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Marketing channel choice and its determinants among small-scale oil palm fruit farmers in Akwa Ibom State, the southern region of Nigeria

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ABSTRACT
The study identified preferred marketing channel choices and determinants among oil palm fruit farmers in the southern region of Nigeria. Three hundred oil palm fruit farmers were randomly selected using the multi-stage random sampling technique. Descriptive statistics and logit regression techniques were employed to analyze the collected data. The socio-economic characteristics revealed that female farmers dominated oil palm fruit production in the region. The majority of the farmers were relatively young, literate, and had moderate household sizes but poor social capital accumulation. The study determined that the major marketing channels preferred by oil palm fruit farmers in the region were middlemen/agent marketing and direct sales in local markets. The empirical result identified oil palm fruit farmers' education, experience, socialization, dependent ratio, non-farm income, farm income, land size, and access to credit as significant positive determinants of the choice of middlemen/agent marketing channel. Conversely, the researchers identified household size as a significant negative determinant. Moreover, marital status and household size significantly and positively influenced the choice of direct sales in the local market. On the contrary, the oil palm fruit farmers' education, experience, non-farm income, farm income, farmers' age, distance to the market, hectare of land, and access to farm credit have a significant negative relationship with the choice of direct sales in the local market. For a better and more efficient choice of marketing channel, oil palm farmers should improve their literacy level and build up social capital.

Contribution/Originality: The research has provided insights into the types of marketing channels available to oil palm fruit farmers in the southern region of Nigeria. The results generated new variables and confirmed those existing in the literature, thereby creating greater scope for policy making in agricultural marketing in the region.

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1. INTRODUCTION

The *Elaeis guineensis*, popularly known as the oil palm tree, is considered one of the prominent cash crops grown in the southern region of Nigeria (Akpan, 2020; Ini-mfon, Sunday, Samuel, Daniel, & Ubong, 2013; Ojo, Offiong, Odion-Akhaine, Baiyewu-Teru, & Allen, 2017; PIND, 2011). The crop is part of the region's cultural heritage and dates back to the 1950s, when the country controlled nearly half of global exports. Nigeria held a 43% global market share in the mid-1960s (PIND, 2011). Currently, Nigeria is ranked 5th in global palm oil production, with an annual production of about 1.40 million metric ton which is below 2.0% of the global output in 2022 (FAO, 2022). Despite Nigeria's abysmal performance in oil palm fruit and derivatives production, the relevance of the sub-unit has continued to rise, given its importance in job creation, industrialization drive, and multiple chains of income generation and livelihood sustenance (Akpan, Nkanta, & Udoro, 2023; Udoka, Ekwere, Akpan, & Ugwu, 2019). The crop is rich and has a long chain of derivatives, namely: oil palm fruit, palm oil, palm kernel oil, palm kernel cake, palm kernel, palm kernel meal, and sludge, among others (Owutuamor, Iruo, & Ologidi, 2019). Palm oil is the most widely used oil palm fruit processing derivative. It is a major component in the daily dietary intake of the majority of Nigerians.

In the southern region of Nigeria, oil palm fruit production, which is the parent raw material from which other important derivatives are obtained, is basically dominated by small-scale producers (about 80.00%). The majority of these small-scale farmers either inherit or purchase the wild plantations across the production belt area, spanning about 1.04 million hectares to 1.33 million hectares (Market Development in the Niger Delta (MADE), 2020). This group of oil palm fruit farmers occupied about 74.00% of the region's production area (Market Development in the Niger Delta (MADE), 2020). The remaining 26.00% consist of privately owned oil palm estates and other smallholder farmers participating in government schemes such as out-grower schemes, cooperative plantations, and other commercial based farmers cultivating improved 'Tenera' varieties. According to Market Development in the Niger Delta (MADE) (2020) in the southern region of Nigeria, the subsector provides jobs for more than one million smallholder plantation farmers, oil palm millers, processors, farm workers, market agents such as wholesalers, and retailers, among others.

