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DETERMINANTS AND PROFITABILITY OF SMALLHOLDER SOYBEAN FARMERS' PARTICIPATION IN EXPORT MARKETS: EVIDENCE FROM DAWANAU INTERNATIONAL MARKET, KANO STATE, NIGERIA

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ABSTRACT

Smallholder integration into export markets is a key pathway for agricultural commercialization, income growth, and rural transformation in Sub-Saharan Africa. Yet, empirical evidence on the drivers of soybean export participation remains limited. This study investigates the determinants and profitability of soybean farmers' participation in export markets in Kano State, Nigeria, focusing on the Dawanau International Market, a major grain aggregation hub in West Africa. A primarily quantitative approach was adopted, supported by qualitative insights to refine the survey instrument. Data were collected from 97 soybean farmers, comprising 54 export participants and 43 non-export participants. Analytical tools included descriptive statistics, gross margin analysis, and a Binary Logistic Regression model grounded in Random Utility Theory. Results indicate that export-participating farmers are younger (36.59 years) and earn higher average incomes (₦1,251,912.36) compared to non-export farmers (41.15 years and ₦901,367.23). They also travel shorter distances to aggregation centres (16.73 km versus 26.13 km) and have greater access to credit, extension services, and improved seed varieties. Profitability analysis shows that soybean production is viable in both channels, but export participation yields higher returns (₦971,381 per hectare versus ₦854,134). Regression results reveal that household size, income, credit access, extension services, and improved seed adoption significantly increase the likelihood of export participation, while distance reduces it. Strengthening rural services, credit access, and infrastructure is essential for enhancing smallholder export integration.

Keywords: Smallholder, Exportation, Profitability, Market, Participation

INTRODUCTION

Agricultural commercialization has increasingly been recognized as a cornerstone for economic development, poverty reduction, and food security in developing countries (Ferris et al., 2014; Mdoda & Obi, 2019; Okeke & Eze, 2019; Victor et al., 2022). In Nigeria, where agriculture employs a significant proportion of the rural population, transitioning smallholder farmers from subsistence-oriented production to market-oriented systems is essential for sustainable growth (Abdullahi et al., 2026; Barrett et al., 2012; Lekobane & Seleka, 2017). Market participation, particularly in export-oriented value chains, offers opportunities for higher incomes, improved productivity, foreign exchange earnings, and stronger integration into global markets (Barrett et al., 2012; Hoang & Nguyen, 2023; Lar et al., 2026; Ouma et al., 2010).

In recent years, agricultural exports have become an increasingly important component of Nigeria's economic diversification strategy. For instance, Nigeria recorded agricultural export earnings of about ₦1.7 trillion in the first quarter of 2025, representing a 65% increase compared with the same period in 2024 (National Bureau of Statistics, 2025). Despite this growth, agriculture still accounts for a relatively modest share of total exports, estimated at around 5–8%, highlighting the untapped potential of export-oriented agricultural value chains in the country (National Bureau of Statistics (NBS), 2025).

Soybean has emerged as one of the most strategic cash crops in Northern Nigeria due to its growing domestic and international demand, nutritional importance, and industrial applications (Ibrahim et al., 2016). Nigeria has increasingly positioned itself as a key soybean exporter in Africa. Recent estimates indicate that soybean exports rose significantly from about 1.25 million metric tonnes in 2023 to approximately 2.2 million metric tonnes in 2025, valued at roughly US$456 million (about ₦700 billion), with major export destinations including China, India, Turkey, and several European countries (Nigerian Export Promotion Council (NEPC)., 2025). These exports represent nearly 70% of Africa's total soybean export volume, underscoring the crop's growing significance in the country's non-oil export portfolio (Osebeyo & Aye, 2014)..

Kano State, located in northwestern Nigeria, plays a central role in the country's grain trade and export activities (Arinloye et al., 2015). The presence of the Dawanau International Market, recognized as one of the largest grain markets in West Africa, positions the state as a critical gateway for agricultural exports to neighboring African countries and international destinations across Asia, Europe, and the Middle East (Girei et al., 2018). Given the rapid expansion of global demand for oilseeds and the growing export orientation of Nigeria's soybean sector, Kano's role as a major aggregation and trading hub provides significant opportunities for smallholder farmers to integrate into international value chains. However, despite this strategic advantage, empirical evidence on the drivers of smallholder soybean farmers' participation in export markets within this context remains limited (Derso et al., 2022; Patrick et al., 2016).

