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INDEX OF CROP-SPECIFIC COMMERCIALISATION AMONG SMALLHOLDER ARABLE CROP FARMERS IN BENUE STATE, NIGERIA

[1]Ogbanje, E.C., [1]Ashiko, F.T.G. and [2]Abah, D.
1 Department of Agricultural Marketing and Co-operatives; 2 Department of Agricultural Economics, Joseph Sarwuan Tarka University, Makurdi, Benue State, Nigeria.
Email: *ogbanje.christopher@uam.edu.ng; +234803 365 0197*

Abstract
Structural changes in food systems affect smallholder farmers' market participation. This study assessed crop-specific commercialisation among smallholder arable crop farmers in Benue State, Nigeria. A stratified random sampling technique was used to select 357 producers of soybean, cowpea, maize, rice, cassava and yam. Primary data were analysed using descriptive statistics, the crop commercialisation index and one-way analysis of variance. Respondents were predominantly male (69.47%) and married (78.99%), with a mean age of 47 years and farm size of 1.92 ha. Majority (65.27%) of the farmers lacked access to extension services, while 55.46% had access to agricultural credit. The overall crop commercialisation index was 0.4054, with soybean recording the highest index (0.56). Commercialisation differed significantly among crops ($F = 85.69$; $p < 0.01$). The study concludes that crop commercialisation remains moderate and recommends stronger cooperative participation and improved access to credit and market information.
Keywords*:Index, crop specific, smallholder, farmers, commercialisation*

1.0 Introduction

Agriculture remains important to Nigeria's economy and supplies food, livestock feed, agro-industrial raw materials and export commodities (Oyetunde-Usman & Olagunju, 2019; Wagan et al., 2018). Agricultural commercialisation entails a sustained transition from subsistence-oriented production towards production for markets (Abu et al., 2024). This transition can increase cash income and support rural transformation in developing economies (Asselt & Useche, 2022; Amare et al., 2023; Kunasri et al., 2025). Crop specialisation is generally associated with stronger market orientation, whereas diversified crop portfolios may also reflect household consumption needs (Abebaw et al., 2023).

At household level, commercialisation is commonly measured as the value of agricultural sales relative to total agricultural output (Gebre-Ab, 2006). It may occur through increased marketed surplus or greater use of purchased inputs (Ogundele, 2020). Commercialisation can strengthen resilience to shocks (Do, 2023; Do & Nguyen, 2024), contribute to agricultural transformation (Do et al., 2026), and support income, food security and livelihoods (Ogbanje & Oraka, 2021; Cele & Mudhara, 2022; Mukwedeya & Mudhara, 2023). These outcomes are consistent with Sustainable Development Goals 1, 2 and 8 (United Nations, 2016, 2022).

Despite these potential benefits, smallholder market participation remains limited in many developing-country settings (Wakaba et al., 2022). Nigerian studies have examined commercialisation among small-scale farmers generally (Ogundele, 2020) and specific crops such as Bambara nut (Falola et al., 2022), while Sekyi et al. (2023) examined crop specialisation and commercialisation in Ghana. Evidence comparing commercialisation across major staple crops in Benue State remains limited. This study therefore determined crop-specific commercialisation among smallholder farmers in Benue State.

2.0 Objectives of the Study

3.0 Methodology

The study was conducted in Benue State, Nigeria, located in the Middle Belt with Makurdi as its capital. The State lies approximately between latitudes 6°30′N and 8°10′N and longitudes 6°35′E and 8°10′E. It shares boundaries with Nasarawa State to the North, Taraba State to the East, Cross River State to the Southeast, Enugu State to the Southwest and Kogi State to the West. Benue State covers about 33,955 km² and comprises 23 Local Government Areas grouped into three agricultural zones. Agriculture is a major livelihood activity, supported by rural and urban markets that facilitate exchange of staple crops and other agricultural produce.

The study population comprised 3,209 smallholder producers of soybean, cowpea, rice, maize, yam and cassava identified during a reconnaissance survey. Stratified random sampling, using Taro Yamane's sample-size approach and proportional allocation, produced a sample size of 357 respondents. Primary data were collected using a questionnaire. Descriptive statistics were used for socioeconomic characteristics, crop commercialisation index for crop-specific commercialisation, and one-way analysis of variance to test differences among crops.

The commercialisation model by Linderhof *et al.* (2019) was adopted as follows:

$$COMPS_i = \frac{\sum_{k=1}^{k} P_k S_{ik}}{\sum_{k=1}^{k} P_k Q_{ik}}$$

where,

COMPS = crop output market participation share; S_{ik} = quantity of crops k sold at the market by farm household *i* evaluated at an average community level price P_k; Q_{ik} = total quantity of crop *k* produced by farm household *i*, evaluated at an average community level price P_k.

