processing activities. The economic significance of cassava therefore extends beyond the quantity harvested. Farmers may sell fresh roots, process roots into gari, flour, fufu, starch and other products, or combine production with processing and marketing. These additional

stages create opportunities for income generation and market diversification, but they also involve costs associated with equipment, labour, energy, transport, quality control, storage, finance and market coordination. Value addition should therefore be understood as an economic process whose benefits depend on the resources and capabilities available to the farmer.

Agricultural cooperatives can potentially help farmers address these production, processing and marketing constraints. By pooling members and resources, cooperatives may facilitate access to processing equipment, credit, technical assistance, input supplies, market information, collective marketing and bargaining power. Such functions are particularly relevant to cassava because fresh roots are bulky and highly perishable, whereas processing equipment and organised market channels may be difficult for individual smallholders to secure. Evidence from Edo State has documented cooperative involvement in group processing, packaging, transportation, storage and bulk sales of cassava products (Alufohai et al., 2018). Other Nigerian studies also associate cooperative participation with technology adoption, welfare, technical efficiency, productivity and market-related outcomes, although the outcomes and analytical designs differ across studies (Kehinde & Ogundeji, 2022; Olagunju et al., 2021; Wossen et al., 2017).

Membership, however, does not necessarily translate into effective access to cooperative resources. A farmer may belong to a cooperative without receiving equipment, finance, technical support or reliable market linkages. The relevant issue is therefore the extent to which cooperative resources are perceived to support actual value-addition activities. In addition, organisational characteristics such as cooperative size and length of membership may shape access to resources through aggregation, bargaining power, accumulated experience, relationships and information. Understanding these perceptions is useful for cooperative management, agricultural extension and rural development policy.

This study focuses on the perceived contribution of cooperative resources and selected organisational characteristics to cassava value-

addition activities among smallholder farmers in Edo State. Particular attention is given to access to processing tools, financial and technical support, market information, cooperative size, and membership duration. Because the study is cross-sectional and descriptive, the findings are interpreted as respondents' reported perceptions and associations rather than as causal estimates of effects on income or value addition.

2. Objectives of the Study

The main objective was to assess smallholder farmers' perceptions of cooperative resources and cassava value addition in Edo State, Nigeria. Specifically, the study sought to:

1. assess respondents' perceptions of cooperative resources that support cassava processing and value addition;
2. examine respondents' perceptions of the role of cooperative size in processing and value-addition support; and
3. assess respondents' perceptions of the role of membership duration in processing and value-addition support.

3. Research Questions

1. Which cooperative resources do respondents perceive as supporting cassava value addition?
2. How do respondents perceive cooperative size in relation to cassava processing and value addition?
3. How do respondents perceive membership duration in relation to cassava processing and value addition?

4. Literature Review

4.1 Cooperative resources and rural economic outcomes

Cooperatives are commonly viewed as collective institutions through which farmers may access resources and services that are difficult or costly to obtain individually. Nigerian evidence suggests that cooperative membership can be

associated with improved farmer outcomes, although the magnitude and pathway differ by context. Afolabi and Ganiyu (2021), using probit estimation and propensity-score matching, reported higher rural income among cooperative members than matched nonmembers. Wossen et al. (2017) found relationships between extension access, cooperative membership, technology adoption and household welfare. Olagunju et al. (2021) reported higher technical efficiency among cooperative members in Nigerian maize production after accounting for observed and unobserved selection factors. Kehinde and Ogundeji (2022) also reported stronger cocoa productivity where farmers had access to both credit and cooperative services. These studies support the view that cooperative services may work through complementary resource channels rather than membership status alone.

4.2 Cassava value addition, processing technology and markets

Cassava value addition involves more than transforming fresh roots into processed products. It includes activities such as processing, packaging, storage, transportation, product diversification and marketing. Alufohai et al. (2018) documented several of these activities among cassava cooperatives in Edo State. Iheyi and Kim (2025) reported higher income among cassava value-adders in Kogi State using propensity-score matching, while emphasizing differences between value-adders and non-value-adders in education, farm size, credit access, market linkage and equipment use. Such evidence indicates that value addition can be economically important while also highlighting the need to distinguish the value-addition process from the farmer characteristics that make it possible.