Existing literature on market participation in Sub-Saharan Africa has identified several determinants, including household size, income, education, farm size, access to credit, extension services, and transaction cost factors such as distance to markets (Alene et al., 2008; Cai & Ma, 2015; Ouma et al., 2010; Pedreño et al., 2014). While these studies provide valuable insights, many focus broadly on domestic market participation or high-value crop commercialization without explicitly distinguishing between export and non-export market channels. Furthermore, few studies integrate profitability analysis with behavioral participation models to simultaneously examine both the economic incentives and the structural drivers influencing farmers' decisions.

Theoretically, farmers' market participation decisions can be explained through Random Utility Theory (Manski, 2001; McFadden, 1976), which posits that individuals choose the alternative that maximizes their expected utility (Bhuiyan, 2018; Escobal & Cavero, 2012). In the context of soybean marketing, farmers compare the expected benefits of participating in export markets such as higher prices and stable demand, against associated costs, including transportation, compliance with quality standards, and transaction risks (Zhang et al., 2017). Participation occurs when the expected net utility of export engagement exceeds that of non-participation. However, this decision is conditioned by observable socioeconomic characteristics, institutional support systems, and transaction cost attributes, which may either facilitate or constrain integration into export value chains.

Despite Kano State's prominence as a major grain aggregation and export hub, there is a paucity of empirical studies that rigorously analyze the determinants of export market participation among soybean farmers within this unique commercial ecosystem. Most existing studies like Girei *et al.* (2018) and Tijani *et al.* (2010) either concentrate on southern Nigeria or emphasize production efficiency without linking it to export commercialization outcomes. Additionally, the growing influence of foreign firms and expanding global trade networks around Dawanau Market underscores the need to understand how smallholders are positioned within this evolving market structure.

This study therefore seeks to fill this gap by examining both the profitability and the determinants of smallholder soybean farmers' participation in export markets in Kano State. Specifically, the study aims to: (1) compare the profitability of soybean production under export and non-export market channels; and (2) identify the socioeconomic, institutional, and transaction cost factors influencing farmers' decisions to participate in export markets. By integrating gross margin analysis with a Binary Logistic Regression framework grounded in Random Utility Theory, the study provides a comprehensive assessment of both economic incentives and structural constraints.

The findings of this study are particularly relevant for policymakers, development agencies, and agribusiness investors seeking to strengthen export-oriented value chains in Northern Nigeria. Enhancing access to credit, extension services, improved seed technologies, and rural infrastructure could significantly increase smallholder integration into high value markets. In doing so, export market participation can serve not only as a pathway to improved farmer welfare but also as a driver of broader agricultural transformation and economic diversification in Nigeria.

Methodology

This study employed a primarily quantitative research approach, complemented by a limited use of qualitative data to provide deeper insights into the dynamics of farmers' participation in export markets. The qualitative information was mainly utilized during the preliminary stage of the study to inform and refine the design of the survey questionnaire, ensuring that the instrument adequately captured the relevant factors influencing farmers' market participation decisions

Study Area and Case Study Choice

This study was conducted in Kano State, Nigeria, a strategic agricultural hub in the northern region of the country. Kano State lies between latitudes 11°N and 13°N and longitudes 8°E and 10°E, covering a land mass of approximately 20,760 km² (National Agricultural Extension and Research Liaison Services, 2014). As of 2014, the state had a projected population of 11,923,539, growing at an annual rate of 3.2% (National Population Commission (NPC), 2006). Agriculture forms the backbone of the state's economy, with over 65% of the working population engaged in farming and related agribusiness activities as their primary source of livelihood (Yusuf & Abubakar, 2016). This strong agricultural orientation makes Kano State an appropriate and relevant setting for examining smallholder market participation, particularly in export-oriented value chains.

