

Bridging The Commercialization Gap: An Analysis of Barriers to Market Orientation and Participation Among Smallholder Rice Farmers in Nigeria

Ikenna Charles UKWUABA^{1*}, Benjamin Chiedozi OKPUKPARA², Ridwan MUKAILA³,
Ejiofor Emmanuel OMEJE⁴, Sunday Ifeanyi UKWUABA⁵, Angela Chidimma IGWEH⁶,
Ifeyinwa Cynthia UKWUABA⁷, Victoria Obianuju OKPUKPARA⁸

Abstract

Smallholder rice farmers' limited market access and share have been linked to weak market orientation and participation decisions. Therefore, this study examines the factors that hinder the commercialization of smallholder rice farmers in Southeast Nigeria. Primary data from 288 randomly selected smallholder rice farmers were analyzed using descriptive statistics, the market orientation index, and the market participation index. The socioeconomic profile shows that the majority (68.8%) were male, with a mean age of about 48 years and a moderate mean education of 10 years; the mean farming experience, household size, farm size, and monthly income were 22 years, seven persons, 1.64 hectares, and ₦66,631.94 (\$95.19), respectively. Results on the use of purchased inputs showed that only 41.3% purchased rice seedlings, while all (100%) farmers purchased and used fertilizer, herbicides, and insecticides. Results on market orientation and participation revealed that respondents were moderately market-oriented (index of 0.52), while the market participation index indicated a semi-commercialized status (index of 0.73). Significant constraints to market orientation included the high cost of inputs ($\bar{x} = 3.35$), land fragmentation ($\bar{x} = 2.95$), lack of capital ($\bar{x} = 2.80$), long distance to market ($\bar{x} = 2.76$), and the land tenure system ($\bar{x} = 2.63$). In contrast, significant constraints that slowed market participation and access included poor road networks ($\bar{x} = 3.36$), long distance to market ($\bar{x} = 3.31$), lack of market information ($\bar{x} = 3.29$), lack of access to credit facilities ($\bar{x} = 3.01$), inadequate storage facilities ($\bar{x} = 2.96$), poor transportation system ($\bar{x} = 2.88$), and insufficient institutional support ($\bar{x} = 2.78$). Thus, the study calls for increased subsidies on inputs and improved market access to optimize and accelerate smallholder commercialization.

Keywords: Commercialization, Market access, Land fragmentation, Market barriers, Transactional cost, Smallholders

^{1*}**Sorumlu Yazar/Corresponding Author:** Ikenna Charles Ukwuaba, Department of Agricultural Economics, University of Nigeria, Nsukka. Enugu State, Nigeria.

Email: ikenna.ukwuaba@unn.edu.ng  OrcID: 0000-0002-3534-9785

²Benjamin Chiedozi Okpukpara, Department of Agricultural Economics, University of Nigeria, Nsukka. Enugu State, Nigeria. Email:

benjamin.okpukpara@unn.edu.ng  OrcID:0000-0003-1373-3521

³Ridwan Mukaila, Department of Agricultural Economics, University of Nigeria, Nsukka. Enugu State, Nigeria. Email: ridwan.mukaila@unn.edu.ng  OrcID: 0000-0001-8584-0858

⁴Ejiofor Emmanuel Omeje, Department of Agricultural Economics, University of Nigeria, Nsukka. Enugu State, Nigeria. Email: ejiofor.omeje@unn.edu.ng  OrcID: 0000-0002-1448-7003.

⁵Sunday Ifeanyi Ukwuaba, Department of Agricultural Economics, University of Agriculture and Environmental Sciences, Umuagwo, Imo state, Nigeria. Email: ukwuaba005@gmail.com  OrcID:0000-0002-7420-8774

⁶Angela Chidimmaigweh, Department of Agricultural Economics, University of Nigeria, Nsukka. Enugu State, Nigeria. Email: angela.igweh@unn.edu.ng  OrcID: 0009-0007-8008-9920

⁷Ifeyinwa Cynthia Ukwuaba, Department of Agricultural Economics, University of Nigeria, Nsukka. Enugu State, Nigeria. Email: ifeyinwafoleta@gmail.com  OrcID: 0009-0009-4827-9112

⁸Victoria Obianuju Okpukpara, Centre for Entrepreneurship and Development Research, University of Nigeria, Nsukka. Enugu State, Nigeria. Email: victoria.okpukpara@unn.edu.ng  0000-0001-6134-178X

Atıf/Citation: Ukwuaba, I. C., Okpukpara, B. C., Mukaila, R., Omeje E. E., Ukwuaba, S. I., Igweh, A. C., Ukwuaba, I. C., and Okpukpara, V. O. (2026). Bridging the commercialization gap: an analysis of barriers to market orientation and participation among smallholder rice farmers in Nigeria. *Journal of Tekirdag Agricultural Faculty*, 23(2): 469-485.