Processing technology is an important pathway because appropriate equipment can reduce labour requirements, improve processing consistency and expand production capacity. Market information and market participation are similarly important because farmers must identify profitable outlets and negotiate terms that allow them to retain value. Nwachukwu et al. (2020) identified socioeconomic and financial

factors associated with market participation among cassava processors in Abia State. Postharvest loss is another relevant issue because cassava roots deteriorate rapidly after harvest. Bamikole et al. (2022) reported important loss points between harvest and marketing in Oyo State. Cooperative resources that improve processing speed, storage, transport and market coordination may therefore contribute to value-chain efficiency.

4.3 Cooperative size and membership duration

Cooperative size may matter because larger membership bases can facilitate resource pooling, aggregation and bargaining. Larger organisations may also have greater capacity to spread the fixed costs of machinery and infrastructure across members. However, size is not automatically equivalent to effectiveness. Large cooperatives may experience governance difficulties, unequal access to services or congestion in the use of common facilities. Membership duration may similarly influence access to knowledge and networks because repeated interaction can build experience, trust and relationships. At the same time, longer membership may be associated with unobserved characteristics such as commitment, prior success or social connectedness. The present study therefore examines size and duration as perceived institutional characteristics rather than estimating causal effects.

4.4 Gender and value-chain benefits

Gender is relevant to cassava value addition because women and men may perform different activities and face different resource constraints. Olaosebikan et al. (2019) identified constraints related to processing equipment, infrastructure, training, labour and market conditions among women and men cassava farmers and processors in Nigeria. Teeken et al. (2018) further showed that men and women may differ in cassava trait preferences, reflecting differentiated roles and priorities in the value chain. Masamha et al. (2018) demonstrated the relevance of intra-household gender relations to cassava

production, processing, transport, marketing and control over income. These findings reinforce the need to interpret the gender composition of cooperative membership carefully and to distinguish participation from control over value-chain returns.

5. Theoretical Framework

The study is anchored in collective action and transaction-cost perspectives. Collective-action theory explains why farmers may pool resources and coordinate economic activities that are costly to organise individually. In the cooperative context, joint ownership and collective decision-making can facilitate access to services such as processing equipment, market information, technical support and collective marketing. Transaction-cost reasoning complements this perspective by suggesting that collective arrangements can reduce search, bargaining, procurement, transport and coordination costs. Together, the perspectives provide a useful basis for examining how cooperative resources are perceived to support cassava value addition. They provide an explanatory lens but do not convert the present descriptive data into causal evidence.

6. Methodology

6.1 Research design and setting

The study adopted a cross-sectional descriptive survey design in Edo State, Nigeria. Data were obtained from cassava-farming cooperative members at a single period of field observation. The design was considered appropriate for describing respondents' perceptions of cassava value addition and cooperative support.

6.2 Population, sampling and sample size

The target population comprised cassava farmers who were members of agricultural cooperatives in selected cassava-producing areas of Edo State. A multistage sampling procedure was used to select respondents. The sample size of 382 was determined using Yamane's formula at a 5% level of precision. Of the 382 questionnaires administered, 344 were correctly completed and

used for analysis, representing a 90.1% response rate.

6.3 Instrument and measurement

Data were collected using a structured questionnaire. The substantive sections of the questionnaire used a five-point Likert response scale comprising Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD). Responses were coded 5, 4, 3, 2 and 1, respectively. The instrument captured perceptions of cassava value-addition benefits, cooperative-resource benefits, cooperative size and membership duration.

6.4 Data analysis

Data were analysed using descriptive statistics, specifically frequency distributions, percentages, means and standard deviations. Frequencies and percentages were used to summarise respondents' characteristics and response distributions, while item means and standard deviations were used to describe the direction and dispersion of Likert-scale responses. A mean above the scale midpoint of 3.00 was interpreted as general agreement with the statement. The means and standard deviations reported in the tables below were recalculated from the response frequencies using the stated five-point coding scheme to ensure internal consistency.

7. Results

7.1 Demographic and farm characteristics

The sample comprised respondents from different age, educational, marital-status, household-size, farm-size and income categories. The modal age group was 31–40 years (29.7%), followed by 18–30 years (23.3%). Secondary education was the most common educational level (55.2%), while 64.0% were married. Women constituted 66.0% of the respondents and men 34.0%. The modal household size was 3–5 members (43.6%), the modal farm-size category was 1.1–2.0 hectares (40.1%), and the largest monthly income category was ₦50,001–₦100,000 (40.1%).

