CROP COMMERCIALISATION AND SUSTAINABLE LIVELIHOODS AMONG SMALLHOLDER FARMERS IN BENUE STATE, NIGERIA.

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ABSTRACT

Increasing smallholder crop commercialisation is expected to improve rural welfare through higher market participation and farm income, yet greater market orientation may not necessarily translate into sustainable livelihood across multiple dimensions. This study examined the relationship between crop commercialisation and sustainable livelihood among smallholder farmers in Benue State, Nigeria. A multistage sampling procedure was used to select 357 soybean, cowpea, rice, maize, yam, and cassava farmers. Data were analysed using descriptive statistics, Crop Commercialisation Index (CCI), Sustainable Livelihood Index (SLI), heteroskedasticity-robust regression with Bonferroni-adjusted pairwise comparisons, and Pearson correlation. The overall CCI was 0.405, indicating moderate commercialisation. Crop-specific CCI was highest for soybean (0.559), followed by cassava (0.505), rice (0.462), maize (0.455), cowpea (0.335), and yam (0.091). Sustainable livelihood was generally low: 43.14% of farmers had poor livelihood status and 19.05% had very poor status, giving a combined 62.19%. Social livelihood recorded the highest component index (39.60), while economic livelihood was lowest (24.74). Mean SLI varied from 35.03 for cowpea and 34.93 for soybean to 27.00 for cassava and 23.38 for rice farmers. These differences were significant ($F(5,351) = 60.78$, $p < 0.001$; $R^2 = 0.389$). CCI was weakly and negatively associated with SLI ($r = -0.164$, $p = 0.0019$). Agricultural policies should therefore complement market participation with remunerative markets, finance, value addition, extension services and rural infrastructure to improve livelihood returns from commercialisation.

Keywords: crop commercialisation, sustainable livelihood, smallholder farmers, market participation, Benue State

INTRODUCTION

Agriculture remains central to food security, employment, income generation and rural livelihoods in developing economies. Within the broader agrifood system, smallholder farmers perform the dual role of food producers and market participants, linking agricultural production with processing, distribution, marketing and consumption (FAO, 2024). Strengthening these linkages is particularly important for achieving Sustainable Development Goals (SDGs) 1, 2 and 8 relating to poverty reduction, food security, sustainable agriculture, economic growth and productive employment (United Nations, 2015). However, persistent food insecurity and food-price pressures continue to weaken household purchasing power and access to healthy diets, especially among vulnerable households (FAO *et al.*, 2025).

Agricultural commercialisation provides an important pathway for integrating smallholder farmers into agrifood systems. It entails a transition from predominantly subsistence-oriented production towards greater participation in agricultural markets. At the farm-household level, output commercialisation is commonly measured as the proportion of the value of agricultural production sold rather than retained for household consumption (Carletto *et al.*, 2017). Through crop sales, farmers can generate income for food purchases, productive investment, healthcare, education and asset acquisition. Consequently, commercialisation has the potential to improve household welfare and strengthen resilience. Recent empirical evidence nevertheless shows considerable variation in these outcomes. Do and Nguyen (2024) found that crop commercialisation strengthened smallholder resilience to shocks in Southeast Asia, while Eyasu *et al.* (2025) reported significant poverty-reducing effects in rural Ethiopia. In Nigeria, Ajisafe *et al.* (2025) found that agricultural commercialisation increased the probability of household food security. Cross-country evidence from Malawi, Tanzania and Nigeria similarly indicates that commercial farming can be associated with lower poverty and nutrition insecurity than subsistence production (Mgomezulu *et al.*, 2024).

These benefits are not automatic because the welfare derived from commercialisation depends on production costs, output prices, market accessibility, household consumption requirements, infrastructure and institutional support. Saha *et al.* (2024) demonstrated that agricultural commercialisation operates through both positive and negative food-consumption pathways across African contexts. Increased sales may raise purchasing power, but greater dependence on markets may expose households to food-price fluctuations and reduce own-produced food available for consumption. Thus, the proportion of output marketed indicates the intensity of market orientation but does not necessarily reveal the livelihood benefits derived from market participation.