The sustenance of oil palm production is a serious concern, especially in the southern region of Nigeria, where population density and poverty are mounting. Farmers are vulnerable to input cost increases, income inequality, insufficient credit, price volatility, and an unfair marketing system, among others (Akpan, 2020; Akpan, Okon, Udo, & Akpakaden, 2020; Qiu, Shi, He, & Luo, 2021). Moreover, the remoteness of the oil palm farms, poor infrastructure, and difficulties in accessing accurate market information on oil palm fruit price movement have persistently prevented farmers from having fair and competitive marketing activities (Nwalieji & Ojike, 2018). Agricultural food marketing is one of the market activities that guarantees sustainable production, especially among small-scale producers in developing countries (Borsellino, Schimmenti, & El Bilali, 2020). A good food marketing system is pivotal to the achievement of food security, poverty reduction, and a sustainable agricultural system, especially for the resource-poor small-scale farmers in rural areas (Wong et al., 2017; Woodhill, Kishore, Njuki, Jones, & Hasnain, 2022). In most developing countries, the marketing system has created job opportunities for youths, generated more income for participants, and widens the production scope of farmers (Christiaensen, Rutledge, & Taylor, 2021; Geza et al., 2021).

Despite this crucial role that the marketing system plays in agricultural production, small farmers in developing countries, who make up the majority of the agricultural population, sometimes face difficult marketing decisions (Kamara, Conteh, Rhodes, & Cooke, 2019; Pawlak & Kołodziejczak, 2020). Inflating transaction costs and inadequate marketing infrastructure, including the existence of marketing roles and regulations, sometimes lead to difficulties in farmers' marketing decisions (Hung & Khai, 2020). Also, sometimes, family sudden needs, distance to the market, lack of adequate assets, and skewness in market information affect the marketing decisions of small-scale farmers. As noted by Xaba and Masuku (2013), farmers' low bargaining power due to inadequate market information, exploitative and limited credit arrangements, or contractual arrangements has created opportunities for the majority of small-scale farmers in rural areas of developing countries to be exploited during the marketing process of products. Therefore, the literature has provided evidence that the majority of farmers in developing countries are price takers and are unable to obtain a fair price for their products (Abokyi, Strijker, Asiedu, & Daams, 2020; Assouto, Houensou, & Semedo, 2020; Ncube, 2020). Perhaps the inability of rural farmers in developing countries to adequately integrate into the marketing system and take full advantage of its benefits explains part of the reason why most of them are considered income and agricultural resource poor.

The ability to identify and utilize the appropriate marketing mechanism is an effective way to rescue the oppressed rural farmers trapped by the unfavorable marketing system in the developing countries of Africa (Zhu, Shen, Tian, Wu, & Mu, 2022). This includes introducing an appropriate marketing channel that brings the greatest possible benefit to participants. Such a decision to use a particular marketing channel depends on many factors, including, but not limited to, the availability of the channels or outlets, financial benefits, and the associated transaction costs. With changing marketing channels and patterns, a major concern for smallholder farmers in most developing countries, including Nigeria, is how to survive and maximize their benefits. The situation of oil palm fruit farmers is precarious given the seasonality of production and the bulky nature of their products, oil palm fruit farmerssituation is precarious. Furthermore, oil palm fruit farmers' choice of a particular marketing channel is extremely important and a fruitful path to the sustainability of the business, as they are considered resource poor and there is a high prevalence of poverty and low wages in rural areas. The key points of this study are identification of the available marketing channels, reasons for adopting the chosen channel, and factors affecting it among oil palm fruit farmers.

Following the importance of this issue, several pieces of literature have given an insight into the choice and determinants of marketing channels used by small scale farmers in developing countries. For example, Harrizon, Benjamin, Patrick, and Anthony (2016) showed that farmers' age, gender, years of education, and farming experience significantly influenced the choice of tea marketing channel in Kericho District, Kenya. In Tanzania, Mmbando, Wale,

and Baiyegunhi (2017) showed that household wealth, access to agricultural credit, extension services, accumulation of social capital, age, education, and price of products influenced smallholder farmers' choice of marketing channels. Also in Tanzania, Musara, Musemwa, Mutenje, Mushunje, and Pfukwa (2018) found that product price, distance to the market, and access to extension services positively influenced sorghum farmers' decision to sell to traders rather than local markets. In Nigeria, Opata (2018) identified farmers' age, storage cost, quantity of cocoyam marketed, distance to the market, purpose of farming, and farm size as significant factors influencing the choice of household cocoyam market outlet in the Southeast region.