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1. Introduction

Sub-Saharan Africa has a largely agrarian economy, with the agricultural sector providing essential resources for human survival and economic growth (AGRA, 2022; World Bank, 2018). However, the region's agricultural sector is dominated by rural and smallholder farmers operating at a subsistence level (Mkuna and Wale, 2022). Consequently, productivity remains low and falls short of expectations, with few countries achieving food self-sufficiency and many experiencing severe food insecurity (Kebede et al., 2024; Wudil et al., 2022). In addition, this low level of production limits farmers' ability to realize the numerous benefits that could be achieved through commercializing agricultural production. Agricultural commercialization holds enormous potential for all value chain actors in the agricultural sector, creating more employment opportunities for rural dwellers, reducing the area of wasteful arable land, and contributing to strategies to achieve Sustainable Development Goals (SDGs) 1 and 2 (Tom-Dery et al., 2023). It has been identified as a sustainable strategy for alleviating poverty, increasing food self-sufficiency and security, and boosting agricultural and economic growth (Etuk and Ayuk, 2021; Hoang, 2020; Diriba, 2020). With rapid urbanization, increasing populations, and climatic changes evident in Asia and Sub-Saharan Africa, agricultural production is expected to transform and surpass current levels by 2050 to meet growing demand (FAO, 2017; Ukwuaba et al., 2024a). Achieving this increased production implies a massive shift from subsistence to commercial production levels among these smallholder farmers, who constitute the majority of agricultural producers (Etuk and Ayuk, 2020). These smallholders are defined as resource-poor, low-income farmers (Garner and de la O Campos, 2014) with small land sizes (AGRA, 2014; CGAP, 2014), poor access to labor (Lambert et al., 2016), limited resource endowment or capital (Snashall and Poulos, 2023; IFAD, 2011), low education, poor market access, and restricted access to agricultural extension services (Ukwuaba et al., 2024a).

Smallholder commercialization goes beyond increased participation in the output market. It also involves transforming agricultural production from subsistence to market-oriented (Abdullah et al., 2019). It further includes greater participation in the input market, a shift from family to hired labour, and a stronger profit-maximizing motive among farmers (Leavy and Poulton, 2007). An outcome of agricultural commercialization is farmers' market orientation, defined as the extent to which resource allocation is based on market signals (Barrett, 2008; Berhanu and Moti, 2010). For farmers, market orientation is an agribusiness approach that prioritizes identifying consumer market gaps, needs, and desires and creating products and services that satisfy them. Thus, market orientation and smallholder farmers' participation are core ingredients of a thriving agricultural transformation agenda. Evidently, Ukwuaba et al. (2024a) and Ogundari (2016) have shown that the absence of farm-level market orientation and participation constitutes a bottleneck to smallholder commercialization in Nigeria. Inadequate market participation, poor market orientation, and market volatility are among the challenges to commercialization facing smallholder farmers. Similarly, challenges stemming from high transportation costs, poor and unreliable market information, expensive and poor-quality inputs, and poorly accessible and highly ineffective input-output markets, among others, militate against attaining high market orientation among farmers (Abate et al., 2020; Ma et al., 2024; Akinwale et al., 2015). Furthermore, despite these challenges, smallholder farmers continue to make significant contributions to Nigeria's domestic rice production (Omeje et al., 2022; Okpukpara et al., 2023; Omeje et al., 2024). To this end, Omeje et al. (2022) called for a policy guide to address the specific challenges faced by small-scale rice farmers in Nigeria. The authors also advocated for increased government efforts to enact policies that accelerate the commercialization of smallholder rice.

Commercialization among smallholder rice farmers is a potential pathway to farmers' economic welfare. Rice is a staple crop produced and consumed in Nigeria. With demand growing due to population growth and changing consumer preferences, current production levels have been unable to meet domestic demand. Nigeria has yet to attain self-sufficiency in rice production. Given this demand, the Nigerian government has advocated increased production to meet local demand and, over time, has encouraged the allocation of essential resources to develop the rice subsector (FMARD, 2021). The government's ban on rice imports was further implemented to promote domestic production and ensure a steady market for locally produced rice. Consequently, this growing demand, coupled with the ban on rice imports, provides farmers with an incentive to increase production and participate in the market. Despite this positive market signal, the market orientation and participation of smallholder farmers remain below expectations (Ukwuaba et al., 2024b). Smallholders are still constrained by shortages of inputs, plagued by price volatility, and face limited access to markets due to low market orientation and participation

(Anthony et al., 2021; Olayemi et al., 2021). Consequently, it has become essential to investigate the constraints and gain better insight into specific policies that would further enhance smallholder commercialization in Nigeria.

Furthermore, the literature has not clearly distinguished between market orientation and participation in advancing commercialization. There is a growing trend of exploring market participation at the expense of market orientation, as commercialization is often equated with output market participation in most literature (Nwafor, 2020). Consequently, most research on barriers to smallholder commercialization has focused on obstacles to market participation (Jaleta et al., 2009; Otieno et al., 2009). This assumption is incorrect; market orientation and participation barriers may differ significantly, as households may use marketable commodities for consumption. Similarly, due to surplus production, households may sell products originally intended for consumption. Previous studies on smallholder commercialization, such as Aromolaran et al. (2020), Mani et al. (2019), Opata et al. (2020) and Ukwuaba et al. (2024a) focused on the drivers of market orientation and participation, but did not explore the constraints on these behaviours. To bridge this gap in the literature, this study distinguishes between market orientation and market participation and analyzes the barriers to each. Therefore, the study described the socioeconomic profiles of smallholder rice farmers, examined the use of purchased inputs, estimated market orientation and participation indices, assessed the relationship between these indices, and identified barriers to market orientation and participation separately. This differentiated approach elucidates the complex factors that influence the commercial transformation of smallholder farmers. Therefore, identifying the specific barriers to market orientation and participation is essential to facilitate commercial transformation, as it will guide targeted interventions at both the production and marketing levels.