Kano State is endowed with vast arable land suitable for the cultivation of staple and cash crops, including maize, millet, rice, sorghum, legumes, and soybean, alongside livestock rearing and fish farming activities. The state receives an average annual rainfall of about 700 mm, with mean daily maximum and minimum temperatures of 35°C and 19°C, respectively—conditions favorable for crop production (National Agricultural Extension and Research Liaison Services (NAELS), 2011). Major crops grown in the state include rice, millet, maize, cowpea, vegetables, and groundnut (NAERLS, 2011), reflecting its diversified production base and strong potential for commercial agriculture.

A key feature of Kano State's agricultural economy is the Dawanau International Market, which served as the focal case study for this research. The market was selected due to its strategic role as one of the largest grain aggregation and export centers in West Africa. Originally established as a trading hub for staple commodities such as sorghum, millet, garri, and yam, the market has expanded significantly over time. It now facilitates mini-export activities to neighboring countries including Niger, Cameroon, Chad, Benin, Mali, and Senegal (Olofin et al., 2008).

Beyond regional trade, Dawanau International Market has evolved into a major center for the export of high-value cash crops to international markets. Commodities traded include soybean, cowpea, sesame seed, groundnut, pepper, tamarind, ginger, cassava chips, cashew nut, pigeon pea, rice, maize, moringa, and hibiscus flower, among others (National Agricultural Extension and Research Liaison Services, 2014). In recent years, foreign business firms from America, Asia, Europe, India, and Arab countries have established correspondent operations in and around the market, further strengthening its global trade linkages. The market's prominence as an export gateway makes it an ideal case study for analysing the drivers of smallholder farmers' participation in export markets.

Sampling Procedure

A probability sampling technique was employed to ensure representativeness and minimize selection bias. Specifically, a simple random sampling method was used to select respondents from a comprehensive sampling frame obtained from registered farmer associations within the study area. The initial sampling frame comprised 112 soybean farmers, categorized into two distinct groups based on their market orientation: 63 farmers who participated in the export market and 49 farmers who did not participate.

To ensure proportional representation of both groups in the final sample, respondents were selected using proportionate random sampling. The sample size was determined scientifically using the Yamane (1971) formula at a 5% level of precision, resulting in a final sample of 97 respondents. Based on proportional allocation, 54 export-participating farmers and 43 non-export farmers were randomly selected through balloting. This approach guaranteed that each farmer in the sampling frame had an equal and known probability of

selection, thereby enhancing the statistical validity, reliability, and generalizability of the study findings.

Data Collection

The qualitative component involved focus group discussions with soybean farmers and in-depth interviews with exporters operating within the study area. These interactions provided rich contextual insights into production practices, market dynamics, institutional constraints, and transaction-related challenges.

Insights generated from the qualitative phase, together with evidence from existing literature, informed the design of a structured survey questionnaire. The questionnaire was subsequently administered to selected farmers to collect quantitative data for empirical analysis. This sequential approach strengthened the study by ensuring that the survey instrument was context-specific, comprehensive, and grounded in real market experiences, thereby enhancing the validity and reliability of the data collected.

Conceptual and Analytical Framework

This study is grounded in Random Utility Theory (RUT), which provides the theoretical basis for analyzing farmers' participation decisions. Random Utility Theory posits that when individuals are confronted with multiple alternatives, they select the option that maximizes their expected utility(Clark et al., 2003; Manski, 2001; McFadden, 1976). In the context of this study, a soybean farmer chooses whether to participate in the export market or remain in the non-export market based on a comparison of the expected benefits and costs associated with each alternative. The decision is therefore assumed to be rational and utility-maximizing, subject to socioeconomic, institutional, and transaction cost constraints.

Formally, let the expected utility derived from participating in the export market be denoted as U_i^M, and the utility from non-participation as U_i^N. A farmer will choose to participate in the export market if:

$U_i^M > U_i^N$

This can be expressed in terms of net utility:

$U_i^* = U_i^M - U_i^N$

where the farmer participates if $U_i^* > 0$. Because utility is not directly observable, the net utility difference is modeled as a function of observable characteristics and an unobserved stochastic component. The latent variable model is specified as:

$U_i^* = \beta \boldsymbol{X_i} + \varepsilon_i$

where U_i^* is the unobserved latent variable representing the net utility gain from export participation; $\boldsymbol{X_i}$is a vector of explanatory variables; $\beta$is a vector of parameters to be estimated; and $\varepsilon_i$is a random error term capturing unobserved factors.