The sustainable livelihood perspective provides a broader framework for assessing such benefits. Sustainable livelihood encompasses the capabilities, resources and activities through which households secure and maintain their means of living (Gautam & Jha, 2022; Odozi et al., 2025). Unlike assessments based solely on income, expenditure or food security, the Sustainable Livelihood Index (SLI) captures multiple dimensions of household wellbeing. In this study, these comprise food, economic, health, educational, social, institutional and infrastructural livelihood conditions, consistent with multidimensional livelihood assessment approaches (Kamaruddin & Samsudin, 2014; Sabo et al., 2025). These dimensions are particularly relevant to smallholder farmers because livelihood outcomes depend not only on crop income but also on access to human, financial, social, institutional and physical resources.

The relationship between commercialisation and sustainable livelihood may also vary across crops. Agricultural commodities differ in consumption importance, production costs, market demand, storability, processing requirements, value-addition opportunities and exposure to price fluctuations.

Consequently, farmers producing crops with relatively high commercialisation indices may not necessarily attain correspondingly high sustainable livelihood indices. Recent evidence confirms substantial heterogeneity in smallholder commercialisation. Gebiso *et al.* (2023) reported variations in commercialisation arising from household, farm and market characteristics in Ethiopia, while Warner *et al.* (2024) documented considerable crop-level differences in marketed shares among smallholders in Rwanda. Such heterogeneity underscores the need to examine commercialisation at the crop level rather than rely solely on aggregate measures.

This issue is particularly relevant in Benue State, Nigeria, where smallholder farmers produce major food and market crops including soybean, cowpea, rice, maize, yam and cassava. Despite increasing interest in agricultural commercialisation, existing studies have concentrated largely on its determinants or individual welfare outcomes such as income, poverty, food security and nutrition. Comparatively less attention has been given to the relationship between crop-specific commercialisation and multidimensional sustainable livelihood. It therefore remains unclear whether farmers producing relatively more commercialised crops necessarily attain better livelihood outcomes across food, economic, health, educational, social, institutional and infrastructural dimensions. Establishing this relationship is important because policies that increase marketed output without improving the returns and livelihood benefits from market participation may have limited welfare consequences.

Accordingly, the broad objective of the study was to examine the relationship between crop commercialisation and sustainable livelihood among smallholder farmers in Benue State, Nigeria. Specifically, the study determined the level of commercialisation of major crops; assessed sustainable livelihood status across food, economic, health, educational, social, institutional and infrastructural dimensions; compared the Sustainable Livelihood Index across major crop groups; and determined the relationship between Crop Commercialisation Index and Sustainable Livelihood Index. The study tested the null hypotheses that mean Sustainable Livelihood Index does not differ significantly across the major crop groups and that Crop Commercialisation Index has no significant relationship with Sustainable Livelihood Index among smallholder farmers in Benue State.

METHODOLOGY

The study area is Benue State. Benue State was created in 1976 and is located in the middle belt region of Nigeria with the capital at Makurdi. Benue State lies approximately between latitudes $6^0 30'$N and $8^0 10'$N of the equator and longitudes $6^0 35'$E and $8^0 10'$E of the Greenwich meridian. Benue State is considered as one of the hottest states in Nigeria with an average minimum and maximum temperature of 21^0C and 38^0C respectively. It is in the southern guinea savannah ecological zone, which has a typical climate with the clearly marked seasons of dry season (late October to March) and wet season (April to early October). Annual rainfall ranges from 1,700 mm in the southern part to 120 mm in the northern ecology of the state.

