The Profit Analysis and Constraints of Oil Palm Production in Delta State

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Abstract

This study was conducted to analyze the profitability of oil palm production in Delta State. Multistage sampling procedure was used to draw samples for the study. Data were composed using questionnaire and analyzed using descriptive statistic such as mean, percentage count, frequency and Likert scale. The mean age of producers was 46 years, with a fairly balanced gender distribution (51.7% male, 48.3% female) that were married (47.5%), with high degree of farming experience. Small farm sizes (1-10 acres) dominate (70.8%), and personal plantations were common (45.0%). Access to credit and extension services were limited (42.5% and 12.5%, respectively). The total cost incurred in palm oil production was N613789 and the total revenue generated from the palm oil plantation was N 842,600 resulting in a net income of N210, 811. The benefit cost ratio of the business was 1.33 revealing 33% profit, implying that for every Naira spent on palm oil processing, a profit of 33 kobo is generated, demonstrating profitability of the palm oil enterprise. The most significant constraint was the high cost of equipment (87.5%), followed by inadequate processing and the least constraint was lack of improved varieties (31.7%). It is therefore recommended that there should be a Collaboration between financial institutions and government agencies to provide affordable and accessible credit options to palm oil producers.

Keywords
Constraint, Oil Palm, Profit, Production, Delta State

1. Introduction

Oil palm, a kind of edible vegetable oil, which is derived from the pulp of the fresh palm fruit in its various forms, has become the leading vegetable oil produced globally, accounting for one quarter of global consumption and nearly 60% of international trade in vegetable oils (World Bank, 2010). Nigeria used to be the world's largest producer of Oil Palm (Elaeis guineensis), before the crude oil boom era. Today, Nigeria has conceded this feat to Malaysia and Indonesia which together can boast of 83% of the world's total population of palm oil while Nigeria can boast of only 1.7% of which is insufficient to meet its domestic consumption which stands at 2.7% (Olusegun, 2018). The Oil palm (Elaeis guineesis, jacq) was recognized as the most efficient oil producing cultivated plant (Achoja, Okoh, Osilama, 2019). Moreover in Nigeria, an early planting of oil palm was undertaken near Calabar between 1912 and 1916, but it was only in 1939 that an oil palm research station was established near Benin City which was later known as Nigeria Institute for Oil Palm Research (NIFOR) in 1981 (Orewa et al., 2019). In the early 40s, Orewa et al. (2019) alluded to the fact that the British government pursued a policy of developing the production of oil palm, like that of other crop, on indigenous farms so as to produce more palm oil. According to them, several plantations were established in Nigeria in the 50s by the Unilever Company to produce palm oil, but not until independence that the first national development plans for oil palm were drawn up, based on the establishment of industrial plantations.

However, the economic and political problems that accompanied independence triggered a decline in the exportation of palm oil in Nigeria. In spite of the efforts of governments and donor agencies, Nigeria's palm oil output has grown more slowly than human population (Orewaet al., 2019). Furthermore, Nigeria was one of the world's largest producers of palm oil and more than 82 percent of the country's total value of domestic exports was from palm oil before the advent of petroleum oil in the last quarter of the 20th century. He also added that in the 60s, palm oil production in Nigeria accounted for 43% of world's production, but today, Nigeria accounts for just 7 percent merely trailing Malaysia and Indonesia the world's largest exporters of palm oil currently. Palm oil also remains the major source of edible oil in Nigeria (Nnamdi, 2010).

The oil extracted from these palms is included in several common products used all over the world such as margarine, baked goods and sweets, detergents and cosmetics (UNESCO 2017). Socio-economic benefits of a sustainable oil palm plantation could include poverty alleviation and long-term employment opportunities. Profit sharing may provide a further incentive, attracting more workers to the palm oil sector, along with better living and working conditions (Albán and Cárdenas 2017). Depending on the role played by authorities and smallholder cooperatives, smallholders may benefit substantially from oil palm production in the world due to its higher returns to land and labour, compared to other commonly grown agricultural products (Rist et al, 2010). For instance, oil palm might be an alternative for farmers to invest in and benefit from the higher returns they offer, instead of destroying forest for cattle pasture (Butler 2011).