2. Materials and Methods

2.1. Study area

This study was conducted in Nigeria's Southeast region, which spans approximately 28,987 km² (National Bureau of Statistics, 2010). The area has a population of roughly 24,989,337 (Worldometer, 2024), distributed across five states and 19 agricultural zones. The Southeast region is characterized by tropical rainforests and sandy loam soils that support a variety of farming activities. The climate is bimodal, with a rainy season from April to October and a dry season from November to March. Annual rainfall ranges from 2,000 to 2,500 mm, providing suitable conditions for agricultural production. These geographical and climatic features make the Southeast region an important agricultural hub in Nigeria, supporting the livelihoods of millions of people. Smallholder agriculture, particularly in rural areas, is the primary economic activity. Rice, maize, yams, and cassava are the major staples grown at subsistence levels. Rice is a strategic commodity for food security in Nigeria; its consumption is growing faster as the population grows and dietary patterns change. Farmers engage in rice marketing and related activities through various market channels; some sell directly at the farm gate, while others sell in rural or urban markets.

2.2. Sampling procedure

The study used a multi-stage sampling procedure to select rice farmers. First, Anambra, Ebonyi, and Enugu states were purposively selected for their high concentration of rice farming. Second, three agricultural zones within the selected states were purposively selected for their high rice production. In the third and fourth stages, three local government areas (LGAs) and three communities were selected from each zone based on the number of rice-farming households. The final stage involved a proportionate random selection of smallholder rice-farming households across the selected communities. A list of rice-farming households was obtained from ADP offices in Anambra, Ebonyi, and Enugu States. The final sample consisted of 84 respondents from Anambra, 108 from Ebonyi, and 96 from Enugu. A total of 288 smallholder rice farmers were selected for analysis.

The sample size is calculated based on the population mean, accounting for the continuous nature of the market orientation and participation index. We assumed a 95% confidence level, a standard deviation of 0.5, and a 6% margin of error (to ensure the sample size is sufficient even in the worst-case scenario), which is common during planning. It is estimated as:

$$n = \left(\frac{z \cdot \sigma}{d} \right)^2 \quad (\text{Eq. 1})$$

Where Z is the Z -score for the desired confidence level (1.96 for 95%), σ is the estimated standard deviation of the market orientation index, and d is the margin of error.

This method gives a minimum sample of approximately 267. The final sample of 288 respondents meets this statistical threshold for robust inference. Therefore, the selected 288 farmers are sufficient for both types of analysis.

Table 1. Summary of the sampling procedure

State	Agricultural Zones	LGAs	Communities	No of Farmers	Total Farmers
Anambra	Awka	Awka North	3	08	24
	Anambra	Anyamelum	3	10	30
	Onitsha	Ogbaru	3	10	30
Ebonyi	Ebonyi Central	Ezza North	3	12	36
	Ebonyi South	Ivo	3	10	30
	Ebonyi North	Izzi	3	14	42
Enugu	Awgu	Aninri	3	08	24
	Enugu	Isi -Uzo	3	10	30
	Nsukka	Uzo-Uwani	3	14	42
Total	9	9	27	288	288

2.2. Data collection and analysis

This study was conducted between January and May 2023, using primary data collected through a mixed-methods approach that included a semi-structured questionnaire and focus group discussions. Insightful and relevant information was gathered from the head of each rice-farming household. Descriptive statistics, including frequencies, percentages, means, and Likert-scale responses, along with market orientation and market participation indices, were used to analyze the primary data.

2.3. Model specification

2.3.1 Market orientation index

Following Ukwuaba et al. (2024a) and Aromolaran et al. (2020), the market orientation index for the smallholder households was computed as follows in equation 2:

$$MOI_i = \frac{\sum_{j=1}^J CMI_j L_{ji}}{L_i^T} \quad (\text{Eq. 2})$$

$$L_i^T > 0, \text{ and } 0 < MOI_i \leq 1$$

Where:

MOI_i = market orientation index of household i ;

CMI = crop-specific marketability index

L_{ji} = size of land allocated to rice j by the i^{th} farm household i ,

L_i^T = total cropland operated by the i^{th} farm household in the production year under consideration.

A household with a higher MOI value allocates more land to marketable crops, indicating a greater market orientation.

$$CMI_j = \frac{\sum_{i=1}^N X_{ji}}{\sum_{i=1}^N Y_{ji}} \quad (\text{Eq. 3})$$

$Y_{ji} > X_{ji}$, and $0 \leq CMI_{ji} \leq 1$

Where:

CMI_{ji} = crop-specific marketability index;

X_{ji} = the amount of crop j sold (the proportion of rice sold) by household i ;

Y_{ji} = the total amount of crop j (rice) produced by household i ;

N = the number of sample households.

CMI aggregates values from 0 to 1, with market crops closer to 1 and consumption crops closer to 0.

2.3.2. Market participation index

According to Ukwuaba *et al.* (2024b) and Gebremedhin and Jaleta (2012), the household crop output market participation index is calculated by dividing the quantity sold by the total quantity produced. Mathematically, it is expressed as follows in equation 3.

$$\frac{\sum_{k=1}^k \hat{P}_k S_{ik}}{\sum_{k=1}^k \hat{P}_k Q_{ik}} \times 100 \quad (\text{Eq. 4})$$

Where:

S_{ik} = the quantity of output k sold by household i ,

(\hat{P}_k) = the estimated average community-level price

Q_{ik} = the total amount of output k produced by household i ,

The index ranges from 0 to 1, with higher values indicating greater commercial orientation. In line with Alawode and Makinde (2021), with a slight modification, smallholder household crop commercialization was categorized as low (<50%), medium or semi (50-74%), and high (75-100%).