In Malawi, Chikuni and Kilima (2019) reported that maize price, distance to the market, purpose of farming, and access to agricultural extension services have a positive impact on maize farmers' market participation, whereas farmers' sex and low education level have a negative effect. Nxumalo, Oduniyi, Antwi, and Tekana (2019) identified age, marital status, gender, access to credit, education, and farming experience as important determinants of market channel choice among maize and sunflower farmers in the North West Province of South Africa. Mgale and Yunxian (2020) in Tanzania found that rice farmers' education, access to credit, access to price information, their own means of transportation, and perceived buyers' trust are positive and important influencing factors in farmers' choice of Millers/wholesalers sale outlet instead of the village collectors, whereas the distance to the market had a negative effect. Similarly, Kaimba, Muendo, and Mithofer (2020) reported that gender, age, marital status, years of experience, product price, distance to market, transport cost, and access to credit influenced baobab collectors' choice of marketing channels in Kenya.

Donkor, Garnevska, Siddique, and Donkor (2021) in Ghana also confirmed that a lower percentage of rice farmers sold their processed rice directly to processors and also identified farm size, production price, market information, and access to agricultural credit as factors that increased the participation of rice farmers in direct marketing, whereas payment terms and ownership of transportation reduced their participation in direct marketing. Mengstu, Alemu, Dagnew, and Worku (2023) analyzed the factors influencing the choice of alternative markets for bamboo in Ethiopia. The result showed that family size, land size, quantity of culm produced, farming experience, and distance to market influence the likelihood of a farmer's choice of marketing outlet. In western Kenya, Omondi and Orinda (2023) identified the determinants of preferred markets for smallholder farmers and traders of domesticated and field-collected edible insects. The findings identified gender, farm-gate sales, and market training as key factors. Recently, Gachoka, Kingori, and Wanja (2023) identified the determinants of market choice for mango and passion fruit farmers in Kenya. The results showed that market distance, household size, age, and years of schooling have a positive and significant influence on the choice of market outlet.

Despite their importance and uniqueness (i.e., seasonality in production), the marketing of oil palm fruits appears to have received no attention from the limited literature available. Again, the literature available in Nigeria is old and sparse. Therefore, we need to update the available information to align with current realities and introduce new policy variables. Therefore, this study was designed to address the identified research gaps and generate additional variables to help address the identified problem in the subunit. Therefore, the study specifically aims to identify the marketing channels and the determinants of choosing a particular channel among the oil palm fruit farmers in the southern region of Nigeria.

2. RESEARCH METHODOLOGY

2.1. Study Area

The study was conducted in the Abak and Uyo Agricultural Zones of Akwa Ibom State in the Southern Region of Nigeria. The state is located in the coastal region and has six agricultural zones. The state's other agricultural zones are Oron, Ikot, Ekpene, Eket, and Etinan. Abak Agricultural Zone consists of five (5) local government areas, namely Etim Ekpo, Abak, Oruk Anam, Ukanafun, and Ika Local Government Areas, while Uyo Zone consists of Uyo, Uruan, Ibesikpo Asutan, Ibiono Ibom, and Itu Local Government Areas.

2.2. Sample Size Selection

The study used the Cochran (1963) method of sample size selection. From the large population of small-scale oil fruit farmers in the study areas, a representative sample was derived using the formula given in Equation 1.

$$S_x = \frac{z^2\rho(1-\rho)}{D^2} \qquad (1)$$

Where Sx is the estimated representative sample population; Z represents the 95% confidence interval (1.96); "ρ" is the percentage of oil palm fruit farmers in the total population of cash crop farmers (approximately 80%) in the study areas; and D represents the absolute error at a 5% probability of Type 1 error. Equation 2 determines the representative population for the study.

$$S_n = \frac{(1.96)^2 0.80(1-0.80)}{(0.05)^2} = 246 \qquad (2)$$

The calculation indicated that the study required a total of 246 oil palm fruit farmers. However, to ensure equal distribution of respondents across the study areas, we scaled up the sample size to three hundred. Therefore, the study selected three hundred oil palm fruit farmers from various study areas as the total sample size.

2.3. Sampling Technique and Method of Data Collection

A multi-stage random sampling technique was used in selecting the oil palm fruit farmers in the study area. In the first stage, a purposive sampling technique was used to select four local government areas in the Ikot Ekpene agricultural zone and three local government areas in the Uyo agricultural zone. The study utilized a total of seven (7)

local government areas. In this stage, the purposive sampling technique was intended to target and capture heavy production areas within the state. In the second stage, we identified high production intensity areas within the local government areas and randomly sampled a predetermined number of villages, as indicated in Table 1. The next phase was a random sampling of the oil palm fruit farmers in each of the selected villages. Note that the total number of oil palm fruit farmers sampled in each local government area represents about 20% to 25% of the total number of oil palm fruit farmers in that area. Hence, an equal proportion range was maintained for equity in the number of respondents used in each local government area selected for the study. A total of three hundred (300) oil palm fruit farmers were randomly sampled and used for the study.