Given the binary nature of the observed decision (participation = 1, non-participation = 0), the empirical analysis employs a Binary Logistic Regression Model to estimate the probability of export market participation. The explicit functional specification is given as:

$$Y_i^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon_i$$

Where:

i. $Y_i = 1$ if the farmer participates in the export market; $Y_i = 0$otherwise.
ii. X_1= Household size (number of persons)
iii. X_2= Access to credit (1 = Yes, 0 = Otherwise)
iv. X_3= Adoption of improved seed varieties (1 = Yes, 0 = Otherwise)
v. X_4= Distance to Dawanau Market (kilometres)
vi. X_5= Access to extension services (1 = Yes, 0 = Otherwise)
vii. X_6= Annual farm income (Naira)
viii. X_7= Farm size
ix. β_0= Constant term
x. $\beta_1 - \beta_6$= Parameters to be estimated
xi. ε_i= Error term

The logistic regression framework is appropriate because it estimates the probability of participation while accounting for the nonlinear relationship between the explanatory variables and the binary outcome. This analytical approach allows for empirical testing of the theoretical proposition that farmers participate in export markets when the expected utility derived from participation exceeds that of non-participation, conditional on observable socioeconomic, institutional, and transaction cost factors.

RESULTS AND DISCUSSION

Description of Farmers' Attributes

The socioeconomic characteristics of soybean farmers presented in Table 1 reveal some notable differences between farmers participating in export markets and those selling through non-export channels. Overall, the results indicate that export-oriented farmers tend to have better market access and institutional support compared with their non-export counterparts. In terms of age, soybean farmers involved in export markets are relatively younger, with an average age of 36.59 years (SD = 10.74) compared to 41.15 years (SD = 9.11) for non-export farmers. This suggests that younger farmers may be more inclined to participate in export markets, possibly due to greater willingness to adopt new market opportunities and production practices.

With respect to income, export-participating farmers earn significantly higher average incomes, recording about ₦1,251,912.36 (SD = 9,532.11) compared with ₦901,367.23 (SD = 11,221.22) for non-export farmers. This difference indicates that participation in export markets may provide better price incentives and improved revenue opportunities for soybean farmers. The average household size for both export and non-export farmers is approximately six persons (mean = 5.98), although the variability is higher among non-export households **(**SD = 10.21**)** compared to export farmers (SD = 5.17). This suggests that family labour availability is relatively similar across the two groups.

Regarding farm size, both export and non-export farmers cultivate relatively small holdings, with an identical mean farm size of 0.89 hectares. However, export farmers exhibit slightly higher variation **(**SD = 0.47) compared with non-export farmers **(**SD = 0.36**),** confirming that soybean production in the study area is largely dominated by smallholder farmers regardless of market channel. Similarly, the years of farming experience are the same for both groups, averaging 10.07 years, though non-export farmers display a larger variation **(**SD = 16.20) compared to export farmers **(**SD = 7.91**).** This suggests that while both groups possess comparable levels of experience, the distribution of experience among non-export farmers is more uneven.

In terms of education, farmers in both groups have an average of 10.34 years of schooling, indicating that most respondents have at least completed basic or secondary education. However, the variability in education levels is slightly higher among non-export farmers (SD = 5.61) than export farmers **(**SD = 4.26**).** One of the most notable differences between the two groups **is** distance to aggregation centres. Export farmers travel a shorter average distance of 16.73 km (SD = 4.34)

compared with 26.13 km (SD = 2.77) for non-export farmers. This suggests that proximity to aggregation or export collection centres may significantly facilitate farmers' participation in export markets by reducing transportation and transaction costs.