Finally, the study employed Pearson correlation analysis to examine the relationship between market orientation and market participation among smallholder rice farmers.

2.3.3. Likert-type scale rating techniques

This study used a 4-point Likert scale to assess barriers to market orientation and participation. Respondents provided qualitative responses, which were rated on a scale from Strongly Agree (SA), Agree (A), Disagree (D), to Strongly Disagree (SD), with corresponding values of 4, 3, 2, and 1, respectively. The mean score (\bar{x}) was calculated by averaging these values, yielding a baseline score of 2.50.

$$\text{This is expressed thus: } \bar{x} = \frac{\sum X}{n} = \frac{4+3+2+1}{4} = 2.50 \quad (\text{Eq. 5}).$$

To determine the significance of each factor, a cut-off point of 2.50 on a 0.05-interval scale was established. This resulted in upper and lower limit cut-off points of 2.55 and 2.45, respectively. The study employed the following interpretation criteria: factors with a mean score below 2.45 were considered weak and insignificant, while those with a mean score above 2.55 were deemed significant and strongly considered.

3. Results and Discussion

3.1. Socio-economic characteristics of smallholder rice farmers

As shown in *Table 2*, the socio-economic characteristics of smallholder rice farmers indicate that the majority (68.8%) are male, reflecting the dominance of smallholders, largely due to land ownership systems in developing countries that favor males and the physically demanding nature of smallholder agriculture. This result aligns with Akanbi *et al.* (2024, 2025) and Chidiebere-Mark *et al.* (2019), who report that men dominate smallholder rice

farming in Southeastern Nigeria. Regarding age, the majority (58.3%) fall within the 41 to 60 years age group, while the 21 to 30 years age group (5.6%) is the least represented. The mean age of the smallholder rice farmers is 48.3 years, indicating that most farmers are economically active and productive, enabling them to engage in smallholder agriculture, which is often demanding and labor-intensive. It also shows that household decisions on rice production are primarily made by active household members, promoting the sustainability of the rice enterprise. The study confirms that, according to Abdullah et al. (2019), most Pakistani smallholder rice farmers (63.1%) are aged 40-60.

Table 2 also showed that 8.3% of respondents were single, 80.9% were married, 2.4% were divorced, and 13% were widowed. This suggests that marriage confers special privileges in accessing community land, making smallholder rice farmers in Southeast Nigeria highly committed to meeting household demands. The study aligns with Adeyemi et al. (2023) and Ukwuaba et al. (2020) but contradicts Danladi et al. (2021). The results showed that about 26% had completed only primary school, 37.2% had completed secondary school, and 24% had tertiary education. The average of 10 years of schooling indicates that smallholder rice farmers are generally literate and moderately educated, enabling them to adopt new technologies and innovations that contribute to commercialization and overall welfare. The study contradicts Obi et al. (2023), who reported low educational levels among Nigerian farmers, but aligns with Chidiebere-Mark et al. (2019), who reported an average of 9 years of education. For household size, Table 2 showed that the majority (53.1%) fell within the 5–8-person range, 31% in the 9-12 range, and 0.3% in the 13-person range. The mean household size of 7 persons suggests a relatively high household size, which contributes significantly to rice production. This finding aligns with Sennuga et al. (2020) but contradicts Chiemela et al. (2021). Regarding farming experience, the majority (39.9%) had 21-30 years, 25.7% had 11-20 years, and only 20.1% had ≤ 10 years. The mean experience of smallholder rice farmers was 22 years, indicating their expertise in rice production. This experience significantly impacts productivity and the adoption of innovations, potentially leading to their transition into commercial rice farmers. The result aligns with Mbam et al. (2021) and Onyekuru et al. (2019). However, it differs from Danladi et al. (2021), who reported less than 7 years of farming experience.

The farm size analysis shows that 91% of farms cover 1 to 2 hectares, with an average of 1.64 hectares. This suggests that farmers are subsistence farmers, unable to meet the growing population's rice needs. Land constraints in rice production are also a concern; population growth and urbanization are converting many agricultural farmlands to residential areas for road expansion, public infrastructure, commercial, and other purposes. The result aligns with Mukaila et al. (2022), Falola et al. (2023), and Gbigbi (2021), who reported that most smallholder farmers have farm sizes of 1 to 2 hectares. Table 2 also shows that family labour contributes 12.5% to rice production, while 26.1% rely on hired labour. The majority (61.4%) combine family and hired labour, suggesting that smallholder farmers are transitioning to semi-commercial farming. This shift is attributed to schooling and household work among household members. The study contradicts Sennuga et al. (2020), who suggest that family labour is a significant source of labour for smallholder farmers in developing countries. Regarding cooperative membership, the study reveals that 54.2% of smallholder rice farmers belong to cooperative societies, indicating that membership enhances their production and market participation by allowing them to share ideas and information. This aligns with Ma et al. (2022) and suggests that smallholder farmers' cooperative membership enhances production, income, and access to agricultural credit, facilitating the transition to market-oriented production. The result corroborates the findings of Blekking et al. (2021) and Manda et al. (2020); however, it differs from those of Danladi et al. (2021), who noted that most (61%) of the smallholder farmers in Taraba state do not belong to any cooperative society. The study shows that 51% of smallholder rice farmers earn less than ₦50,000, 33% earn between ₦51,000 and ₦100,000, and only 3.8% earn above ₦200,000. The average monthly income was ₦66,631.94, exceeding the Nigerian government-approved minimum wage of ₦30,000 for civil servants. However, most farmers diversify their income from rice farming with other sources, thereby sustaining themselves, especially during prevailing economic downturns and periods of high inflation. The result differs from that of Nwankwo et al. (2021), who found that smallholder farmers earned less than ₦30,000 monthly.

