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The influence of coordination and cooperation strategies on profitability of cassava processing farmers' organizations in Kogi and Nasarawa states, Nigeria

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Abstract

This study examined the influence of coordination and cooperation strategies on the profitability of cassava processing farmers' organizations in Kogi and Nasarawa States, Nigeria. Specific objectives included describing the socio-economic characteristics of members and non-members, assessing the profitability of cassava processing across both groups, and determining differences in income generation between members and non-members. Using a multistage random sampling technique and the Taro Yamane formula, 456 respondents were selected. Primary data were collected via structured questionnaires and analyzed using descriptive statistics, gross margin analysis, benefit-cost ratio, and Z-test at a 5% significance level. Findings revealed that females dominated cassava processing in both states, comprising 80% and 75% of members and non-members respectively in Kogi State, and 80% and 70% in Nasarawa State. Members of farmers' organizations demonstrated higher educational attainment, with 85% and 80% holding combinations of primary, secondary, and tertiary qualifications in Kogi and Nasarawa States respectively, compared to non-members where only 40–45% attained primary education. Members also recorded significantly higher profitability, with benefit-cost ratios of 1:13 and 1:12 in Kogi and Nasarawa States respectively, outperforming non-members who recorded ratios of 1:12 and 1:11. Z-test results confirmed significant differences in income generation, with z-calculated values of 10.72 and 7.45 exceeding the z-tabulated values of 1.966 and 1.976 in Kogi and Nasarawa States respectively. The study concludes that organizational membership significantly enhances income and productivity, and recommends intensified extension services to encourage non-member participation in farmers' organizations.

Keywords: Cassava processing, farmers' organizations; Profitability; Coordination and cooperation strategies; Income generation

1. Introduction

Profit is the strength and weakness of any agri-business as a measure of performance among cooperative farmers, that is, the difference between the total revenue and the total cost of production (Erhabor, 2019; Olorunsanya and Akinyemi, 2021). It is equally the reward for decision making and the risk bearing function of the entrepreneurs (farmers). To maximize optimum profit of cassava processing by the members and non-members of cassava farmers' organization in Kogi and Nasarawa States, Nigeria, proper articulation of organizational elements that will strengthen interpersonal network and intergroup relationship to promote understanding, high, production of good quality cassava processed products has become necessary (Blake, 2021; Hossain and Andrew, 2019). A good profit of cassava processing agri-business obtained by members and non-members of cassava farmers' organization is an indication of the effectiveness of coordination and cooperation strategies among the cassava farmers within the organization. Coordination among cassava farmers' organization involved setting rules, and standards based on cooperation, fostering relationship and

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interest aggregation to enhance interpersonal and intergroup relationship that can guarantee performance (Arnaud and Schminke, 2021).

Considering the crucial roles profit play in agricultural production among the cassava farmers' organization, it has become imperative to think of how to sustain it to boost the performance of the organization. It is against this backdrop that this study analysed the influence of coordination and cooperation strategies on profitability of cassava processing among members and non-members of cassava farmers' organization in Kogi and Nasarawa States, Nigeria.

The specific objectives are to: described socio-economic characteristics of members and non-members of cassava processing farmers organization, ascertain the profitability of cassava processing among members and non-members of cassava farmers' organization in the study area and find out the differences in income generation among members and non-members of cassava farmers' organization in Kogi and Nasarawa States, Nigeria.

2. Methodology

The study was carried out in Kogi and Nasarawa States, Nigeria. Kogi State is located between latitude 6° 30'N and 8° 50'N and longitude 5° 51'E and 8° 00'E sharing boundaries with Kwara, Ondo, Ekiti, Niger, Benue, Edo State and Federal Capital Territory (KOSEEDS, 2014). The State consists of twenty-one (21) Local Government Areas and it has a population of 4,473,500 people out of which 1,691,737 are males and 2,781,763 are females with an average of 172,000 farm (National Population Commission, 2016). Occupationally, the State has a significantly farming population producing, cassava, maize, yam, rice etc. They are also known for hunting, blacksmithing, brick pot, molding, fishing and trading (Katherin, 2020).