Table 1: Socio-economic characteristics of the respondents

Variable	Category	Frequency	Percentage (%)
Age	18–30 years	80	23.3
	31–40 years	102	29.7
	41–50 years	78	22.7
	51–60 years	52	15.1
	61 years and above	32	9.3
Sex	Male	117	34.0
	Female	227	66.0
Education	Primary	57	16.6
	Secondary	190	55.2
	Tertiary	97	28.2
Marital status	Married	220	64.0
	Single	70	20.3
	Divorced	25	7.3
	Widowed/widower	29	8.4
Household size	1–2 members	98	28.5
	3–5 members	150	43.6
	6–8 members	70	20.3
	9 or more members	26	7.6
Farm size	0.5–1.0 ha	112	32.6
	1.1–2.0 ha	138	40.1
	2.1–3.0 ha	64	18.6
	More than 3.0 ha	30	8.7
Monthly income	₦0–50,000	80	23.3
	₦50,001–100,000	138	40.1
	₦100,001–150,000	70	20.3
	More than ₦150,000	56	16.3

Source: Field Survey, 2026.

7.2 Perceived benefits of cooperative resources

Perceptions of cooperative-resource benefits varied considerably. Market information recorded the highest mean ($M = 4.87$), followed

by processing tools ($M = 4.67$). Technical support also received favourable ratings ($M = 4.06$). Cooperative credit ($M = 4.29$), shared facilities ($M = 4.19$), motivation for increased processing ($M = 4.42$), and access to new

technologies ($M = 4.28$) were also viewed favourably. In contrast, the raw-material item received a very low mean ($M = 1.27$), with all respondents selecting a disagreement category. Financial resources recorded a mixed response

pattern with a corrected mean of 3.06. The results indicate that respondents perceived cooperative support more strongly for information, equipment and technical resources than for raw materials and finance.

Table 2: Perceived benefits of cooperative resources

No.	Statement	SA (%)	A (%)	U (%)	D (%)	SD (%)	M	SD
1	Processing tools increase income	230 (66.9)	114 (33.1)	0 (0.0)	0 (0.0)	0 (0.0)	4.67	0.47
2	Processing raw materials improve income	0 (0.0)	0 (0.0)	0 (0.0)	92 (26.7)	252 (73.3)	1.27	0.44
3	Financial resources enable expansion	0 (0.0)	160 (46.5)	92 (26.7)	46 (13.4)	46 (13.4)	3.06	1.06
4	Technical support enhances efficiency	22 (6.4)	322 (93.6)	0 (0.0)	0 (0.0)	0 (0.0)	4.06	0.25
5	Market information increases income	299 (86.9)	45 (13.1)	0 (0.0)	0 (0.0)	0 (0.0)	4.87	0.34
6	Cooperative credit increases processing income	177 (51.5)	130 (37.8)	16 (4.7)	2 (0.6)	19 (5.5)	4.29	1.00
7	Shared facilities improve income	166 (48.3)	128 (37.2)	14 (4.1)	22 (6.4)	14 (4.1)	4.19	1.05
8	Resources motivate more processing	196 (57.0)	121 (35.2)	10 (2.9)	9 (2.6)	8 (2.3)	4.42	0.86
9	Resources enable new technologies	175 (50.9)	122 (35.5)	27 (7.8)	7 (2.0)	13 (3.8)	4.28	0.97
10	Resources positively influence income	126 (36.6)	119 (34.6)	9 (2.6)	66 (19.2)	24 (7.0)	3.75	1.31

Source: Field Survey, 2026; Grand mean = 3.89.

7.3 Perceived role of cooperative size

Respondents generally perceived larger cooperatives as better positioned to provide processing facilities and resources and to facilitate market linkages, shared equipment, bargaining power and collective marketing.

Market linkage had the highest mean ($M = 4.42$), while the perception that size influences training received had the lowest mean ($M = 3.73$), though still above the neutral midpoint. The findings reflect respondents' beliefs about the advantages of cooperative scale rather than an analysis based on observed cooperative size.