Table 2: Distribution of Respondents according to their Socio-economic Characteristics

Variable	Frequency	Percentage	Mean
Sex			
Male	198	68.8	
Female	90	31.2	
Age (Years)			46.77
21 - 30	16	5.6	
31 - 40	73	25.3	
41 - 60	168	58.3	
≥61	31	10.8	
Marital Status			
Single	11	3.8	
Married	234	81.3	
Divorced	6	2.1	
Windowed	37	12.8	
Educational Status			9.99
No formal education	35	12.2	
Primary education	77	26.7	
Secondary	107	37.2	
Tertiary	69	24.0	
Household Size			7.29
≤ 4	44	15.3	
5 - 8	153	53.1	
9 - 12	90	31.3	
13 - 16	1	0.3	
Farming Experience (Years)			21.82
≤ 10	58	20.1	
11 - 20	74	25.7	
21 - 30	115	39.9	
31 - 40	34	11.8	
41 - 50	7	2.4	
Farm Size (Hectares)			1.64
< 1	26	9.0	
1 - 2	262	91.0	
Source of Labour			
Family Labour	35	12.2	
Hired	74	25.7	
Both	179	62.1	
Membership of Cooperatives			
Yes	156	54.2	
No	132	46.8	
Monthly Income (₺)			66,631.94
≤ 50000	147	51.0	
51000 - 100000	95	33.0	
101000 - 150000	17	5.9	
151000 - 200000	16	5.6	
201000 - 250000	11	3.8	
251000 - 300000	2	0.7	

Source: Field Survey, 2023

3.2. Use of purchased inputs among smallholder rice farmers

Table 3 presents the use of purchased inputs, including rice seeds, fertilizers, chemicals (herbicides and insecticides), and labour, by smallholder rice farmers. The Table shows that a larger proportion (54.2%) of rice farmers relied on their own home stock, that is, rice seeds from the previous season or their harvest, as the source of planting material. Table 3 also shows that only 4.5% of respondents sourced rice seeds from friends and family, while about 41% purchased them from the local market or agro-input suppliers. Specifically, 27.8% of respondents sourced rice seeds from local markets, while 13.5% sourced them from agro-input suppliers. These results suggest

that home stock remains the primary source of planting material. This may negatively affect the quality and yield of planted rice seeds. The findings align with Nwafor (2020) and Sibiko and Qaim (2020), who found that increased use of purchased improved seeds and agrochemicals enhances productivity and spurs agricultural development, especially among smallholder farmers. However, the results differ from those of Langyintuo (2020), who found that low use of agricultural inputs, such as improved seeds from certified agro-input suppliers and fertilizers, was the primary cause of low agricultural performance, especially in developing countries. Regarding the use of purchased fertilizer, the study showed that all (100%) respondents purchased and used inorganic fertilizer. Specifically, about 73% purchased fertilizer from local markets, while about 25% bought it from agro-input dealers. This suggests that all respondents understand the importance of inorganic fertilizers in rice production. This can be attributed to extension activities, during which farmers are educated on the importance of fertilizer application. The widespread adoption of fertilizers can be attributed to the dominant presence of cooperative societies, which provide a platform for farmers to share knowledge, expertise, and resources. Membership in these cooperatives allows farmers to leverage collective knowledge, access critical information, and benefit from collaborative learning, ultimately driving increased fertilizer adoption. This supports Manda et al. (2020), who found that households affiliated with cooperatives use more fertilizer and hybrid seeds, resulting in higher yields. The results align with Lenis et al. (2017), who posited that most farmers in SSA purchase inputs, such as fertilizer, to enhance farm yields. The authors noted that using these purchased inputs, such as fertilizer and other agrochemicals, increased yields and improved farmers' income and food security in the region. the region.

Table 3. Smallholder rice farmers' level of use of purchased inputs

Variables	Frequency	Percentage
Rice Seeds		
Home/Own stock	156	54.2
Family and Friends	13	4.5
Local Market	80	27.8
Agro Input Dealers	39	13.5
Fertiliser		
Local Market	210	72.9
Agro Input Dealers	73	25.3
Extension/ Government Agency	5	1.8
Chemical (Herbicides and Insecticides) Use		
Local Market	214	74.3
Agro Input Dealers	74	25.7
Labour		
Family	35	12.2
Hired	74	25.7
Both	179	62.1

Source: Field survey, 2023

Table 3 also showed that all respondents (100%) purchased chemicals, such as herbicides and insecticides, to protect rice farms. About 74% of respondents sourced these products from local markets, while 25.7% purchased them from agro-input suppliers. This affirms the importance of herbicides and insecticides in rice production. Thus, farmers were able to mitigate the effects of both field and storage pests. As indicated in Table 2, the farmers' considerable experience in rice production contributed to their high fertilizer adoption rate. This knowledge base and expertise enabled them to efficiently incorporate fertilizers and agrochemicals into their farming practices. This pattern is also linked to the majority being members of cooperatives, where they easily share ideas and information that support their farming activities. However, the result differs from Langyintuo (2020), who observed that agrochemical use is generally low in many countries in SSA. Table 3 also indicates that about 26% of respondents used hired labour during rice production, while only 12.2% employed family labour. The result also shows that most respondents (62.1%) combined family and hired labour. This suggests that farmers do not rely

solely on family members as their primary source of labour. Therefore, smallholder farmers are progressively shifting from subsistence farming, which depends on the family as the primary source of labour, to semi-commercial agriculture, which combines family labour with strategically hired labour. The result aligns with Anarah et al. (2019), who reported a decline in the contribution of family labour to agricultural production among farmers in Anambra State, Nigeria.