Similarly, Nasarawa State is located in the Middle Belt Region of Nigeria. It lies between latitude 7° 45'N and 9° 25'N of the equator and between longitude 7° and 9° 37'E of the Greenwich meridian. It shares boundary with Kaduna State, in the East, Taraba and Benue State in the South while Kogi and the Federal Capital Territory flanks it in the West (Adisa, 2021). The State has a total land area of 27,137.8 square kilometer and a population of 2.5 million (National Population Commission, 2016). Nasarawa State is made up of 13 Local Government Areas, largely produce sesame, soyabean, cassava, groundnut, yam and millet, etc.

A multistage random sampling technique and Taro Yamani formular was used to determine the sample size of 152 registered members and 152 non-members of cassava farmers' organization across agro-ecological zone with the total of 304 cassava farmers was selected from Kogi State, while 76 registered cassava farmers who are members of cassava farmers' organization and 76 non-members across agro-ecological zones with the total of 152 cassava farmers was selected from Nasarawa State. The sample size of 456 respondents was selected.

A well-structured questionnaire was used to collect the primary data that were needed for the study. Primary data collected focused on socio-economic characteristics of members and non-members, profitability of members and non-members of cassava farmers' organizations in the study area and differences in income generation among members and non-members of cassava farmers' organization in Kogi and Nasarawa State.

2.1. Model Specification

Gross margin and Benefit cost ratio are the income and business analysis used to estimate the total revenue and the total cost of an enterprise (Erhabor, 2019).

$$G.M = TR - TC$$

Where:

GM = Gross Margin

TR = Total Revenue

TC = Total Cost

$$\text{Also, Benefit cost ratio} = \frac{\text{Total Revenue}}{\text{Total Cost}}$$

3. Results and Discussion

3.1. Socio-Economic Characteristics of Registered Members and Non-Members of Cassava Farmers' Organization in Kogi State and Nasarawa State

3.1.1. Sex

The result in Table 1 showed that the majority (80%) of registered members, and (75%) of non-members of cassava farmers' organization that engaged in cassava processing in Kogi State were females respectively. While 20% and 25% of registered members and non-members were males respectively.

Similarly, in Nasarawa State (80%) and (70%) of registered members and non-members of cassava farmers' organization that engaged in cassava processing were females, while (20%) and (30%) of registered members and non-members were male respectively. This finding implies that cassava processing in Kogi and Nasarawa State was dominated by female processors. This corroborates Ayieko (2021), who reported that 60% - 80% of Africa women in rural area play a crucial role in cassava processing while men do cassava production and animal husbandry. This finding was equally in line with Olawoye (2022), who further reported that women play a pivotal role in agricultural cooperative and food security, because of their strategic position in cassava processing, and other household endeavours than men. The implication is that any encouragement will lead to poverty reduction and enhance the standard of living of rural women.

3.1.2. Age Distribution of Registered Members and Non-Members

The result in Table 1 showed that the majority an average proportion (50%) of registered members belonged to the age bracket of 31 – 40 and (40%) of non-members belong to 31 – 40 in Kogi State. Also, in Nasarawa State, the majority (60%) of registered members belonged to the age bracket of 31 – 40, while (50%) of non-members of cassava farmers' organization belonged to age bracket of 31 – 40. This implies that the mean age (35 years) of registered members and non-members of cassava farmers' organization in Kogi and Nasarawa States showed that they were within economically active age to carry out agro-cassava processing. This is in conformity with the finding of Okali (2019), Oyemole and Eforuoke (2019), who reported that the age of well coordinated members of cassava farmers' organization in Nigeria who take cassava processing as the main source of livelihood ranged between 35 – 50 years. The implication is that processor with this active age bracket appreciate the values and good quality cassava process products.

3.1.3. Marital Status of Registered Members and Non-Registered Members of Cassava Farmers' Organization

This result in Table 1 indicated that the majority (60%) and an average proportion (50%) of registered members and non-members of cassava farmers' organization in Kogi State were married, (10%) and (20%) of registered members and non-members were single and (25%) and (30%) were widow.

Similarly, in Nasarawa State result revealed that the majority (60%) and (70%) of registered members and non-members of cassava farmers' organization were married, (20%) of both the registered members and non-registered members were single, while (20%) and (10%) of the registered members and non-registered members were widow respectively. This implies that cassava processing in Kogi and Nasarawa States were dominated by married women followed by widows.