The fibre residue left after the oil has been extracted from the fruit provides fuel while the shell from the cracked palm nuts provides not only fuel but also serve as an aggregate for flooring houses (NIFOR, 2019). According to Aramide, Achoja, Ogisi, and Uliong (2021), profitability analysis will examine the basic structure and the cause-and-effect relationships in economic activities. Without such information, the business planners would not be able to rationally allocate resources for production (Gbigbi, 2020). This knowledge is very necessary because, according to Gbigbi (2020), factor-product relationship is a basic production relationship between the input and output. It guides the producer in deciding as to how much to produce and the goal of this relationship is the optimization of resources. Olayide, (2010) study was investigated to evaluate the economic analysis of oil palm processing in Ilesa East Local Government Area of the State of Osun. Many studies have been conducted to study oil palm production systems and economic benefits of the palm oil industry, which is increasing worldwide especially in Asia and West Africa because of high demand of the product globally. However, to the researchers' knowledge, little or not much research has been undertaken on the profitability of oil palm production in Nigeria especially in the case of rural oil palm production sector. In Nigeria economy, resources are scarce and opportunities for new technology are lacking, profitability studies can show the possibility of raising productivity in the oil palm production sector by improving efficiency without expanding the resource base. This study will therefore, append knowledge to supplement previous works and serve as reference material for researchers and students in future studies into the sector. It will also provide much insight into policies that could be pursued by governmental and non-governmental organizations as well as other major stakeholders to aid oil palm production to improve profit. The study will also help to identify the critical constraints faced by palm oil processors in the country. It would therefore serve as a useful input when stakeholders are taking steps to address these constraints. Hence the following objectives were to:

1. Describe the socio-economic characteristics of oil palm producers in the area
2. Determine the revenue generated from oil palm production in the area
3. Analyze the costs involved in oil palm production in the area
4. Determine the benefit cost ratio of oil palm production in the area
5. Identify the challenges confronting oil palm production in the area.

Hypothesis of the study:

The hypothesis was tested in null form as follows:

Hoi: There is no statistical significance relationship between Socio-economic characteristics and profitability.

Hoii There is no statistical significance relationship between constraints of oil palm production and profitability

2. Materials and Methods

The State is made up of twenty-five (25) that was chosen because of its land fertility and abundant oil palm farmers. It has an approximately land mass of 17,163 (square kilometer) with an average population of 5,663,362 persons (NPC, 2016). A multi-stage procedure of sampling was used in respondents' selection. The first stage was purposive selection of four local Government Areas (LGAs) followed by the purposive selection of five communities each from (LGAs) amounting to 20 communities. The last stage involved the purposive selection of 6 oil palm farmers amounted to 120 farmers. Data were composed using questionnaire and interviews and analyzed using descriptive statistic such as mean, percentage count, frequency and regression analysis.

Model Specification

The specification of general form of the multiple regression require that the dependent variable (Y) be hypothesized as a function of independent variables X1, X2, X3……XN. The implicit form of the multiple regression model is given below:

Y= f(X1, X2, X3, X4, X5, X6, X7)

Where, Y= Benefit cost ratio output

X1= Farmer age (yrs),

X2 = years of farm experience (yrs),

X3 = Household size (no),

X4 = Farm size (ha),

X5 = no of years in school (yrs),

The gross margin analysis was used to analyze the oil palm production. The model is specified as followed:

Mean = ∑fx/ ∑f

TCop = TVCop+TFCop

GMop = TRop-TVCop

NRop = TFCop

BCRop = TRop/TCop

∑ = Summation sign

f = Frequency

x = Class mark

TCop = Total Cost

TVCop = Total Variable Cost

TFCop = Total Fixed Cost

GMop = Gross Margin

TRop = Total Revenue

NRop = Net Return

BCRop = Benefit Cost Ratio

3. Results and Discussion

3.1 Socio-characteristics of palm oil producer s

Table 1 provides various parameters such as age, gender, marital status, education level, farming experience, household size, farm size, source of plantation, source of financial money, cooperative membership, access to credit, and access to extension services. The mean age of the respondents is approximately 46 years. The majority of producers fall into the age range of 41-50 years, representing 35.8% of the respondents. This may have implications for succession planning, as younger generations might need to be encouraged to join the industry to ensure its continuity. The gender distribution among palm oil producers is fairly balanced, with 51.7% being male and 48.3% being female. The balanced gender distribution is positive and indicates that both men and women are actively engaged in palm oil production, potentially contributing to a more diverse and inclusive agricultural sector. However, the result indicated that the study is dominated by male respondents. The domination of male oil palm producer could be attested to the responsibility of been the head of the family. As result they could engage in any money yielding venture, including farming for survival (Emaziye et al, 2022a). That majority of palm oil producers are married (47.5%), single accounted for 24.2%. A smaller percentage is widowed (18.3%) and divorced (10.0%). The high percentage of married producers may indicate that family support systems, which are often crucial in farming, are well-established. This finding is in line with Emaziye et al, (2023) who found out in their study that married people are more likely to participate in agricultural activities than unmarried ones. This is due to the fact that married people have more family responsibilities than unmarried farmer. The educational background of palm oil producers varies, with a significant portion having no formal education (34.2%) and primary education (19.2%). However, a notable portion also has secondary education (25.8%) and tertiary education (20.8%) These findings collaborated with Emaziye and Emaziye (2022) that most farming households possess low educational qualification in Niger Delta area. The variation in education levels highlights the need for tailored agricultural training and extension services. Producers with lower education levels may require simplified and practical guidance, while those with higher education can benefit from more technical support. Most palm oil producers have between 1 to 20 years of farming experience. The mean years of farming experience are approximately 10. This suggests that a significant number of producers are relatively new to palm oil production. The mean farming experience of approximately 10.2 years suggests that many producers are relatively new to the industry. Training and mentorship programs can be beneficial to enhance their skills and knowledge.

Table 1. Socio-characteristics of palm oil producers

Parameter	Frequently	Percentage	Mean
Age			
21-30	15	12.5	
31-40	20	16.7	
41-50	43	35.8	
51-60	29	24.2	46 years
61-70	13	10.8	
Gender			
Male	58	48.3	Male
Female	62	51.7	
Marital status			
Single	22	18.3	
Married	57	47.5	Married
Divorced	12	10.0	
Widowed	29	24.2	
Education level			
No formal edu	41	34.2	No formal edu.
Primary education	23	19.2	
Secondary edu	31	25.8	
Tertiary education	25	20.8	
Farming experience			
1-10	49	40.8	
11-20	61	50.8	10 years
21-30	10	8.3	
Household size			
0-4	52	43.3	
5-9	61	50.8	5 persons
10-14	7	5.8	
Farm size			
1-10	85	70.8	
11-20	24	20	
21-30	8	6.7	9.6 Ha
31-40	3	2.5	
Source of plantation			
Personal plantation	54	45.0	Personal plantation
Purchase	27	22.5	
Rented purchase	15	12.5	
Rented and personal purchase	7	5.8	
Rented and purchased	17	14.2	
Source of financial money			
Money lender	27	22.5	
Personal savings	45	37.5	Personal savings
Friends	20	16.7	
Cooperative society	25	23.3	
Cooperative membership			
Yes	38	31.7	
No	82	68.3	No
Access to credit			
Yes	51	42.5	
No	69	57.2	No
Access to extension service			
Yes	15	12.5	No
No	105	87.5	

Source: Field Survey, data

The majority of producers have household sizes of either 0-4 (43.3%) or 5-9 (50.8%) members. Only a small percentage have larger household sizes (10-14). Producers with larger household sizes may have more labor available for farm activities, potentially contributing to increased productivity. However, they may also face greater financial demands. The relevance of farm size in this study stems from the studies of Williams *et al.,* (1984) that farm size in terms of hectares, and labour is significantly related to farmer's utilization of improved farm practices applicable to their farm enterprise. A majority of the producers have relatively small farms of 1-10 acres (70.8%), with a mean farm size of approximately 9.6 acres. Fewer producers have larger farm sizes of 11-30 acres or more. Most producers have small farms, which may limit their income potential. Encouraging strategies for optimizing land use and increasing productivity on smaller plots could be beneficial.

Most respondents have their own personal plantations (45.0%). Others either purchased or rented their plantations, with some using a combination of both methods. Those who own personal plantations have more control over their land, which can be advantageous. However, those who rent or purchase land may face uncertainties related to land tenure, which can affect long-term planning. A significant portion of palm oil producers rely on personal savings (37.5%) or money lenders (22.5%) for financial support. Some also depend on friends and cooperative societies. Producers relying on personal savings may have limited access to external resources. Promoting financial literacy and facilitating access to credit can help these producers invest in their farms and expand their operations. About one-third of the respondents (31.7%) are members of cooperative societies, while the majority (68.3%) are not. Cooperative membership can provide access to collective resources and market opportunities. Encouraging more producers to join cooperatives may enhance their bargaining power and access to support services. Emaziye (2021) recommendation is that plantain farmers should form themselves into cooperatives to regulate the unstable plantain prices and access to more credits to increase farm investment. Approximately 42.5% of palm oil producers have access to credit, while the remaining 57.2% do not. Access to credit can play a vital role in agricultural production. Access to credit is vital for investing in inputs, equipment, and expansion. Efforts to improve financial inclusion and provide affordable credit options can stimulate growth in the palm oil sector. Only 12.5% of respondents have access to extension services, while the majority (87.5%) do not. Access to extension services can be crucial for improving agricultural practices and productivity. The low access to extension services indicates a potential gap in knowledge transfer and technology adoption. Increasing the availability of extension services can help improve agricultural practices and crop yields.