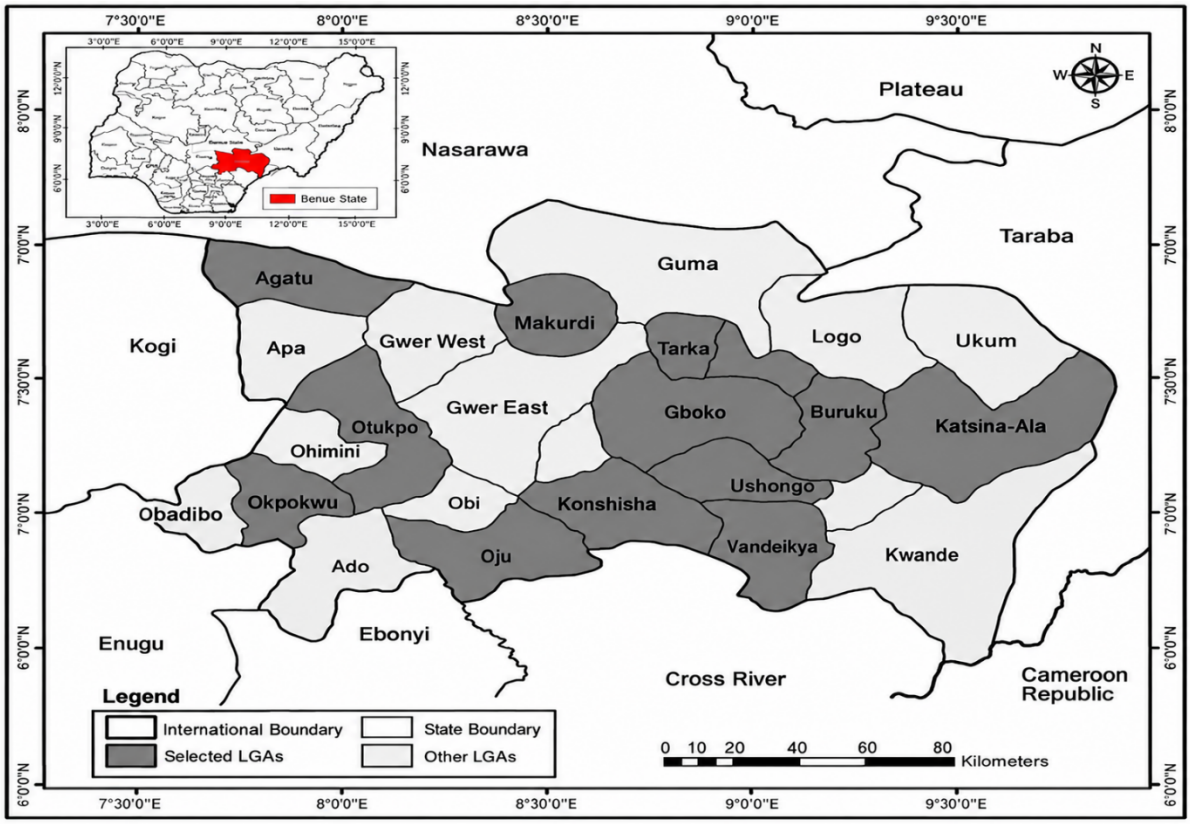

Figure 1: Map of Benue State showing the study area.

The population of this study comprised smallholder farmers in the state who are engaged in the production of staple crops such as soybeans, cowpea, rice, maize, yam and cassava. These crops are predominantly grown in Buruku/Vandeikya, Tarka/Oju, Makurdi/Agatu, Ushongo/Gboko, Katsina-Ala/Otukpo, and Okpokwu/Konshisha LGAs, respectively. From a reconnaissance survey, the farmers are 3,209 in number. Stratified random sampling technique was used to select the respondents for the study. Each stratum was represented by a selected commodity. Yamane's (1967) finite-population formula was used to determine a sample size of 357 respondents. The sample was subsequently distributed among the selected LGAs in proportion to their respective populations using Bowley's (1926) proportional-allocation procedure. The formulas are attached as Appendix I while the result is attached as Appendix II. Primary data for the study were collected from the selected farmers with the aid of a structured questionnaire.

The 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} is the quantity of crops k sold at the market by farm household i evaluated at an average community level price P_k. Q_{ik} is the total quantity of crop k produced by farm household i, evaluated at an average community level price P_k.

Measurement of Sustainable Livelihood Index (SLI)

The Sustainable Livelihood Index (SLI) was used to measure the multidimensional livelihood outcomes of the farm households. Its conceptual foundation was drawn from the sustainable-livelihood approach of Kamaruddin and Samsudin (2014), which evaluates livelihoods through multiple household assets and outcomes. The selection of the specific dimensions was adapted principally from Gautam and Jha (2022), who constructed a household-level livelihood security index comprising food, economic, health, educational, social, institutional and infrastructural dimensions. This multidimensional approach is consistent with other applications of composite livelihood indices in agricultural and rural-development studies (Garai et al., 2019; Pani & Mishra, 2022; Ravisankar et al., 2022; Singh & Hiremath, 2010).