3.3. Market orientation and participation indices of smallholder rice farming households

Market orientation and participation among smallholder rice farmers in southeast Nigeria are presented in Table 4. The results showed that these farmers managed a total of 481,10 hectares of farmland, of which 339,80 hectares were allocated to rice production. During the 2022 farming season, they produced 233,615 kilograms of rice, of which 170,342 kilograms were sold. The study found a market orientation index of 0.52, indicating a moderate level of market orientation. This suggests that these farmers allocate approximately 52% of their cultivable land to marketable crops, such as rice. The moderate market orientation implies that smallholder rice farmers in the region are transitioning from subsistence farming to more commercialized agricultural practices. Thus, these farmers demonstrate 52% responsiveness to market signals, demands, and opportunities in rice production, indicating that more than half of their production decisions are driven by market considerations. The result corroborates Nwafor's (2020) findings, which reported a mean market-orientation index of 0.55 among smallholder rice farmers in South Africa. The result contradicts previous findings by Abate et al. (2020) and Mekie et al. (2019), which reported remarkably low market orientation indices of 0.10 and 0.29, respectively, among smallholder farmers in Ethiopia. The authors attributed the low level of market orientation to an over-concentration on consumption needs rather than the market. This discrepancy suggests that smallholder rice farmers in the study area exhibit a more pronounced responsiveness to market signals, demands, and opportunities compared to their counterparts in Ethiopia.

Table 4. Results of market orientation and participation indices

Indicators (Kg)	Total	Mean	Std. Dev.
Size of Land (Ha)	481.10	1.67	0.47
Land Size Allocated to Rice (Ha)	339.80	1.180	0.57
Quantity of Rice Produced (Kg)	233,615.00	811.16	455.86
Quantity of Rice Sold (Kg)	170,342.00	591.47	437.01
Market Orientation Index	Mean = 0.52	Min = 0.00	Max = 0.81
Market Participation Index	Mean = 0.73	Min = 0.08	Max = 0.95

Field survey, 2023

Regarding the market participation index, Table 4 reports a mean of 0.73 among smallholder rice farmers. This suggests that, on average, 73% of rice produced in Southeast Nigeria was sold in markets, indicating that smallholder farmers were semi-commercialized. This pattern reflects increased market-oriented production and greater use of purchased inputs. Thus, despite high transactional costs and poor infrastructure, smallholders' access to the output market was not significantly hindered. This shift toward commercialization has significant implications for household welfare, livelihoods, food security (Ukwuaba et al., 2024b), and income levels (Ghosh, 2021). The result aligns with Ayele et al. (2021) and Ogundele (2020), who found that smallholder cereal farmers are semi-commercialized. However, it differs from Abate et al. (2021) and Manda et al. (2021), who reported low market participation indices of 0.10 and 0.20, respectively.

Correlation Coefficient of Market Orientation and Market Participation

This study examines the relationship between market orientation and market participation among smallholder rice farmers. Pearson's correlation coefficient was used to assess the nature and direction of the relationship. The

analysis was conducted in SPSS, and significance was tested using the t-distribution with $(n - 2)$ degrees of freedom. The correlation was significant at the 1% level ($p < 0.01$). The results, presented in *Table 5*, show a Pearson correlation coefficient of 0.992, significant at the 1% level ($p < 0.01$). The results indicate a strong, positive linear relationship between market orientation and market participation. This implies that as the market orientation of smallholder rice farmers increases, market participation also increases proportionally. The 1% significance level underscores the strength and robustness of the relationship, suggesting it is unlikely due to random chance. Therefore, smallholder rice farmers with a higher market orientation index are more likely to experience substantial increases in their market participation intensity. High market participation translates into improved market performance, greater competitiveness, and higher income for farm households, thereby enhancing household welfare.

Table 5. Pearson Correlation Coefficient of Market Orientation and Market Participation

		Market Orientation (Y)
Market Participation (Y)	Pearson Correlation	0.992***
	Sig. (2-tailed)	0.000
	N	288

Source: Field Survey, 2023

*** Correlation is significant at the 0.01 level (2-tailed).

3.4. Barriers to smallholder rice farmers' market orientation and participation

3.4.1 Barriers to smallholder rice farmers' market orientation

The constraints militating against market orientation among smallholder rice farmers in southeast Nigeria are presented in *Table 6*. The study identified high cost of inputs ($\bar{x} = 3.35$), land fragmentation ($\bar{x} = 2.95$), high labour demands ($\bar{x} = 2.85$), lack of capital ($\bar{x} = 2.80$), long distance to market ($\bar{x} = 2.76$), land tenure system ($\bar{x} = 2.63$) and lack of market information ($\bar{x} = 2.63$) as the major hindrances to smallholder rice farmers' market orientation in the southeast, Nigeria. The result implied that the high cost of inputs, such as improved rice seeds, labour, land, inorganic fertilizers, and chemicals (including herbicides, weedicides, and pesticides), ranked first as a significant constraint dissuading smallholder rice farmers from being market-oriented. The result is similar to Langyintuo (2020), Ochilo et al. (2019), Omonona et al. (2019), Tesfay (2020), Ukeje et al. (2017), and Yaseen et al. (2018), that the high cost of inputs such as improved seeds, inorganic fertilizers, and other complementary inputs was among the constraints militating against smallholder farmers' market orientation in SSA. In their various studies, the authors noted that high input costs limit smallholders' market-oriented decision-making, productivity, and profitability, especially in developing countries.