Institutional support variables also show clear differences. Access to credit is substantially higher among export farmers (mean = 0.83**)** compared with non-export farmers (mean = 0.47**),** indicating that financial access may play a critical role in enabling farmers to meet the production and quality requirements of export markets. Similarly, access to extension services is more common among export farmers **(**mean = 0.55**)** than non-export farmers (mean = 0.39), suggesting that advisory support and information dissemination may enhance farmers' ability to participate in higher-value markets.

Finally, the adoption of improved soybean seeds is considerably higher among export farmers (mean = 0.66) compared to 0.34 for non-export farmers. This implies that export market participation may be associated with the use of improved technologies that enhance productivity and product quality. Overall, the descriptive statistics indicate that while both groups share similar farm sizes, experience levels, and household sizes, export-participating farmers tend to have higher incomes, better access to credit and extension services, greater adoption of improved seeds, and shorter distances to aggregation centres, all of which may facilitate their integration into export-oriented value chains.

Table 1: Socio-Economic Characteristics of Soybean Farmers

S/N	Variables	Export		Non-Export	
		Mean	**Std Dev.**	**Mean**	**Std Dev.**
I	Age (in Years)	36.59	10.74	41.15	9.11
Ii	Income (in Naira)	1251912.36	9532.11	901367.23	11221.22
Iii	Household size (in Person)	5.98	5.17	5.98	10.21
Iv	Farm size (in Ha)	0.89	0.47	0.89	0.36
V	Years of Experience (in Years)	10.07	7.91	10.07	16.20
Vi	Years of Education (in Years)	10.34	4.26	10.34	5.61
Vii	Distance to Aggregation Centre	16.73	4.34`	26.13	2.77
Viii	Access to Credit (1=Yes, 0=No)	0.83	0.17	0.47	0.02
Ix	Extension Service (1=Yes, 0=No)	0.55	0.23	0.39	0.33
X	Improved Seeds Adoption (1=Yes, 0=No)	0.66	0.13	0.34	0.28

Source: Field Survey, 2025

Farmers' Comparative Profitability Analysis

The primary objective of any enterprise is profitability, and participation in high-value markets should enhance the financial returns for producers. The profitability analysis of soybean production in the study area, presented in Table 2, indicates that the total variable cost (TVC) per hectare was ₦179,026 for export-oriented production and ₦177,527 for non-export production. Labour was the largest component of production costs, amounting to ₦61,402.88 and ₦58,403.09 per hectare for export and non-export markets, respectively, representing approximately 32% of total costs.

Total returns per hectare were ₦971,381 for export markets and ₦854,134 for non-export markets, with gross incomes of ₦792,355 and ₦676,607, respectively. Returns on investment were ₦4.4 for export and ₦3.4 for non-export markets, demonstrating that soybean production was profitable during the production year. Participation in the export market proved more profitable, likely due to higher foreign exchange rates and increased market demand. These findings are consistent with Ogbanje (2023), who reported a gross profit of ₦264,753.90 with an investment ratio of 3.06 in Benue State, but differ from Samuel and Idris (2021), who recorded a profit of ₦168,908.6 in Taraba State. Similarly, Afouda et al. (2019) reported a gross margin of $242.38/ha, while Ugbabe et al. (2017) and Sani (2018) found lower returns of ₦178,613/ha in Dawakin-Tofa LGA of Kano State and ₦146,221.1/ha among soybean farmers in the Zamfara Comprehensive Agricultural Revolution Programme. Overall, the substantial increase in gross income since 2011—when Biam and Tsue (2013) reported ₦77,478.66/ha in Benue State—can be attributed to growing demand in export markets and favorable exchange rates.