The indicators were expanded and modified to reflect the socioeconomic, institutional and agricultural conditions of the study population. Consequently, the SLI comprised seven dimensions: food livelihood, economic livelihood, health livelihood, educational livelihood, social livelihood, institutional livelihood and infrastructural livelihood. Each dimension was measured using a set of positively stated questionnaire items. All the items were scored directly on a common scale ranging from 0 to 100%, with higher scores representing more favourable livelihood conditions. Because the items were already expressed on an identical percentage scale, neither normalisation nor reverse coding was required.

For each farm household, the index for a particular livelihood dimension was calculated as the arithmetic mean of the percentage scores for all items included in that dimension:

$$LI_{id} = \frac{1}{n_d}\sum_{j=1}^{n_d} X_{ijd}$$

where:

LIid = livelihood index of household *i* for dimension *d*;

Xijd = percentage score obtained by household *i* on item j under dimension *d*; and

nd = number of items included in livelihood dimension *d*.

The computation produced separate indices for food livelihood (FLI), economic livelihood (ELI), health livelihood (HLI), educational livelihood (EDLI), social livelihood (SOLI), institutional livelihood (INLI) and infrastructural livelihood (IFLI). The composite SLI for each household was calculated as the unweighted arithmetic mean of the seven dimension indices:

$$SLI_i = \frac{FLI_i + ELI_i + HLI_i + EDLI_i + SOLI_i + INLI_i + IFLI_i}{7}$$

Equal weighting was adopted because the dimensions were considered equally important components of sustainable livelihoods, and no sufficiently strong empirical or theoretical basis existed for assigning differential weights. Computing the composite index from the dimension indices also prevented dimensions containing more questionnaire items from exerting disproportionately greater influence on the index.

Both the dimension indices and the composite SLI ranged from 0 to 100%. Higher index values indicated more favourable and sustainable livelihood outcomes, whereas lower values indicated less favourable livelihood conditions. The mean SLI for the sample was subsequently computed as:

$$Mean\ SLI = \frac{1}{N}\sum_{i=1}^{N} SLI_i$$

where N is the total number of farm households. Household-level SLI values were retained for descriptive analysis, comparison across major crop groups.

Comparison of Sustainable Livelihood Index across Major Crops

Differences in the Sustainable Livelihood Index (SLI) across the six major crop groups were initially assessed using one-way analysis of variance. The model was specified as:

$$SLJ_{ij} = \mu + \alpha_j + \varepsilon_{ij}$$

Where, SLIij = Sustainable Livelihood Index of the ith farmer in crop group (j); μ= overall mean SLI; α= effect associated with the jth major crop comprising soybeans, cowpea, rice, maize, yam and cassava; and ε^{ij} is the stochastic error term. Because the test for homogeneity of variances indicated unequal variances across crop groups, the comparison was estimated using ordinary least squares with heteroskedasticity-robust standard errors. Major crop was entered as a categorical explanatory variable, with soybean serving as the reference category. The empirical model was expressed as:

$$SLI_i = \beta_0 + \sum_{j=2}^{6} \beta_j D_{ji} + \varepsilon_i$$

where (SLIi) = Sustainable Livelihood Index of farmer (i); β_0 = mean SLI of the reference crop group (soybean); D_{ji}= dummy variables for cowpea, rice, maize, yam and cassava; β_j= difference between the mean SLI of each crop group and that of soybean; and ε_i= error term. The joint significance of the crop-group coefficients was evaluated using a heteroskedasticity-robust F-test. Following a significant omnibus test, pairwise comparisons of adjusted crop-group means were conducted with Bonferroni adjustment for multiple comparisons. Statistical significance was evaluated at the 5% level. The null hypothesis was:

$$H_{01} = \mu_{soybean} = \mu_{cowpea} = \mu_{rice} = \mu_{maize} = \mu_{yam} = \mu_{cassava}$$

against the alternative that at least one crop-specific mean SLI differed significantly.