The specification of one-way analysis of variance is as follows:

$$F = \frac{\frac{\sum_{i=1}^{k} n_i (X_i - X)^2}{k-1}}{\frac{\sum_{i=1}^{k} \sum_{j=1}^{n_i} (X_{ij} - X_i)^2}{N-k}}$$

where,

k= Number of groups; ni= Sample size in group i; N= total sample size; X¯i = Mean of group i; X¯= Grand mean; Xij = Individual observation

4.0 Results and Discussion

4.1 Socioeconomic/farm/institutional characteristics of smallholder farmers

Table 1 shows that majority (69.47%) of the respondents were males, indicating the male dominance in the sampled crop enterprises. This is consistent with Mgalamadzi et al. (2024) and Zondi et al. (2022), who also reported male-dominated smallholder samples in Malawi and South Africa, respectively. Respondents had a mean age of 47 years, with 39.78% aged 37–53 years. This indicates a predominantly economically active farming population with accumulated production experience. Comparable studies reported relatively young or middle-aged farming populations in Nigeria and Ethiopia (Nkwi et al., 2022; Washo et al., 2021; Oyenpemi et al., 2023). Majority (78.99%) of the, consistent with findings among livestock and crop farmers in Nigeria (Silong et al., 2020; Akpan et al., 2019; Biye et al., 2018). Mean household size was five persons, similar to Oyenpemi et al. (2023) but lower than values reported by Oyawole et al. (2020) and Falola et al. (2022). Household size may affect the share of output retained for consumption and, consequently, the marketed surplus.

Mean formal education was 10.4 years, indicating moderate educational attainment. Education can improve farmers' capacity to obtain information and make production and marketing decisions. The mean exceeded levels reported in some studies of yam, sesame and maize producers (Faleye & Afolami, 2020; Dossa et al., 2023; Appiah-Twumasi et al., 2022). The nearest market

was 8 km away on average. Market distance raises transport costs and can constrain participation, particularly where rural infrastructure is weak. The result is comparable with Feyisa (2020), close to the 9 km reported by Oluwatusin (2016), but below Olanrewaju et al. (2016) and above Langat et al. (2024).

Mean farming experience was 15 years, suggesting substantial practical knowledge among respondents. This is broadly comparable with values reported by Abegunde et al. (2020), Onunka et al. (2020) and Adebayo et al. (2018). Mean farm size was 1.92 ha, confirming the smallholder character of the sample. Small farm size can constrain the volume of marketable surplus. Related studies also reported relatively small holdings among farmers in Ghana and Nigeria (Darfor et al., 2021; Kalu & Mbanasor, 2023).

Agricultural credit was accessed by 55.46% of the respondents. Among borrowers, semi-formal (44.44%) and informal (36.36%) sources predominated, while formal institutions accounted for 19.19%. The pattern indicates limited use of formal agricultural finance. The overall access rate was close to Abebaw et al. (2023), although access varies considerably across Nigerian studies (Ndubuisi et al., 2022; Adigun, 2022). Majority (79.55%) of the respondents had access to current market-price information, mainly through fellow farmers and middlemen. Reliance on informal sources may weaken price transparency and bargaining decisions. Taiwo et al. (2025) similarly emphasised the effects of market-information asymmetry on food prices and farmer incomes in rural Nigeria.

Table 1: Socioeconomic Characteristics of arable crop farmers (n=357)

Socioeconomic Characteristics	Frequency	Percentage (%)	Mean
Sex			
Male	248	69.47	
Female	109	30.53	
Age (years)			
20 – 36	61	17.09	
37 – 53	142	39.78	47 years
54 – 70	126	35.29	
71 – 87	28	7.84	
Marital Status			
Married	282	78.99	
Single	75	21.01	
Household size			
1 – 2	8	2.24	5 persons
3 – 4	131	36.69	
5 – 6	147	41.18	
7 – 8	71	19.89	
Years of formal education			
0 – 5	88	24.65	
6 – 11	62	17.37	10.4 years
12 – 17	178	49.86	
18 – 23	29	8.12	
Distance to nearest market km)			
1 – 4	77	21.57	
5 – 8	122	34.17	8 km
9 – 12	116	32.49	
13 – 18	42	11.76	
Farming experience (yrs)			
2 - 15.25	222	62.18	15 years

15.26 - 28.51	79	22.13	
28.52 - 41.76	50	14.01	
41.77 - 55.02	6	1.68	
Farm Size			
0.50 – 1.10	33	9.24	1.92 ha
1.11 – 1.70	103	28.85	
1.71 – 2.30	96	26.89	
2.31 – 3.00	125	35.01	
Access to agricultural credit			
Accessed	198	55.46	
Not accessed	159	44.54	
Access to current market price			
Yes	284	79.55	
No	73	20.45	