Table 1. Distribution of respondents.

Sample areas	No. of villages	Farmers per village	Total sampled	Percentage of total
Ukanafun	7	10	70	23.33
EtimEkpo	6	10	60	20.00
OrukAnam	7	10	70	23.33
Ika	4	10	40	13.33
Ibiono Ibom	5	4	20	6.67
IbesikpoAsutan	5	4	20	6.67
Itu	5	4	20	6.67
Total	39		300	100.00

The oil palm fruit farmers provided the primary data. The primary data collection instrument was a structured questionnaire, which was supplemented by focus group discussions with some farmer groups and key informants in villages. The questionnaire sought information on the socioeconomic characteristics of the oil palm fruit farmers, marketing decisions, and factors affecting their marketing decisions in the study area.

2.4. Method of Data Analysis

The specific objectives of the study guided the analysis of the data or information collected from the oil palm fruit farmers. Descriptive statistics such as means, percentages, and frequency tables were employed to describe the socio-economic characteristics and marketing decision options of the oil palm fruit farmers in the study area. The determinants of the use of a particular marketing channel by the oil palm fruit farmers were analyzed using a binary Logit model Equation 3 explicitly presents the specified model.

$$MAC = \left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + +\beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + U_i \quad (3)$$

When the other covariates remain fixed, the marginal effect of the logit captures the immediate impact of a shock in any explanatory variable on the likelihood of an oil palm fruit farmer using a particular marketing channel. These estimates are obtained by computing the derivatives of the conditional mean function with respect to explanatory variables or probabilities. The estimation of the marginal effect is presented in Equation 4.

$$\frac{\delta MAC_i}{\delta X_i} = \frac{E\{Y|X\}}{\delta X_i} = f(Z_i)\beta_i = f(X\beta_i)\beta_i \quad (4)$$

Variables used in Equation 3 are defined in Table 2.

MAC = the probability of using a particular marketing channel (dummy; 1 for the marketing channel used and 0 for otherwise).

Table 2. Description of explanatory variables.

S/n	Variable	Symbol	Unit	Expected sign
1	Marital status	X_1	Dummy	Positive or negative
2	Years of formal education	X_2	Years	Positive or negative
3	Farming experience	X_3	Years	Positive or negative
4	Socialization of farmers	X_4	Years	Positive
5	Household size	X_5	Number	Positive or negative
6	Household dependent ratio	X_6	Ratio	Negative
7	Non-farm income	X_7	Naira	Positive
8	Age of a farmer	X_8	Years	Positive or negative
9	Farm income of a farmer	X_9	Naira	Positive
10	Distance to market	X_{10}	Km	Positive or negative
11	Hectare of land own by a farmer	X_{11}	Hectares	Positive
12	Access to extension services	X_{12}	Number of times	Positive
13	Access to farm credit	X_{13}	Naira	Positive
14	Farmer's sex	X_{14}	Dummy	Positive or negative

Note: Dependent ratio = Children less than 15 years plus adult greater than 65 years divided by the household size.

3. RESULTS AND DISCUSSION

3.1. The Social and Economic Characteristics of Oil Palm Fruit Farmers

Table 3 presents summaries of the socioeconomic characteristics of oil palm fruit farmers. The results showed that the majority of oil palm fruit farmers were women, accounting for about 56.67% of farmers. The results indicate that in the study area, the female gender is the dominant gender in oil palm fruit production. They are likely to participate in the business to provide additional income for the family. The age distribution of oil palm fruit farmers revealed that they are relatively young and active, with an average age of 49.10 years. This finding leads to the conclusion that it is imperative to increase the participation of younger (youth) farmers in oil palm fruit production in the study area.