Land fragmentation was identified in *Table 6* as the second-most-severe constraint among smallholder rice farmers. This suggests that scattered plots limit farmers' willingness to allocate more inputs to more marketable products, such as rice. The result also aligns with Obayelu et al. (2019), who state that land fragmentation was a significant setback to agricultural development among smallholder farmers, leading to higher production costs and lower profits. Lack of capital was also reported as a key inhibitor of smallholder market orientation in southeast Nigeria. This is not surprising, given the pivotal role of capital in enhancing smallholder market orientation by facilitating the acquisition and availability of other agricultural inputs and adding value to primary products. The study is similar to Balana and Oyeyemi (2022), which states that the lack of capital is mainly responsible for the poor adoption of agricultural technologies, such as inorganic fertilizers, improved seeds, agrochemicals, and mechanization, thereby limiting the market orientation of smallholder farmers in Nigeria. *Table 6* also shows that market orientation among smallholder rice farmers was significantly hindered by long distances to markets, limited market information, and inadequate transportation systems. The result aligns with Taku-Forchu (2019), who posited that insufficient market information sources, limited market access, and poor transport and storage infrastructure are among the major obstacles to smallholder market orientation in Cameroon. However, the result of *Table 6* showed that market uncertainties ($\bar{x} = 2.30$), poor road networks ($\bar{x} = 2.15$), inadequate market infrastructures ($\bar{x} = 2.05$), fluctuating market price ($\bar{x} = 2.02$), buyers dictating prices ($\bar{x} = 1.93$) and high taxation on marketing ($\bar{x} = 1.90$) with mean scores of less than 2.45 were regarded as less severe constraints among smallholder rice farmers. This implies that this group of constraints was insufficient to limit the market orientation

of smallholder rice farmers severely. The result contrasts with Sharma et al. (2012), which indicated that fluctuating market prices, especially during peak season, and high market charges are major limiting factors to market orientation among smallholder farmers.

3.4.2 Barriers to smallholder rice farmers' market participation

The constraints militating against market participation among smallholder rice farmers are presented in Table 7. The Table showed that poor road networks ($\bar{x} = 3.36$), long distance to market ($\bar{x} = 3.31$), lack of market information ($\bar{x} = 3.29$), lack of access to credit facilities ($\bar{x} = 3.01$), inadequate storage facility ($\bar{x} = 2.96$), poor transportation system ($\bar{x} = 2.88$), inadequate institutional supports ($\bar{x} = 2.78$) and poor processing facility ($\bar{x} = 2.71$) were the significant economic and institutional constraints militating against market participation of smallholder farmers in Southeast, Nigeria. The result indicated that poor road networks, ranked as the top inhibitor to market participation, limited smallholder rice farmers' access to markets. This is linked to the poor road networks in rural areas, making it difficult for smallholder rice farmers to transport agricultural produce to competitive markets. The lack of all-weather roads can result in impassable or muddy paths, making it challenging to reach buyers, processing facilities, or established markets, and increasing transaction costs and inefficiency. Poor road infrastructure can also restrict smallholder rice farmers from selling rice in unprocessed form and reduce their ability to explore higher-value or more competitive markets, forcing them to sell only to nearby, less competitive markets. The result is similar to Jebesa (2019), Ola and Menapace (2020), and Poole (2017), which linked low market participation among smallholder farmers to poor market access due to inadequate infrastructure, high transaction costs, and weak institutions.

Table 6. Likert scale result of the barriers to smallholder rice farmers' market orientation

Constraints	Mean	Standard Deviation	Rank
High Cost of Inputs	3.35	0.64	1 st
Land Fragmentation	2.95	0.80	2 nd
Lack of Capital	2.82	0.94	3 rd
High Labour Demands	2.80	0.69	4 th
Long Distance to Market	2.76	0.75	5 th
Lack of Market Information	2.63	0.91	6 th
Inadequate Transportation System	2.62	0.94	7 th
Poor Storage Facility	2.49	0.81	8 th
Market Uncertainties	2.30	0.92	9 th
Poor Road Networks	2.15	0.90	10 th
Inadequate Market Infrastructures	2.05	0.89	11 th
Fluctuating Market Price	2.02	0.76	12 th
Buyers dictating prices	1.93	0.97	13 th
High Taxation on Marketing	1.90	0.86	14 th

Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1 Field Survey, 2023

Access to market information is critical for stimulating smallholders' interest in engaging with markets effectively. However, the results in Table 7 indicate that a lack of market information is a key constraint limiting smallholder rice farmers' market participation. The results suggest that smallholder rice farmers lack timely, critical information on market prices and demand trends. This lack of relevant market information negatively affects farmers' profits, as they may have little or no information on when, where, or how to sell to maximize profits. The results align with Falola et al. (2022a), Mutemi and Sakwa (2017), and Ola and Menapace (2020), who note that a lack of timely market information significantly hinders smallholder farmers' active participation in the output market in developing countries. Lack of access to credit facilities was also identified as a critical factor hampering market participation. This suggests that a lack of credit facilities can trap smallholder farmers in a cycle of subsistence farming, limiting their ability to invest, expand, and participate in more profitable markets. Thus, without access to credit, smallholder rice farmers may be unable to afford the resources necessary to increase productivity, resulting in lower yields and reduced market participation. The finding agrees with Ezeibe et al. (2020), Mukaila (2024), Ola and Menapace (2020), Poole (2017), and Snoxell and Lyne (2019), who posited that

a lack of credit hinders the accumulation of productive assets and investment in production, leading to low levels of commercialisation and low household income among smallholder farmers (Falola et al., 2022b).