Correlation between crop commercialization index (CCI) and sustainable livelihood index (SLI)

$$r_{CCI,SLI} = \frac{\sum_{i=1}^{n}(CCI_i - CCI^{-})(SLI_i - SLI^{-})}{\sqrt{\sum_{i=1}^{n}(CCI_i - CCI^{-})^2 \sum_{i=1}^{n}(SLI_i - SLI^{-})^2}}$$

Where $r_{CCI,SLI}$= Pearson correlation coefficient between Crop Commercialisation Index and Sustainable Livelihood Index; CCI_i= Crop Commercialisation Index of the ith farmer; CCI^{-}= mean Crop Commercialisation Index; SLIi = Sustainable Livelihood Index of the ith; SLI^{-}= mean Sustainable Livelihood Index; and n = number of respondents. The null hypothesis was:

$H_{02}: \rho CCI, SLI = 0$ as against $H_{12}: \rho CCI, SLI \neq 0$

RESULTS AND DISCUSSION

Crop Commercialisation among Smallholder Farmers

Table 1 shows considerable variation in crop commercialization among smallholder farmers in Benue State. The overall mean Crop Commercialisation Index (CCI) was 0.405, indicating that about 40.5% of the value of crop output was marketed. This represents moderate commercialisation and suggests that production served both household consumption and market purposes. The result is comparable with the mean CCI of 43.4% reported by Gebiso *et al.* (2023) in Ethiopia and the average marketed share of about 33% reported by Warner *et al.* (2024) in Rwanda. It is, however, lower than the CCI of 0.61 reported by Mkandawire *et al.* (2026) among households participating in Malawi's Agricultural Commercialisation Project, suggesting that commercialisation varies with commodity, market access and institutional context.

Commercialisation differed markedly across crops. Soybean recorded the highest CCI (0.559), followed by cassava (0.505), rice (0.462), maize (0.455), cowpea (0.335) and yam (0.091). This substantial variation supports Warner *et al.* (2024) and Gebiso *et al.* (2023), who reported crop- and household-level heterogeneity in smallholder commercialisation. Soybean's relatively high CCI may reflect its multiple food, feed and processing uses, although these market channels were not explicitly investigated in the present study. Similarly, cassava's CCI of 0.505 may be associated with its diverse food and processing uses, which create opportunities for both fresh and processed markets.

Rice and maize recorded intermediate CCIs of 0.462 and 0.455, respectively, indicating that slightly less than half of their production value was marketed. Their dual roles as household staples and market commodities may explain the allocation of output between consumption and sale. Cowpea recorded a lower CCI of 0.335, also reflecting a mixed consumption-market orientation. Yam had the lowest CCI (0.091), indicating substantial household retention among the sampled farmers. This should not be interpreted as inherently weak commercial potential because Agbachom *et al.* (2024) documented profitable participation within Nigeria's yam value chain.

The results demonstrate substantial crop-specific heterogeneity in commercialisation. The difference between soybean (0.559) and yam (0.091) shows that an aggregate CCI can conceal important commodity-level patterns. More importantly, commercialisation measures the intensity of market orientation rather than the welfare derived from market participation. Ajisafe *et al.* (2025) found that commercialisation improved household food security in Nigeria, with an average marginal effect of 0.061, while wider African evidence indicates that welfare outcomes depend on household, production and market conditions. Consequently, the observed crop-specific differences provide the basis for determining whether higher commercialisation corresponds with better sustainable livelihood outcomes.

Table 1: Crop Commercialisation Index of Smallholder Farmers by Major Crop

Major crop	Mean CCI	Rank
Soybeans	0.559	1
Cassava	0.505	2
Rice	0.462	3
Maize	0.455	4
Cowpea	0.335	5
Yam	0.091	6
Overall Mean	**0.405**	—

Source: Field Survey, 2025.

Sustainable Livelihood Status of Smallholder Farmers

Table 2 shows generally low sustainable livelihood among the smallholder farmers. About 43.14% had poor livelihood status and 19.05% very poor status, indicating that 62.19% were concentrated in the two lowest categories. Only 30.25% had moderate and 7.56% good livelihood status. This suggests substantial multidimensional livelihood constraints despite participation in agricultural production. The finding is consistent with Sanusi and Dries (2025), who reported low overall resilience and particularly weak adaptive capacity among smallholder rice households in Nigeria. Sanusi and Dries (2024) similarly found marked differences in livelihood vulnerability and coping capacity among rice-farming households.