The marital status of oil palm fruit farmers shows that about 83.33% of farmers are married. This means that oil palm fruit production has a strong affinity with married households. This is likely due to the availability of cheap family labor, which is advantageous given the semi-labor-intensive nature of oil palm fruit production in the study area. Additionally, the findings revealed that oil palm fruit farmers in the region had an average agricultural experience of 17.50 years. This implies that oil palm fruit production in the study area is a well-established and sustainable enterprise. Furthermore, the distribution of membership in social organizations among oil palm fruit farmers showed a low participation profile with an average of 2.65 years. More than 50% of farmers do not belong to any social organization. This means that in the study area, the social capital available to oil palm fruit farmers is relatively low. A good social organization can help farmers improve access to production information, market potential, and inputs, while also promoting cooperation among members. The household size distribution among oil palm fruit farmers showed an average family size of seven (7) members. This further demonstrates the importance of family labor in the study area's oil palm fruit production. With the presence of inelastic demand for hired labor in most rural communities and rural-urban migration among youths, family labor has become the most available source of labor for small-scale farmers in the region. Furthermore, the result showed that more than 90.00% of oil palm farmers have attended at least some formal training. The average duration of formal education is around 9.20 years, which puts it in the category of secondary education. This means that the majority of oil palm fruit farmers are literate, or can read and write.

Table 3. The socio-economic characteristic s of oil palm fruit farmer.

Characteristic	Description	Frequency	Percentage	Mean
Gender (Dummy)	Male	130	43.33	
	Female	170	56.67	
	Total	300	100.00	Dummy
Age (Years)	< 39	30	10.00	
	39–50	190	63.33	
	>50	80	26.67	
	Total	300	100.00	49.10
Marital status (Dummy)	Married	250	83.33	
	Others	50	16.67	
	Total	300	100.00	Dummy
Farming experience (Years)	< 10	15	5.00	
	10–30	280	93.33	
	>30	5	1.67	
	Total	300	100.00	17.50
Membership of social organization (Years)	0	155	51.67	
	1 – 3	65	21.67	
	4–10	70	23.33	
	>10	10	3.33	
	Total	300	100.00	2.65
Household size (Number)	< 3	6	2.00	
	3 – 5	44	14.67	
	> 5	250	83.33	
	Total	300	100.00	7.00
Educational level (Years)	No formal education	9	3.00	
	Primary school	156	52.00	
	Secondary school	95	31.67	
	Tertiary	40	13.33	
	Total	300	100.00	9.20
Annual farm income (₦)	Less than 10,000	30	10.00	
	10,000 – 50,000	120	40.00	
	50,001 – 100000	141	47.00	
	Greater than 100,000	9	3.00	
	Total	300	100.00	143,069.00
Non-farm income	Less than 10,000	9	3.00	
	10,000 – 50,000	81	27.00	
	50,001 – 100000	120	40.00	
	Greater than 100,000	90	30.00	
	Total	300	100.00	153,111.54

The acquisition of formal education is believed to have a positive effect on decision-making ability and resource utilization in business management. Moreover, the study area documented an average annual farm income of N143,069.00, or $158.92, for the oil palm fruit farmers. This justifies the small-scale nature of the oil palm fruit farmers selected for the study. It is crucial to acknowledge that the production of oil palm fruit is seasonal, and the prevailing climatic factors, among other factors, influence the obtained output. Likewise, the average annual non-farm income of the oil palm farmers stood at N153,111.54, or $170.03, which is higher than the mean annual farm income reported earlier. The plausible explanation for the difference in income sources is the seasonality of the production of oil palm fruit. Hence, the involvement of the oil palm farmers in non-farm activities is an adaptation strategy to cushion the effect of income lack, especially during the off-season.

3.2. The Marketing Channel Options for Oil Palm Fruit Farmers

The study identified two major sources of marketing channels, mostly preferred by the oil palm fruit farmers in the study area. The summaries of the oil palm fruit farmers' responses are presented in Table 4.

Table 4. Marketing Channel used by the oil palm fruit farmers.

Marketing channel	Frequency	Percentage
Direct sales in the local market	105	35.00
Sales through the middle men/Agent	195	65.00
Total	300	100.00

Source: Field survey (2023).

The result shows that the majority (65.00%) of oil palm fruit farmers preferred to sell their oil palm fruits to middlemen or agents, and only 35.00% preferred to sell directly in the local market. The incentives offered by buyers may influence the decision to sell to middlemen or agents. The literature documents the fact that in order to initiate a viable transaction with the oil palm fruit farmers, some of these intermediaries offered attractive incentives such as advance payments, contractual agreements, and the provision of inputs, among others (Opata, 2018). Since most oil palm fruit farmers are resource-poor, they are easily lured by the lobbying of middlemen to reap the benefits in the short term, whereas in the long run, such an arrangement becomes exploitative and harmful to the oil palm fruit farmers. However, selling directly to a local market is less preferred by oil palm fruit farmers in the study area. In the literature from other regions of the country, distance to the point of sale/market and taxes levied in the local market have been cited as triggering factors, among others (Musara et al., 2018; Opata, 2018).