The predominance of married women in Kogi and Nasarawa States in cassava processing for economic reasons proved the fact that any intervention from governmental and non-governmental organizations will help to reduce the poverty level of rural women at the same time enhance their income generation. This findings is consistent with ILO (2015) and Kramer (2020), who reported that (70.0%) of women processor in Nigeria were married and appropriate coordination and cooperation will lead to better production of good and quality process products.

3.1.4. Educational Status of Registered Members and Non-Registered Members of Cassava Farmers' Organizations

The result in Table 1 further revealed that among registered members of cassava farmers' organization in Kogi State, (15%) had non-formal, (45%) had primary education, (30%) obtained secondary education and (10%) attended institution. However, the combination (85%) of primary, secondary and tertiary educational qualification in Kogi State showed that farmers attained different level of educational qualification. Also, among non-members, (60%) had non-formal education, (40%) primary education and (none) had secondary and tertiary education respectively.

Similarly, in Nasarawa State among the registered members of cassava farmers' organizations, (20%) had non-formal education, (40%) had primary education, (30%) obtained secondary education and (10%) attended tertiary institution. However, the combination of primary, secondary and tertiary (80%), attained different level of educational qualification. Also, among the non-members, (60%) had non-formal education, (40%) had primary education, and (none) had secondary and tertiary educational qualification respectively. However, the majority (60%) were illiterates.

This implies that in Kogi and Nasarawa States, registered members of cassava farmers' organization attained different level of educational qualifications, while the majority of non-members had no formal education. This corroborates Akerele (2016), who reported that (84.2%) of cooperative members of organization attained primary level of educational standard and had exposure on cooperative credit acquisition. Likewise to Nurai and Bembeni (2018), who reported that the majority of non-members of cooperative who engaged in cassava processing particularly in rural areas, were illiterates; and this is one of the known hindrance from benefitting government programmes and adoption of improved cassava processing technology in the study area. The implication is that non-members should be encouraged to join farmers' association in order to benefit from government intervention.

Table 1 Socio-Economic Characteristics of Registered Members and Non-Members of Cassava Farmers' Organization in Kogi State and Nasarawa State

KOGI STATE								NASARAWA STATE					
Registered Members				Non-Registered Members				Registered Members			Non-Registered Members		
S/No	Variables	Frequency	Percentage	Mean/Mode	Frequency	Percentage	Mean/Mode	Frequency	Percentage	Mean/Mode	Frequency	Percentage	Mean/Mode
A	Sex			Female			Female			Female			Female
	Male	31	20		38	25		15	20		23	30	
	Female	121	80		114	75		61	80		53	70	
	Total	152	100		152	100		76	100		76	100	
B	Age (Years)			35 years			35 years			35 years			35 years
	21 - 30	23	15		15	10		9	12		8	10	
	31 - 40	76	50		61	40		46	60		38	30	
	41 - 50	38	25		46	30		15	20		22	50	
	51 and above	15	10		30	20		6	8		8	10	
	Total	152	100		152	100		76	100		76	100	
C	Marital Status			Married			Married			Married			Married
	Single	15	10		30	20		15	20		15	20	
	Married	91	60		76	50		46	60		53	70	
	Divorced	8	5		0	0		0	0		0	0	
	Widow	38	25		46	30		15	20		8	10	
	Widower	0	0		0	0		0	0		0	0	
	Total	152	100		152	100		76	100		76	100	

D	Educational Qualification			Primary			Non-Formal Education			Primary			Non-Formal Education
	Non-formal education	23	15		91	60		15	20		46	60	
	Primary	69	45		61	40		30	40		30	40	
	Secondary	46	30		0	0		23	30		0	0	
	Tertiary	15	10		0	0		8	10		0	0	
	Total	152	100		152	100		76	100		76	100	

Source: Field Survey, 2024

Table 2: The result in Table 2 showed that the total profit made by all the members of cassava farmers’ organization in Kogi State was N61,060,064 and average profit by each member was N401,711 with a benefit cost ratio 1:13. Also, the total profit made by non-members was N44,985,048 and the average profit by each member was N295,954 with a benefit cost ratio of 1:12.