Inadequate storage facilities, poor transportation systems, insufficient institutional support, and poor processing facilities were also identified as significant constraints to smallholder rice farmers' market participation. This is because most smallholder farmers are located in remote areas with poor transportation and market infrastructure, resulting in high transaction costs. The findings support Kyaw et al. (2018), who linked low market participation among smallholder rice farmers to technological, institutional, and market factors, including poor storage and processing facilities, high transaction costs due to inadequate transport systems, limited market linkages, inadequate training and capacity-building, and insufficient extension services. The results also corroborate the findings of Falola et al. (2022a), Mani et al. (2019), and Okoye et al. (2016). Table 7 further reveals that limited bargaining power ($\bar{x} = 2.31$), high processing costs ($\bar{x} = 2.18$), insufficient market linkages ($\bar{x} = 2.17$), high taxation ($\bar{x} = 1.99$), and government policy and regulation ($\bar{x} = 1.97$) were not regarded as critical constraints to market participation among smallholder rice farmers in southeast Nigeria. The results suggest that smallholder rice farmers do not consider limited bargaining power, high processing costs, insufficient market linkages, high taxation, and government policies and regulations to be critical challenges to their market participation. This might reflect favourable conditions or strategies within the region, such as practical negotiation skills, favourable tax policies, and supportive government regulations, including the border closure and ban on rice importation, which were aimed at achieving food sufficiency and improving the income and welfare of the farmers through active involvement in the output market.

Table 7. Likert scale result of barriers to smallholder rice farmers' market participation

Constraints	Mean	Standard Deviation	Rank
Poor Road Networks	3.36	0.77	1 st
Long Distance to Market	3.31	0.63	2 nd
Lack of Market information	3.29	0.94	3 rd
Lack of Access to Credit Facilities	3.01	0.76	4 th
Inadequate Storage Facility	2.96	0.89	5 th
Poor Transportation System	2.88	0.94	6 th
Inadequate Institutional Supports	2.78	0.99	7 th
Poor Processing Facility	2.71	0.90	8 th
Limited Bargaining Power	2.31	0.95	9 th
High Cost of Processing	2.18	0.83	10 th
Insufficient Market Linkages	2.17	0.86	11 th
High Taxation	1.99	0.90	12 th
Government Policy and Regulation	1.97	0.93	13 th

Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1 Source Field: survey, 2023

4. Conclusions

Smallholder commercialization remains a crucial economic tool for enhancing rural income and promoting economic welfare in SSA. Efforts by various tiers of government in Southeast Nigeria are beginning to yield the desired outcomes, as smallholder rice farmers gradually transition toward commercialization, becoming moderately market-oriented and semi-commercialized. The full commercialization potential of these farmers remains the ultimate goal; however, these efforts are derailed by a lack of farm-level analysis of market orientation and participation decisions, owing to diverse barriers to market access. These barriers constitute a critical missing link in smallholder commercialization. The primary obstacles to market orientation were the high cost of inputs, land fragmentation, a lack of capital, long distances to market, and inadequate market information. Similarly, poor road networks, long distances to markets, limited market information, a poor transportation system, insufficient institutional support, and poor processing and storage facilities limited smallholder rice farmers' market participation. These economic and institutional constraints combined to erode and stagnate smallholder commercialization in Southeast Nigeria. Concerted efforts are therefore needed to reduce the effects of these barriers. High-cost inputs, the most critical obstacles to market orientation, can be drastically reduced through increased subsidies from government agencies or NGOs on inputs such as seeds, fertilizers, and pesticides. This will help reduce the financial burden on smallholder farmers. Increased public-private collaboration in rural road infrastructure is recommended, with a focus on building and maintaining roads connecting agricultural areas to markets. This will help address poor road networks, which have been identified as the most critical factor limiting smallholder rice farmers' market participation.

Acknowledgement

The authors are grateful to the members of the postgraduate committee of the Department of Agricultural Economics, University of Nigeria, Nsukka, for their constructive criticism, which sharpened this work.

Ethical Statement

There is no need to obtain ethics committee approval for this study, as the data were collected from adult farmers who willingly provided the necessary information during the survey.

Conflicts of Interest

There is no conflict of interest between the article authors. Authorship Contribution Statement

Authorship Contribution Statement

Concept: Ukwuaba, I., Okpukpara, B. Omeje, E; Design: Ukwuaba, I., Okpukpara, B, Omeje, E, Ukwuaba, S, Mukaila, R, Igweh, A, Okpukpara, V; Data Collection or Processing: Ukwuaba, I., Omeje, E, Ukwuaba, S, Mukaila, R, Igweh, A, Okpukpara, V, Ukwuaba, I.; Statistical Analyses: Ukwuaba, I., Okpukpara, B, Omeje, E, Ukwuaba, S, Mukaila, R, Igweh, A; Literature Search: Ukwuaba, I., Ukwuaba, S, Mukaila, R, Igweh, A, Okpukpara, V, Ukwuaba, I.; Writing, Review and Editing: Ukwuaba, I., Okpukpara, B, Omeje, E, Ukwuaba, S, Mukaila, R, Igweh, A, Okpukpara, V, Ukwuaba, I.

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