3.3. Determinants of the Preferred Marketing Channel for Oil Palm Fruit Farmers

3.3.1. Determinants of the Choice of Middlemen/Agents Marketing Channel

The determinants of the preferred marketing channel among oil palm fruit farmers were estimated. The results in Table 5 show the determinants of using middlemen or agents as the preferred source of marketing for oil palm fruit farmers. The Logit estimates consist of the coefficients and marginal effects of the explanatory variables on the probability of using middlemen or agents as the marketing channel. The diagnostic statistics revealed a McFadden R-squared of 0.6975. This indicates that the specified explanatory variables determine about 69.75% of the variability in the choice of the middleman or agent. The variance inflation factor (VIF) is less than the threshold of 10 units, signifying that there is no significant presence of multicollinearity among the specified variables.

The empirical result shows that the years of formal education acquired by oil palm fruit farmers have a significant positive relationship with the probability of using the middleman/agent channel in marketing the oil palm fruit in the study area. The result implies that a year-long increase in an oil palm farmer's formal education would likely increase the probability of choosing a middleman or agent channel by 0.016 units. The possible reason for the result could be the fact that an increase in years of formal education will enhance access to better marketing information and also increase the bargaining power of the farmers. Furthermore, an increase in the number of years of formal education for oil palm fruit farmers provides an additional incentive to access innovation and enhances their capacity to prepare a strong business plan.. The results corroborate Harrizon et al. (2016), Nxumalo et al. (2019), Mgale and Yunxian (2020) and Gachoka et al. (2023).

The slope coefficient of the farming experience has a significant positive relationship with the choice of using the middlemen/agent channel. This implies that, a 10.00% increase in farming experience would likely result in a 0.03% increase in the probability of using the middlemen/agent channel. Based on the accumulated experience that the oil palm fruit farmers have in marketing their oil palm fruits, the result suggests that the most experienced farmers tend to prefer the middleman/agent channel over the alternative channel. The findings align with the submissions of Harrizon et al. (2016), Nxumalo et al. (2019), Kaimba et al. (2020), and Mengstu et al. (2023).

The household size has a significant negative correlation with the choice of middlemen/agent channel. This means that as the family size increases, the probability of using the middleman/agent channel declines by 0.009 units. As a result, the findings suggest that oil palm fruit farmers with larger households are less likely to sell their palm fruits to middlemen or agents. The large household size likely provides cheap labor for transporting or processing the fruits to the local market. The findings agree with the assertions of Mengstu et al. (2023) and Gachoka et al. (2023).

The relationship between farmers' years of membership in social organizations and their choice of middleman or agent channel is shown to be positive. This means that the probability of using the middlemen/agents channel increases as farmers' years in social organizations increase. To be precise, a year-long increase in farmer membership in a social organization would lead to a 0.0001 increase in the probability of using the middlemen/agent channel. It is likely that

the increase in farmers' socialization would expose them to different forms of marketing channels and information sharing, among other social capitals. Similar results have been reported by Mmbando et al. (2017).

Table 5. Determinants of the use of middlemen/agent as marketing channel.

Variable	Coefficient	Std. error	z	Slope	p-value	VIF
Constant	0.722	1.206	0.599	-	0.549	-
Marital status	-0.081	0.261	-0.310	-0.019	0.757	1.075
Education	0.067	0.018	3.829***	0.016	0.000	1.199
Experience	0.012	0.002	6.316***	0.003	0.000	1.395
Socialization	0.080	0.030	2.658***	0.0001	0.001	1.120
Family size	-0.041	0.016	-2.563**	-0.009	0.022	1.349
Dependent ratio	0.876	0.517	1.696*	0.216	0.090	1.265
Non-farm income	0.020	0.011	1.800*	0.487	0.071	1.075
Farmer's age	0.012	0.017	0.706	0.003	0.465	1.476
Farm income	0.022	0.010	2.200**	0.496	0.051	1.091
Distance to the market	0.171	0.348	0.492	0.042	0.623	1.224
Hectare of land	1.081	0.576	1.878*	0.266	0.061	1.122
Extension agent	-0.096	0.108	-0.892	-0.024	0.375	1.062
Access to credit	0.028	0.011	2.545**	0.069	0.024	1.267
Farmer's sex	-0.288	0.242	-1.192	-0.071	0.233	1.012
McFadden R-squared				0.698		
Log-likelihood				−198.061		
Likelihood ratio test Chi-square(14)				15.435 [0.349]		
Number of cases 'correctly predicted'				176 (58.7%)		

Note: *significant at 10% ** significant at 5% *** significant at 1% probability level.
Source: Data from field survey, 2023.