Table 3: Perceived role o cooperative size

No.	Statement	SA n (%)	A n (%)	U n (%)	D n (%)	SD n (%)	M	SD
1	Larger cooperatives provide more facilities	127 (36.9)	119 (34.6)	0 (0.0)	37 (10.8)	61 (17.7)	3.62	1.50
2	Larger cooperatives provide more resources	177 (51.5)	130 (37.8)	16 (4.7)	2 (0.6)	19 (5.5)	4.29	1.00
3	Cooperative size influences processing volume	166 (48.3)	128 (37.2)	14 (4.1)	22 (6.4)	14 (4.1)	4.19	1.05
4	Larger cooperatives facilitate market linkages	196 (57.0)	121 (35.2)	10 (2.9)	9 (2.6)	8 (2.3)	4.42	0.86
5	Cooperative size enables shared equipment	175 (50.9)	122 (35.5)	27 (7.8)	7 (2.0)	13 (3.8)	4.28	0.97
6	Larger cooperatives negotiate better prices	126 (36.6)	119 (34.6)	9 (2.6)	66 (19.2)	24 (7.0)	3.75	1.31
7	Size influences training received	127 (36.9)	119 (34.6)	37 (10.8)	0 (0.0)	61 (17.7)	3.73	1.42
8	Larger cooperatives have greater bargaining power	177 (51.5)	130 (37.8)	16 (4.7)	2 (0.6)	19 (5.5)	4.29	1.00
9	Size enables collective marketing	166 (48.3)	128 (37.2)	14 (4.1)	22 (6.4)	14 (4.1)	4.19	1.05
10	Size affects income from processing	177 (51.5)	130 (37.8)	16 (4.7)	2 (0.6)	19 (5.5)	4.29	1.00

Source: Field Survey, 2026; Grand mean = 4.11.

7.4 Perceived role of membership duration

Respondents also viewed longer membership duration favourably across most items. Improved resource access and price negotiation had the highest means (M = 4.42 each), followed by market opportunities and credit access. The

lowest rating concerned the statement that membership duration positively affects income (M = 3.91). The results suggest that respondents associate longer membership more strongly with accumulated knowledge, access and relationships than with direct income gains.

Table 4: Perceived role of membership duration

No.	Statement	SA n (%)	A n (%)	U n (%)	D n (%)	SD n (%)	M	SD
1	Longer membership provides processing skills	166 (48.3)	128 (37.2)	14 (4.1)	22 (6.4)	14 (4.1)	4.19	1.05
2	Longer membership improves resource access	196 (57.0)	121 (35.2)	10 (2.9)	9 (2.6)	8 (2.3)	4.42	0.86

3	Longer membership improves market opportunities	175 (50.9)	122 (35.5)	27 (7.8)	7 (2.0)	13 (3.8)	4.28	0.97
4	Longer membership builds beneficial relationships	126 (36.6)	119 (34.6)	9 (2.6)	66 (19.2)	24 (7.0)	3.75	1.31
5	Longer membership increases training benefits	127 (36.9)	119 (34.6)	37 (10.8)	0 (0.0)	61 (17.7)	3.73	1.42
6	Processing income increases with membership duration	177 (51.5)	130 (37.8)	16 (4.7)	2 (0.6)	19 (5.5)	4.29	1.00
7	Longer membership supports technology adoption	166 (48.3)	128 (37.2)	14 (4.1)	22 (6.4)	14 (4.1)	4.19	1.05
8	Duration improves price negotiation	196 (57.0)	121 (35.2)	9 (2.6)	10 (2.9)	8 (2.3)	4.42	0.87
9	Longer membership improves credit access	175 (50.9)	122 (35.5)	7 (2.0)	27 (7.8)	13 (3.8)	4.22	1.07
10	Membership duration positively affects income	126 (36.6)	119 (34.6)	66 (19.2)	9 (2.6)	24 (7.0)	3.91	1.13

Source: Field Survey, 2026; Grand mean = 4.14.

8. Discussion

The study demonstrates a generally favourable perception of cassava value addition among the sampled cooperative farmers. Respondents particularly associated value addition with improved product quality, increased market value, higher profitability than fresh-root sales, and expansion of the product range. This pattern is consistent with evidence from Kogi State showing that value addition can be associated with better income outcomes among cassava farmers, while differences in farmer characteristics and resource endowment remain important (Iheyi & Kim, 2025). It is also consistent with the documented involvement of cooperatives in cassava processing, packaging, transportation, storage and bulk marketing in Edo State (Alufohai et al., 2018).

The relatively lower rating for the proportion of harvest processed is important. Perceiving value addition as beneficial does not necessarily mean that farmers have the capacity to process a large share of their cassava output. Processing intensity may remain constrained by equipment availability, labour, energy, finance, transport and market demand. Similarly, the lower rating

for reduction in postharvest losses indicates that value addition should not be assumed to eliminate losses automatically. Bamikole et al. (2022) show that cassava losses can occur at several stages between harvesting and marketing, indicating that processing needs to be accompanied by better handling, storage and logistics.