The livelihood dimensions further revealed important disparities. Social livelihood recorded the highest index (39.60), suggesting that social networks and collective resources constituted the strongest livelihood asset. Sanusi and Dries (2025) similarly identified social capital, informal safety nets and collective action as important components of smallholder resilience. Institutional (31.30), infrastructural (30.83) and health (30.55) livelihood occupied intermediate positions. Kehinde (2025) showed that smallholders' access to physical and financial livelihood capital was associated with credit, extension services, association membership, income and education, underscoring the interdependence of livelihood resources.

Food livelihood was relatively low (28.47), demonstrating that agricultural production does not necessarily guarantee household food security. Ojo *et al.* (2024) similarly showed that resource-management practices significantly influenced food-security outcomes among Nigerian smallholder rice farmers. Educational livelihood was also low (27.42), indicating limitations in human capital, while economic livelihood recorded the lowest index (24.74). The latter is particularly important because financial resources support consumption, farm investment, education, healthcare and responses to shocks. Kehinde (2025) likewise demonstrated strong linkages between financial capital and credit, farm size, education, extension services and association membership. Overall, the findings indicate that the farmers' relatively strong social resources coexist with considerable economic, educational, food and material livelihood constraints.

Table 2: Sustainable Livelihood Status and Component Indices of Smallholder Farmers

Panel A: Distribution by Sustainable Livelihood Status

SLI range	Frequency	Percentage	Livelihood status
15.86–24.08	68	19.05	Very poor
24.09–32.31	154	43.14	Poor
32.32–40.54	108	30.25	Moderate
40.55–48.75	27	7.56	Good
Total	**357**	**100.00**	

Panel B: Sustainable Livelihood Dimensions

Livelihood dimension	Weighted mean index
Social livelihood	39.60
Institutional livelihood	31.30
Infrastructural livelihood	30.83
Health livelihood	30.55
Food livelihood	28.47
Educational livelihood	27.42
Economic livelihood	24.74

Source: Field Survey, 2025.

Sustainable Livelihood Index across Major Crops

Table 3 shows significant variation in Sustainable Livelihood Index (SLI) across the six crop groups. Cowpea farmers recorded the highest mean SLI (35.03), followed by soybean (34.93), yam (33.01), maize (31.72), cassava (27.00) and rice farmers (23.38). The heteroskedasticity-robust test confirmed significant differences across crop groups, $F(5,351) = 60.78$, $p < 0.001$, with crop-group membership accounting for 38.9% of the observed variation in SLI ($R^2 = 0.389$). The null hypothesis of equal mean SLI across crop groups was therefore rejected.

The relatively high SLI among cowpea, soybean and yam farmers suggests more favourable multidimensional livelihood conditions, whereas maize farmers occupied an intermediate position. These differences should not be interpreted as causal effects of cultivating particular crops because livelihood outcomes also reflect household assets, income diversification and access to institutional and productive resources. Kehinde (2025) similarly demonstrated the interdependence of financial, physical, human, natural and social livelihood capitals among Nigerian smallholders, highlighting the importance of credit, extension, education, income and association membership.

Cassava farmers recorded a relatively low mean SLI (27.00). This finding is consistent with Isibor *et al.* (2024), who reported that 74% of sampled smallholder cassava farmers in Anambra State were in absolute poverty and identified financial, health, environmental and social risks as significant correlates of poverty. Although poverty is narrower than the multidimensional SLI used in the present study, the evidence demonstrates that participation in cassava production does not necessarily eliminate livelihood vulnerability.

Rice farmers recorded the lowest SLI (23.38). Ojo *et al.* (2024) similarly documented substantial food-security constraints among Nigerian smallholder rice farmers, while Sanusi and Dries (2024) identified considerable variation in livelihood vulnerability and coping capacity among rice-farming households exposed to weather-related shocks. These findings, although based on different welfare measures, support the view that participation in an economically important crop does not necessarily guarantee favourable livelihood outcomes. Overall, the significant crop-group differences underscore the multidimensional nature of smallholder livelihood and the importance of household resources, market conditions, infrastructure and institutional support in shaping welfare outcomes.