Source: Field Survey (2025)

4.2 Index of crop-specific commercialisation of smallholder farmers

The overall crop commercialisation index was 0.4054 (Table 2), indicating that 40.54% of the value of crop output was marketed and 59.46% retained for consumption or other uses. This reflects moderate or semi-commercial production. The estimate is lower than those reported by Carletto et al. (2017), Olanrewaju et al. (2016) and Zantsi and Mushunje (2023), but broadly comparable with estimates from Ethiopia and Kenya (Mamo & Beguije, 2022; Hailua et al., 2015; Gebiso et al., 2023; Getahun & Muleta, 2023; Mutea et al., 2025).

Soybean recorded the highest commercialisation index (0.56), indicating stronger market orientation, plausibly reflecting demand from feed and oil-processing industries. The value was nevertheless below the level reported among soybean farmers in Eastern Zambia (Kahenge et al., 2019). Cassava had a commercialisation index of 0.51, followed by rice (0.46) and maize (0.45). Their dual roles as household staples and market commodities may explain the moderate levels. The cassava estimate was below those reported by Adenegan (2015) and Alawode and Oladeji (2020), while the rice and maize indices were below comparable estimates reported by Cazzuffi et al. (2020), Alawode et al. (2018) and Kidane et al. (2025).

Cowpea recorded a relatively low commercialisation index (0.34), suggesting substantial household retention. Its importance as a protein source may contribute to this pattern. The estimate is close to the 0.39 reported for common bean by Langat et al. (2024). Commercialisation can also influence dietary outcomes (Zheng & Ma, 2023). Yam recorded the lowest commercialisation index (0.09), despite its relatively high harvested quantity. This indicates strong household retention and may reflect yam's food, cultural and social importance. The estimate is substantially below the 0.77 reported by Olanrewaju et al. (2016) in Southwestern Nigeria.

Table 2: Index of crop-specific commercialisation of smallholder farmers (n=357)

Major Crops	Soybeans	Cowpea	Rice	Maize	Yam	Cassava
Quantity harvested (Kg)	32.83	11.78	29.08	42.80	213.46	144.46
Quantity sold (Kg)	19.85	4.01	14.58	19.35	79.45	80.37
Commercialisation (kg)	60.46	34.00	50.15	45.22	37.22	55.64
Value of output harvested (N'000)	2,632.76	1,133.57	1,978.93	2,958.54	42,500.00	11,400.00
Value of output sold (N'000)	1,592.03	389.06	990.82	1.34	2.98	5.44
Mean Commercialisation (N)	0.56	0.34	0.46	0.45	0.09	0.51

Overall commercialisation index	mean	0.4054

Source: Field Survey (2025)

4.3 Difference in Crop Commercialisation Index among arable Crops Farmers

Crop commercialisation differed significantly across soybean (0.56), cassava (0.51), rice (0.46), maize (0.45), cowpea (0.34) and yam (0.09) ($F = 85.69$, $p < 0.01$). The null hypothesis of equal mean commercialisation indices was therefore rejected. The differences indicate crop-specific market orientation, likely reflecting variations in household consumption requirements, industrial demand, market access and storage opportunities. The ranking differs from Alawode and Oladeji (2020), who reported a slightly higher commercialisation index for maize than cassava in Southwestern Nigeria, and from Kavuma and Kisaame (2023), who similarly found maize more commercialised than cassava in Uganda. Ugwu and Alimba (2018) reported cassava as the most commercialised staple crop in South East Nigeria, followed by rice.

Table 3: Difference in Crop Commercialisation Index among Staple Crops Farmers

Source	SS	df	MS	F-statistic	Prob > F
Between groups	8.73	5	1.75	85.69***	0.001
Within groups	7.15	351	0.0204		

Field Survey (2025). *** Statistical significance at 1% level; Bartlett's test for equal variances: chi2(5) = 46.2641; Prob>chi2 = 0.000; Source:

5.0 Conclusion and Recommendations

The study concludes that smallholder crop production in Benue State is moderately commercialised, with substantial variation across crops. Soybean was the most commercialised crop, followed by cassava, while yam was the least commercialised. Smallholder farmers should strengthen cooperative participation to improve aggregation, finance and market access, and make greater use of reliable market information. Extension agencies, particularly the National Agricultural Extension and Research Liaison Services and the Benue State Agricultural and Rural Development Authority, should strengthen market-oriented advisory services and timely dissemination of price and demand information.

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