The cooperative-resource findings provide a clear institutional pattern. Market information and processing tools attracted the strongest agreement, while raw-material access was strongly negative and financial resources generated mixed perceptions. This suggests that cooperative support may be uneven across the value chain. Cooperatives may have greater capacity to organise information sharing and shared equipment than to provide sufficient working capital or raw materials. The finding is consistent with the broader evidence that cooperative services can complement, rather than fully replace, access to financial resources (Kehinde & Ogundeji, 2022; Wossen et al., 2017).

Respondents' favourable perceptions of cooperative size are also plausible from a

collective-action perspective. Larger cooperatives may be better able to aggregate produce, spread equipment costs among members, negotiate with buyers and mobilise resources. Nevertheless, the present data measure perceptions of size advantages rather than actual cooperative size, so the findings should not be interpreted as evidence that larger cooperatives necessarily perform better. The effectiveness of larger cooperatives will also depend on governance, transparency, member participation and equitable access to services.

The perceived benefits of longer membership are similarly plausible. Repeated participation can increase familiarity with cooperative procedures, strengthen social relationships, improve access to information and facilitate learning. However, the observed association may reflect selection: farmers who are more successful or satisfied may remain members longer. Thus, the results support the relevance of membership duration as a factor deserving further investigation, but they do not demonstrate that longer membership itself caused the reported benefits.

The gender composition of the sample further highlights the importance of examining who controls cooperative resources and the returns from processing. Women constituted 64.0% of respondents, indicating a substantial female presence in the sampled cooperative membership. This is relevant because Nigerian cassava studies have documented gendered constraints in equipment, labour, market access and income control (Olaosebikan et al., 2019), while the Tanzanian evidence of Masamha et al. (2018) illustrates how intra-household gender relations can shape control over higher-value activities. The current data, however, do not provide gender-disaggregated comparisons of resource use or income control and should therefore not be interpreted as evidence of gender equality within cooperatives.

Overall, the findings strengthen the argument that the practical contribution of cooperatives to cassava value addition lies in the resources and services they make available rather than in membership status alone. For policy and management, attention should therefore move from increasing membership numbers to strengthening the quality, reliability and

inclusiveness of cooperative services.

9. Policy and Practical Implications

Cooperative development programmes in Edo State should prioritise reliable access to processing equipment, technical support, market information and collective marketing. Because the weakest perceptions concerned raw materials and financial resources, cooperatives and their development partners should also explore working-capital arrangements, input/raw-material aggregation, transparent credit systems and equipment-maintenance funds.

Cooperatives should adopt simple operational records covering equipment use, quantities processed, credit disbursement, sales, maintenance costs and member participation. Such records would help managers identify underperforming services and would also provide better evidence of economic outcomes than perception measures alone. Gender-responsive governance should be incorporated so that access to equipment, credit, marketing channels and control over sale proceeds can be monitored across male and female members.

10. Limitations of the Study

The study is descriptive and cross-sectional; consequently, it cannot establish that cooperative resources, cooperative size or membership duration caused improvements in cassava value addition or income. The study also relies primarily on self-reported perceptions. In addition, some questionnaire statements combine a resource with a presumed economic outcome, which may increase common-method bias (Podsakoff et al., 2003). The analysis would be strengthened in future research by separating measures of resource access from objective outcomes such as processing volume, realised prices, processing costs, postharvest losses and net income. Finally, the findings are appropriately interpreted within the sampled cooperative members and selected study areas; wider generalisation depends on the representativeness of the underlying sampling frame.

11. Conclusion

This study found generally favourable perceptions of cassava value addition among cooperative smallholder farmers in Edo State. Respondents associated value addition with improved product quality, market value, product diversification and economic benefits. Among cooperative resources, market information and processing tools received the strongest perceived benefits, while access to raw materials was weak and perceptions of financial resources were mixed. Respondents also perceived larger cooperatives and longer membership duration as beneficial for several processing-related outcomes.

The central implication is that cooperative membership is most valuable when it provides usable resources and services that support processing and marketing. Cooperatives should therefore strengthen equipment access and maintenance, technical assistance, market information, collective marketing, working capital and other services that directly support cassava value addition. Because the present evidence is descriptive and perception-based, these recommendations should be regarded as priorities for cooperative development rather than proof of causal impacts.

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