Table 3: Robust Comparison of Sustainable Livelihood Index across Major Crop Groups

Major crop	Mean SLI	Robust SE	95% confidence interval	Rank
Cowpea	35.03	0.69	33.67–36.39	1
Soybeans	34.93	0.64	33.67–36.20	2
Yam	33.01	1.12	30.81–35.20	3
Maize	31.72	0.63	30.48–32.97	4
Cassava	27.00	0.44	26.14–27.85	5
Rice	23.38	0.57	22.25–24.51	6

Robust omnibus test: $F(5, 351) = 60.78$; $p < 0.001$; $R^2 = 0.389$.
Source: Field Survey, 2025.

Pairwise Differences in Sustainable Livelihood across Major Crops

Table 4 shows that differences in Sustainable Livelihood Index (SLI) were concentrated among specific crop groups. Cowpea and soybean farmers had statistically comparable SLI (mean difference = 0.09, p = 1.000), while yam did not differ significantly from soybean, cowpea or maize farmers (p = 1.000). Maize farmers, however, recorded significantly lower SLI than soybean (mean difference = −3.21, p = 0.006) and cowpea farmers (−3.31, p = 0.007), but significantly higher SLI than cassava and rice farmers ($p < 0.001$). These overlapping differences suggest that livelihood status reflects broader household resources and opportunities rather than crop production alone. Jimoh *et al.* (2024) similarly found that agricultural diversification, income, market distance and other household characteristics influenced welfare among Nigerian smallholders.

Rice farmers recorded significantly lower SLI than all other crop groups ($p < 0.001$), with the largest difference occurring between rice and cowpea farmers (11.65 points). This relatively disadvantaged position is consistent with Sanusi and Dries (2025), who identified constraints in productive assets, irrigation, insurance and basic services among Nigerian smallholder rice farmers, while demonstrating the importance of social capital, information and collective action to household resilience.

Cassava farmers also recorded significantly lower SLI than soybean, cowpea, maize and yam farmers ($p < 0.001$), although their mean exceeded that of rice farmers by 3.62 points ($p < 0.001$). Isibor *et al.* (2024) similarly reported that 74% of sampled cassava farmers were in absolute poverty, while Osuji *et al.* (2024) found that only 35% of cassava-based farming households studied were food secure. Although these studies employed narrower welfare measures than SLI, they corroborate livelihood constraints among some cassava-producing households. Overall, the pairwise results reinforce the need for crop-sensitive livelihood interventions, particularly for farmer groups recording comparatively low multidimensional livelihood outcomes.

Table 4: Robust Bonferroni Pairwise Comparisons of Mean Sustainable Livelihood Index

Crop comparison	Mean difference	Robust SE	Adjusted p-value	Decision
Cowpea – Soybeans	0.09	0.94	1	NS
Rice – Soybeans	−11.56	0.86	<0.001	***
Maize – Soybeans	−3.21	0.9	0.006	**
Yam – Soybeans	−1.93	1.29	1	NS
Cassava – Soybeans	−7.94	0.78	<0.001	***
Rice – Cowpea	−11.65	0.9	<0.001	***
Maize – Cowpea	−3.31	0.94	0.007	**
Yam – Cowpea	−2.02	1.31	1	NS
Cassava – Cowpea	−8.03	0.82	<0.001	***
Maize – Rice	8.34	0.86	<0.001	***
Yam – Rice	9.63	1.26	<0.001	***
Cassava – Rice	3.62	0.72	<0.001	***
Yam – Maize	1.29	1.28	1	NS
Cassava – Maize	−4.73	0.77	<0.001	***
Cassava – Yam	−6.01	1.2	<0.001	***

*Note: Bonferroni-adjusted probabilities based on heteroskedasticity-robust standard errors. NS = not significant; ** p < 0.01; *** p < 0.001. Source: Field Survey, 2025.*

Relationship between Crop Commercialisation and Sustainable Livelihood

Table 5 shows a weak but statistically significant negative correlation between Crop Commercialisation Index (CCI) and Sustainable Livelihood Index (SLI) ($r = −0.164$, $p = 0.0019$; $n = 357$). The null hypothesis of no significant relationship was therefore rejected. The result indicates that higher commercialisation was associated with slightly lower sustainable livelihood among the sampled farmers. However, the weak correlation and cross-sectional nature of the data preclude causal interpretation.

The finding suggests that greater market orientation does not necessarily translate into improved multidimensional livelihood. Some empirical evidence supports this possibility. Neme *et al.* (2024) examined contract farming as a commercialisation mechanism among 424 vegetable farmers in Ethiopia and, using propensity score matching, found that participation did not improve household income as anticipated.