Similarly, the total profit made by all the members of cassava farmers’ organization in Nasarawa State was N28,852,000 and average profit obtained by member was N379,632 with a benefit cost ratio of 1:12. Equally, the total profit received by the non-members was N23,854,000 and average profit received by each member was N313,868 with a benefit cost ratio of 1:11 in Nasarawa State. This showed that cassava processing business in Kogi and Nasarawa State was profitable and efficient. This implies that every N1.00 invested on cassava processing by members and non-members of cassava farmers’ organization in Kogi State, an addition of N12.48 kobo and N11.85 kobo is realized respectively while N11.98 kobo and N11.72 kobo is realized by members and non-members in Nasarawa State. This is in consonance with Odunnaya (2015) and Yakasai (2018) who reported that cooperative farmers enjoy more profit generation than non-cooperative farmers because of accessibility of agricultural facilities and market information technology. The implication is that cooperative approach to cassava processing will lead to value addition and increase in profit generation.

Table 2 Profitability of Cassava Processing by Members and Non-Member of Cassava Farmers’ Organization

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Variables	Members		Non-Mmembers	
	Kogi	Nasarawa	Kogi	Nasarawa
Total Output	3311	1574	2457	1304
Average Output	22	21	16	17
Average Unit Price	20,000	20000	20000	20000
Total Revenue	66216064	31480000	49130048	2608000
Average Revenue	435632	414211	323224	343158
Total Cost of Production	5156000	2628000	4145000	2226000
Average Cost of Production	33921	34579	27270	29289
Total Profit	61060064	28852000	44985	23854000
Average Profit	401711	379632	295954	313868
Benefit Cost Ratio	12.84	11.98	11.85	11.72

From the result of Table 3 the mean income of members of cassava farmers' organization in Kogi State was (435,632), while the non-members was (323,224). Similarly, in Nasarawa State, the mean income of members of cassava farmers' organization was (414,210.53), while the non-members was (343,157.89). Compared the mean income of members and non-members of cassava farmers' organizations in Kogi and Nasarawa States respectively, the mean income for membership is higher than non-members suggesting that membership in cassava farmers' organization is associated with higher income. This could be attributed to benefits of coordination and cooperation within the organization.

These reflect the findings of Mohammed and Achem (2020), who reported that ascertain differences in income generation on cassava processing among members and non-members of cassava farmers' organization help in determination of their financial potential and strength. The implication is that high income of members over non-members show effectiveness of coordination and cooperation strategies.

Table 3 Result of Z-Test

Respondent	Sample Size (OBS)	Mean	Standard Deviation	Standard Error	95% Confident	Interval	Degree of Freedoms	Z- Calculate
Kogi: Members	152	435,632	98,372	7,979	419,993	451,270	151	10.72
Non-members	152	323,224	83,868	6,803	309,891	336,557	151	Z-value 1.966
Nasarawa: Members	76	414,210.53	62,806.86	7,204.44	400,090.08	428,330.97	75	7.45
Non-members	76	343,157.89	54,460.03	6,246.99	330,914.01	355,401.78	75	Z-value 1.976

Source: Field Survey, 2024

3.2. Test of Null Hypotheses

Hypothesis One: There is no significant difference in income generation by members and non-members of cassava farmers' organization.

The data in Table 4 above showed that the calculated z-test for members and non-members of cassava farmers' organization in Kogi State was 10.72, while the critical value 1.996 at 5% level of significance. Similarly in Nasarawa State, the calculated z-test for members and non-members of cassava farmers' organization was 7.45, while the critical value 1.976 at 5% level of significance. Since the calculated z-test 10.72 is greater than critical value 1.996 in Kogi State and also 7.45 is greater than critical value 1.976 in Nasarawa State, the null hypothesis is therefore rejected that is, there is significant difference in the income generation by members of cassava farmers' organizations in Kogi and Nasarawa States due to benefit of coordination and cooperation within the organization. This implies that membership in cassava farmers' organization significantly increases income per capital among members compared to non-members in Kogi and Nasarawa States, and any tremendous improvement in effective coordination and cooperation will lead to higher income by members.

This corroborated with the findings of Odunaya (2015), Okafor and Umehali (2019), which reported that cooperative farmers enjoy more income generation than non-cooperative farmers because of accessibility to agricultural credit facilities and market information technologies which enhance their production capacity and sales.