Table 2: Gross Margin Analysis for Soybean Production in Export and Non-export (Naira/hectare)

		Export					**Non-export**		
S/N	**Variable**	**Quantity/Unit**	**Unit Price(N)**	**Value**	**S/N**	**Variable**	**Quantity/Unit**	**Unit Price(N)**	**Value**
A.	**Expenses**				A.	**Expenses**			
i.	Seeds	25Kg	561.2	14,030.00	i.	Seeds	25Kg	581.2	14,530.30
ii.	Packaging /sack	18pieces	562.1	10,117.80	ii.	Packaging /sack	17pieces	592	10,656.70
iii.	Labour cost				iii.	Labour cost			
iv.	Ploughing & harrowing	11manhr	3500	33,762.88	iv.	Ploughing & harrowing	11manhr	3000	30,762.88
v.	Planting and harvesting	10manhr		27,640.21	v.	Planting and harvesting	10manhr		27,640.21
vi.	Fertilizer	80Kg	502.3	40,205.15	vi.	Fertilizer	80Kg	506.3	40,505.15
vii.	Insecticides	1.5liter	3200	4,762.89	vii.	Insecticides	1.5liter	3000	4,562.89
viii.	Transportation		760.12	13,389.69	viii.	Transportation		765.12	13,389.69
ix.	Land rent			35,117.80	ix.	Land rent			35,479.40
x.	Others			85,38.14	x.	Others			85,38.14

	Total cost		179,026		Total cost		177,527
B.	**Revenue**			B.	**Revenue**		
i.	Sales of soybeans	50,247.42	904,454	i.	Sales of soybeans	47,247.42	803,206
ii.	Residues		66,927.84	ii.	Residues		50,927.84
iii.	Total Revenue		971,381	iii.	Total Revenue		854,134
C.	**Gross income** (ii-i)		792,355	C.	**Gross income** (ii-i)		676,607

Field survey, 2025

Drivers of Farmers` Participation in the Export Market

Table 3 presents the logit regression results on the determinants of smallholder farmers' participation in the export market. Three models (A, B, and C) were estimated sequentially to capture the incremental effects of different categories of explanatory variables. Model A included socioeconomic and farm-level factors; Model B incorporated institutional variables; while Model C introduced transaction cost attributes, thereby providing a comprehensive specification. The steady increase in the Log Likelihood, Cox & Snell R^2, and Nagelkerke R^2 values across the three models indicates improved explanatory power as additional variables were included, suggesting a good model fit. For parsimony and clarity, the discussion focuses on Model C, the full model. In Model C, approximately 75% of the explanatory variables were statistically significant. Most of the significant variables were positively related to export market participation, except distance to the aggregation centre, which showed a negative relationship. The Cox & Snell R^2 value of 0.658 implies that household size, access to extension services, access to credit, farmer income, adoption of improved seed varieties, and distance to the aggregation centre jointly explain 65.8% of the variation in farmers' decisions to participate in the export market. This indicates substantial explanatory power for a cross-sectional behavioral model.

Household size was positively and significantly associated with participation (odd ratio = 1.107), indicating that an increase in household size raises the probability of export market participation. This finding supports Hlatshwayo *et al.* (2021), who reported that family size significantly influences farmers' market participation decisions. Similarly, Mkuna and Wale (2022) found that larger households motivate farmers to expand production and engage in markets due to increased availability of family labour. In the context of this study, larger households may reduce labour constraints and production costs, thereby enhancing farmers' ability to meet export market requirements.

Access to extension services exhibited a strong positive and statistically significant effect (odd ratio = 2.253), suggesting that farmers who interact with extension agents are substantially more likely to participate in export markets. Extension officers provide critical market information, technical training, and guidance that support informed decision-making (Lelethu et al., 2024). The positive and significant influence observed in this study is consistent with Hegena and Teshome (2022), Tarekegn *et al.* (2020), and Abrha *et al*.(2020), who emphasized the vital role of extension services in enhancing the production and marketing of cash crops. Extension contact likely reduces information asymmetry, improves compliance with quality standards, and strengthens farmers' confidence in engaging with export buyers.

The adoption of improved seed varieties was also positively and significantly related to export participation (odd ratio = 2.429). This implies that farmers who adopt improved seeds are more likely to access export markets. Improved varieties often enhance yield, uniformity, and product quality key requirements in export markets. This finding underscores the importance of technology adoption in facilitating commercialization and integration into high-value markets. However, it contrasts with the findings of Asma and Robert (2024), who reported that technology adoption does not necessarily influence market access. The divergence may reflect contextual differences in institutional support systems, market structures, or complementary services available to farmers.