The study demonstrates that stronger integration into organised agricultural markets does not automatically produce superior economic outcomes and that the conditions under which farmers participate in markets matter (Neme *et al.*, 2024).

The result, however, contrasts with Ajisafe *et al.* (2025), who used the Household Commercialisation Index and an instrumental-variable probit model in Nigeria and found that commercialisation significantly increased the probability of household food security, with an average marginal effect of 0.061. Similarly, Mgomezulu *et al.* (2024), using nationally representative data from Malawi, Tanzania and Nigeria, found that poverty and nutrition insecurity were generally higher among subsistence than commercial crop producers. Their welfare measures were poverty status and dietary diversity rather than multidimensional livelihood (Mgomezulu *et al.*, 2024).

The divergence may therefore partly reflect differences in welfare measurement. Whereas Ajisafe *et al.* (2025) assessed food security, Mgomezulu *et al.* (2024) examined poverty and dietary diversity, and Neme *et al.* (2024) used household income, the present study employed an SLI encompassing food, economic, health, educational, social, institutional and infrastructural dimensions. Thus, commercialisation may improve particular welfare outcomes without necessarily improving livelihood in all dimensions. The weak negative correlation consequently indicates an unsatisfactory relationship between commercialisation intensity and multidimensional sustainable livelihood, suggesting that policies should extend beyond increasing marketed output to ensuring that smallholder market participation translates into broader livelihood improvements.

Table 5: Pearson Correlation between Crop Commercialisation Index and Sustainable Livelihood Index

Variables	CCI	SLI
Crop Commercialisation Index (CCI)	1	
Sustainable Livelihood Index (SLI)	**−0.164*** **	1
P-value	**0.0019**	
Number of observations	357	357

*** *Correlation is significant at the 1% level. Source: Field Survey, 2025.*

CONCLUSION AND RECOMMENDATIONS

The study concludes that crop commercialisation among smallholder farmers in Benue State was moderate and varied across crops. Sustainable livelihood outcomes were generally low and differed significantly across crop groups. The weak negative relationship between commercialisation and sustainable livelihood represents a scenario whereby greater market orientation does not necessarily correspond with better multidimensional livelihood outcomes.

Agricultural policies should focus not only on increasing crop commercialisation but also on improving the livelihood benefits derived from it. Farmers' access to remunerative markets, affordable credit, extension services, storage, processing, market information and rural infrastructure should be strengthened, with particular attention to crop groups recording relatively low livelihood outcomes.

Acknowledgement

The authors gratefully acknowledge the Tertiary Education Trust Fund (TETFund), Nigeria, for providing financial support for this research under the TETFund 2024 Grant Cycle. The authors sincerely appreciate the funding support that facilitated the conduct of the study.

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Appendix I:

Yamane's and Bowley's formulas

Yamane's (1967) finite-population formula:

$$n = \frac{N}{1 + N(e)^2}$$

where n is the required sample size, N is the population size and e is the tolerable sampling error or level of precision. Applying the formula produced a total sample size of 357 respondents.

The sample was proportionately distributed among the selected Local Government Areas using Bowley's proportional-allocation procedure:

$$n_h = \frac{N_h}{N} \times n$$

where nh is the sample allocated to LGA h, Nh is the population of the relevant LGA, N is the total population across the selected LGAs and n is the overall sample size. Proportional allocation ensures that each LGA's representation in the sample corresponds to its share of the study population.

Appendix II:

Sampling Frame and Sample Size

S/No.	Commodities	LGA	Registered farmers	Sample
1	Soybeans	Buruku	285	32
2	Soybeans	Vandeikya	219	24
3	Cowpea	Tarka	240	27
4	Cowpea	Oju	185	21
5	Rice	Makurdi	250	28
6	Rice	Agatu	285	32
7	Maize	Ushongo	240	27
8	Maize	Gboko	220	24
9	Yam	Katsina-Ala	300	33
10	Yam	Otukpo	255	28
11	Cassava	Okpokwu	350	39
12	Cassava	Konshisha	380	42
	TOTAL		3209	357

Source: Farmer-Based Organisations in the various LGAs, 2024.