The result revealed that the oil palm fruit farmers' household dependent ratio, non-farm income, and farm income have significant positive relationships with the choice of middlemen/agents channel. For instance, a unit increase in the oil palm fruit farmers' household dependent ratio, non-farm income, and farm income would lead to an increase in the probability of utilizing the middlemen/agent channel by 0.216, 0.487, and 0.496 units, respectively. An increase in the household dependent ratio will likely reduce the quantity of household labor and possibly increase household expenditure. To avoid escalating household expenditures, selling to the middleman/agent channel will likely be the best option. Similarly, an increase in both non-farm and farm income for oil palm fruit farmers would enhance their ability to explore new marketing channels beyond the conventional local market channels. However, it is noticed that the most important determinants of the choice of middlemen/agents marketing channel based on the magnitude of the slope coefficient are the farm income and non-farm income variables.

The result further revealed that the farmers' land size and access to farm credit also relate positively to the use of the middlemen/agents channel by oil palm fruit farmers. This implies that as access to farm credit and land size increases, the likelihood of utilizing the middlemen/agent marketing channel also increases. To be precise, a unit increase in farm land and farm credit would result in a 0.266 and 0.069 unit increase in the probability of oilpalm fruit farmers preferring the middlemen/agent marketing channel, respectively. The results are substantiated by Donkor et al. (2021) and Mengstu et al. (2023).

3.3.2. Determinants of the Choice of Direct Sales in the Local Market

The results in Table 6 show the logit estimates of the choice of direct sales in the local market. The diagnostic statistics gave a McFadden R-squared of 0.6718. This indicates that the specified explanatory variables determine about 67.18% of the variability in the choice of direct selling in the local market. The variance inflation factor (VIF) is below the threshold of 10 units, meaning that there is no significant multicollinearity among the specified explanatory variables.

The empirical finding revealed that the oil palm fruit farmers' marital status and household size have a positive relationship with the choice of direct sale in the local market. This implies that, as these variables increase, oil palm fruit farmers' willingness to sell directly in the local market increases correspondingly. A unit increase in marital status and household members would increase the probability of utilizing the option of direct sale to the local market by 0.085 and 0.007 units, respectively. The increase in household size creates the advantage of having cheap family labor, which helps transport the oil palm fruits to the nearby local market. The results are validated by Nxumalo et al. (2019); Kaimba et al. (2020); Mengstu et al. (2023); and Gachoka et al. (2023).

In addition, the result shows that years of formal education, agricultural experience, and social organization membership among oil palm fruit farmers have a significant negative association with the likelihood of using direct sales in the local market. The result implies that as oil palm farmers' years of formal education, agricultural experience, and social organization membership increase, the chance of using direct sales in the local market decreases by 0.009, 0.006, and 0.003 units, respectively. Perhaps improving formal training for oil palm farmers will enhance their analytical skills, enabling them to adopt better alternatives than direct sales in the local market. Increasing the experience of oil palm farmers would enable them to assess the financial and other advantages of direct sales and draw

comparisons with alternative options. Likewise, an increase in the socialization of farmers would expose them to better information sources and create an opportunity to explore the benefits of other marketing channel sources. However, Harrizon et al. (2016), Mmbando et al. (2017), Nxumalo et al. (2019), Mgale and Yunxian (2020), Kaimba et al. (2020), Mengstu et al. (2023) and Gachoka et al. (2023), have submitted similar findings.

Table 6. Determinants of the choice of direct sales in the local market.