Table 4 Z-Test of Significant Difference in Income Generation by Members and Non-Members of Cassava Farmers' Organization

Respondent	Sample Size (OBS)	Mean	Standard Deviation	Standard Error	95% Confident	Interval	Degree of Freedoms	Z- Calculate
Kogi: Members	152	435,632	98,372	7,979	419,993	451,270	151	10.72 Z-value 1.966
Non-members	152	323,224	83,868	6,803	309,891	336,557	151	
Nasarawa: Members	76	414,210.53	62,806.86	7,204.44	400,090.08	428,330.97	75	7.45 Z-value 1.976
Non-members	76	343,157.89	54,460.03	6,246.99	330,914.01	355,401.78	75	

Source: Field Survey, 2024

Hypothesis Two: The use of coordination and cooperation strategies do not significantly propel output of cassava processing among members of cassava farmers' organization and non-members.

The data in Table 5 above showed that the calculated z-test for members and non-members of cassava farmers' organization in Kogi State was 11.68, while the critical value 1.966 at 5% level of significant. Similarly in Nasarawa State, the calculated z-test for members and non-members of cassava farmers' organization was 7.22 while the critical value 1.976 at 5% level of significant. Since the calculated z-test 11.68 was greater than critical value 1.966 in Kogi State, and also 7.22 was greater than the critical value 1.976 in Nasarawa State, the null hypothesis is therefore rejected that is, there is significant difference in the output of members of cassava farmers' organization compare to non-members in Kogi and Nasarawa States. This implies that membership of cassava farmers' organization tend to have higher output compared to non-members, highlighting the positive impact of coordination and cooperation strategies within the organization. This is an indication that any affiliation of cassava farmer to each of the structured of organization stand to enjoy higher supports and benefits in term of economic gains and productivity (Faykese, 2019).

This reflect the finding of Faykese (2019), James and Evan (2018), which reported that membership of cassava farmers' organization will provide an opportunity for economic benefits and higher output through procurement and distribution of necessary production facilities for the processing of which will automatically add value to cassava output.

Table 5 Z-Test on Output of Cassava Processing by Members and Non-Members of Cassava Farmers' Organization

Respondent	Sample Size (OBS)	Mean	Standard Deviation	Standard Error	95% Confident	Interval	Degree of Freedoms	Z- Calculate
Kogi: Members	152	21.88	4.63	0.38	21.14	22.61	151	11.68 Z-value 1.966
Non-members	152	16.07	4.02	0.33	15.43	16.71	151	
Nasarawa: Members	76	20.59	3.24	0.37	19.86	21.32	75	7.22 Z-value 1.976
Non-members	76	17.09	2.71	0.31	16.48	17.70	75	

Source: Field Survey, 2024

4. Conclusion

From the findings, it can be conclude that cassava processing is a profitable and efficient venture in the study areas. The record on gross margin of N610,600.64 and N449,850.48 for members and non-members in Kogi State with the benefit

cost ratio of 1:12 and 1:11 respectively while N288,520.00 and N238,540.00 was for members and non-members of cassava farmers organization in Nasarawa State with benefit cost ratio of 1:11 and 1:11 respectively. This implies that every N1.00 invested on cassava processing by members and non-members of cassava farmers' organization in Kogi State, an addition of N12.48 kobo and N11.85 kobo is realized respectively while N11.98 kobo and N11.72 kobo is realized by members and non-members in Nasarawa State. Similarly, members of cassava farmers' organization in Kogi and Nasarawa States experienced higher income generation over non-members due to influence of coordination and cooperation strategies within the organization.

Recommendations

Based on the findings, the following recommendations are made:

- To achieve high profit maximization among members and non-members of cassava farmers' organization in the study area over the current average profit turnover of N401,711 and N295,954 among the members and non-members in Kogi State and N379,632 and N3131,868 for members and non-members in Nasarawa State respectively, non-governmental organization and international agencies should complement the giant effort of government to improve on extension services, processing facilities and secure good market system for the farmers processed products to boost their income and in return promote their standard of living.
- Considering the enormous influence of coordination and cooperation among the members of cassava farmers' organization in cassava processing in relation to income generation and processed output, coordinating institutions should intensify their effort to encourage non-members of the cassava farmers' organization to join farmers group or an association to benefit from government and international agencies interventions to boost production of processed products in the study area.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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