Transaction costs remain a major barrier limiting smallholder participation in remunerative markets (Alene et al., 2008; Cai & Ma, 2015; Escobal & Cavero, 2012). In line with this perspective, the study found that distance to the aggregation centre negatively and significantly influenced export market participation (odd ratio = 0.273). This implies that greater distance reduces the probability of participation, likely due to increased transportation costs, time constraints, and post-harvest losses. The result corroborates Akrong *et al.*(2021) and Mdoda (2017), who found that increased distance to markets significantly reduces smallholder farmers' market participation. The finding reinforces the argument that improved rural infrastructure and proximity to aggregation centres are critical for enhancing export engagement.

Income was positively associated with export market participation, consistent with Ouma *et al.* (2010), who identified income as a key driver of farmers' market participation. The odds ratio of 2.132 indicates that a 1% increase in income increases the likelihood of export market participation by 113.2%. This result aligns with Nwalem *et al.* (2016), who found that output among sesame producers in Benue State positively and significantly increased the probability of market participation by 0.99. Similarly, Omiti *et al.* (2009) reported that increased output raised the probability of smallholder farmers in Kenya participating in markets. These findings collectively suggest that higher productivity and income enhance farmers' capacity to bear the risks and transaction costs associated with export marketing.

Access to credit also had a positive and statistically significant effect on export participation (odd ratio = 3.826). This result supports Adewuyi and Adekunle (2015), who argued that credit access enables farmers to meet the core transaction requirements necessary for participation in remunerative markets. Credit facilities provide the liquidity needed for purchasing inputs, hiring labour, adopting improved technologies, and covering marketing costs. The finding is consistent with Mutayoba and Ngaruko (2015), who identified credit access as a key determinant of market participation among high-value crop farmers in Tanzania. By easing liquidity constraints, credit enhances farmers' ability to scale production and integrate into export markets.

Table 3: Binary Logistic Regression Estimates of Determinants of Farmers Participation in Export Market

Variables	Model A		Model B		Model C	
	Odd Ratio	**S.E**	**Odd Ratio**	**S.E**	**Odd Ratio**	**S.E**
(A) Farmer Characteristics						
i. Household Size	1.211*	0.620	1.109**	0.012	1.107 *	0.062
ii. Farmer's Income	2.146**	0.212	2.131**	0.111	2.132**	0.112
iii. Farmer's Years of Education	1.941 ns	0.510	1.522	1.210ns	1.141ns	1.330
iv. Farm Size	1.012 ns	0.621	1.978 ns	0.523	2.221*	0.762
(B) Institutional Factors						
i. Access to Credit			3.754	1.113	3.826*	0.903
ii. Extension Service			2.931`	0.143**	2.253**	0.631
(C) Transaction Cost Attributes						
i. Distance to Aggregation Centre					0.131*	0.273
ii. Improved Seeds Adoption					2.429**	0.212
Constant	0.161	1.123	0.246	0.832	0.441	0.725
Log likelihood	76.438`		88.534		89.931	
Cox & Snell R^2	0.518		0.652		0.658	
Nagelkerke R^2	0.631		0.584		0.485	

Source: Field Survey, 2025. **and *** indicate 5% and 1% significance levels

CONCLUSION

This study examined the profitability and determinants of smallholder soybean farmers' participation in export markets in Kano State, Nigeria, using evidence from the Dawanau International Market. Guided by the Random Utility Theory, findings show that soybean production is profitable in both export and non-export channels, but export participation yields higher returns, confirming its potential for commercialization and income growth. Participation is significantly influenced by household size, income, access to credit, extension services, improved seed adoption, and distance to aggregation centres. While institutional support enhances participation, distance remains a key barrier, highlighting the role of infrastructure and service access.

RECOMMENDATION

To improve smallholder integration into export markets, extension services should be strengthened to include export standards and market information. Access to credit must be expanded through flexible and value chain financing models. Promotion of improved seed varieties should be intensified through public–private partnerships. Investments in rural infrastructure and aggregation systems are essential to reduce transaction costs. Strengthening farmer cooperatives will enhance market access, while targeted export-oriented policies can further support competitiveness and sustainable participation.

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