Variable	Coefficient	Std. error	Z	P-value	Slope	VIF
Constant	1.647	1.248	1.319	0.181	-	-
Marital status	0.357	0.174	2.051**	0.047	0.085	1.090
Education	-0.038	0.018	-2.106**	0.042	-0.009	1.263
Experience	-0.026	0.011	-2.367**	0.030	-0.006	1.403
Socialization	-0.011	0.029	-0.369	0.713	-0.003	1.127
Family size	0.038	0.020	1.924*	0.081	0.007	1.402
Dependent ratio	-0.261	0.553	-0.471	0.625	-0.063	1.267
Non-farm income	-0.024	0.009	-2.667***	0.010	-0.006	1.075
Farmer's age	-0.029	0.012	-2.456**	0.024	-0.007	1.480
Farm income	-0.028	0.013	-2.154**	0.040	-0.048	1.082
Distance to the market	-0.556	0.155	-3.583***	0.008	-0.137	1.227
Hectare of land	-0.119	0.060	-1.999*	0.074	-0.246	1.131
Extension agent	0.153	0.120	1.281	0.208	0.037	1.062
Access to credit	-0.031	0.007	-4.429***	0.000	-0.074	1.407
Farmer's sex	0.002	0.005	0.400	0.492	0.479	1.319
McFadden R-squared				0.672		
Log-likelihood				−194.898		
Likelihood ratio test Chi-square(14)				16.319 [0.294]		
Number of cases 'correctly predicted'				178 (59.3%)		

Note: *significant at 10% ** significant at 5% *** significant at 1% probability level.
Sources: Data from field survey 2023.

The findings also revealed that oil palm fruit farmers' non-farm income, age, and distance to the market, as well as access to credit, have a significant negative relationship with the probability of choosing direct sales to the local market option. About 0.006%, 0.007%, 0.137%, and 0.074% decreases in the probability of utilizing the direct sales to the local market channel would occur for every unit increase in oil palm fruit farmers' non-farm income, age, and distance to the market, as well as access to credit, respectively. An increase in non-farm income could potentially boost the farmers' innovative ability to select a more effective marketing channel. Also, an increase in the farmers' age might limit their mobility and capacity to transport the oil palm fruits to the local market for sale, hence opting for an alternative channel. The impact of the "distance to the market" is evident. The longer the distance to the market, the higher the transaction cost and the less efficient the direct sale in the market option. Moreover, increased access to farm credit by oil palm farmers would also increase their outputs and their ability to adopt a more efficient marketing channel.. The results are similar to the empirical findings of Harrizon et al. (2016), Mmbando et al. (2017), Musara et al. (2018), Opata (2018), Chikuni and Kilima (2019), Nxumalo et al. (2019), Mgale and Yunxian (2020), Kaimba et al. (2020), Mengstu et al. (2023) and Gachoka et al. (2023).

Furthermore, the findings showed that farm income and hectares of oil palm farm land are significant negative determinants of the choice of direct sales in the local market by the oil palm farmers. By implication, an increase in these variables would lead to a corresponding decline in the probability of using direct sales in the local market. For instance, a unit increase in farm income will result in a 0.048 unit reduction in the probability of using direct sale in the local market, while a unit increase in hectares of land will cause a 0.248 unit decrease in the probability of using direct sale in the local market option. This result is likely due to the strong correlation between the expansion of the enterprise or output and increases in farm income and hectares of land. The existence of economies of scale among oil palm farmers will necessitate a better and more efficient marketing channel, reducing the likelihood of using direct sales in the local market. The finding is supported by Donkor et al. (2021).

4. CONCLUSION

The study identified two major marketing channels used by oil palm fruit farmers in the southern region of Nigeria. However, the study confirmed that oil palm fruit farmers prefer the middleman/agent marketing channel over direct sales in the local market. The analysis of the social and economic characteristics of oil palm fruit farmers revealed that women dominated the subsector. The majority of the farmers were relatively young, well-experienced, literate, and married, with an average household size of seven members. The social capital formation among the majority of oil palm farmers in the region is poor, but there is an increasing preference for non-farm income-generating activities.

What factors affected the decision to sell oil palm fruits through the middlemen/agent channel? The binary logit regression showed that education, farmers' experience, socialization, dependent ratio, non-farm income, farm income, hectare of land, and access to farm credit were all important positive factors. Conversely, we identified household size as a significant negative determinant. Similarly, marital status and household size positively and significantly determined oil palm fruit farmers' preference for using the channel of direct sales in the local market. On the other

hand, oil palm fruit farmers' education, experience, non-farm income, farm income, farmers' age, distance to the market, hectare of land, and access to farm credit have a significant negative influence on the choice of direct sales in the local market. The findings recommend improving the illiteracy levels of oil palm fruit farmers and enhancing their social capital. Adult education in the rural areas where oil palm fruit farmers reside could achieve this. The provision of infrastructure in rural areas will also enhance the choice of marketing channel among oil palm fruit farmers in the region. Increased access to credit will also improve their ability to make positive decisions about marketing channels.

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Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
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