3.2 Cost and Return of Palm Oil Production

The result of the cost and return of palm oil production in Table 2 shows the cost breakdown of the palm oil production indicates that transportation cost and fresh fruit cost was ₦ 53938 and ₦ 435500 respectively. The labour cost was ₦ 93,860 highlighting the significance of efficient labour management in cost control followed by diesel cost of ₦ 29,119 and water cost was ₦ 5,122 while the market levy was ₦ 2,000 giving a total variable cost of ₦ 619,539 indicating that the majority of expenses are variable cost and can be influenced by efficient management. The fixed cost of land rent and depreciation cost of equipment was ₦ 12,250. The total cost incurred in palm oil production was ₦613789. The result showed that the total revenue generated from the palm oil plantation was ₦ 842,600 resulting in a net income of ₦210, 811. The benefit cost ratio of the business was 1.33 revealing 33% profit, implying that for every Naira spent on palm oil processing, a profit of 33 kobo is generated, demonstrating the profitability of the palm oil production enterprise. This assertion agreed with Emaziye and Ogisi (2021) that farming is profitable with good management ability in the rural areas.

Table 2. Cost and Return of Palm Oil Production

Items	Amount (Naira)
Variable Cost	
Transportation Cost	53,938
Fresh fruit bunch cost	435,500
Labour Cost	93,860
Cost of Water	5,122
Diesel Cost	29,119
Market Levy	2,000
Total Variable cost (TVC)	619,539
Fixed Cost	
Rent of Land	5600
Depreciation cost of equipment	6650
Total fixed cost (TFC)	12,250
Total Cost	631,789
Total revenue	842,600
Net income	210,811

Source: Field Survey, data

3.3 Constraint to palm oil production

Table 3 indicates the constraint to palm oil production revealed high cost of equipment, ranked first, emerges as the most pressing challenge with 87.5% of respondents identifying this constraint. The substantial financial burden associated with procuring and maintaining necessary equipment for palm oil production hampers profitability. Limited access to modern machinery and tools can hinder productivity, leading to increased costs and reduced competitiveness. Inadequate Processing Facilities and Inadequate Storage Facilities share the second rank, each noted by 70% of respondents. These constraints are closely related, as they impact the post-harvest phase of palm oil production. The absence of proper processing and storage facilities results in significant losses, both in terms of quantity and quality. Addressing these challenges is essential for preserving the value of the product and reducing waste. The result agreed with Emaziye (2020) that lack of credit facilities confined the palm oil producers to small scale producers who operate at subsistence level. Infrastructure ranks third, with 65.8% of respondents highlighting its significance. Inadequate infrastructure, including poorly maintained roads and transportation systems, affects the efficient movement of palm oil products to markets and processing centers. This constraint can lead to delays, increased transportation costs, and potential product spoilage, thereby diminishing profitability. Insufficient Funds come in fourth place, as 53.3% of respondents report this challenge. Limited financial resources restrict investments in critical areas such as equipment, infrastructure, and improved farming practices. Without adequate funds, producers may struggle to modernize their operations, leading to reduced productivity and profitability. A similar study conducted by Emaziye et al (2022b) also identified similar constraints including tax policies, lack of finance and access to extension agents. Land constraints, the fifth-ranked challenge, are acknowledged by 43.3% of respondents. These constraints encompass issues related to land access and availability. Limited access to land can impede the expansion of palm oil production, restricting the potential for scaling up operations and increasing overall profitability. Inaccessibility to Credit is ranked sixth, with 35% of respondents facing difficulties in obtaining credit. Access to affordable credit is vital for investment in various aspects of palm oil production. Producers often require financial support to purchase equipment, improve infrastructure, and implement modern practices. The lack of credit access can hinder profitability. This agrees with Emaziye (2020) who both was of the opinion that access to credit is among the key elements for improving agricultural production and poverty reduction. Credit can facilitate farm household to purchase the needed agricultural inputs and enhance their capacity to effect long-term investment in their farms. These findings agreed with that of Emokaro and Ugbekile (2014). Lack of Improved Varieties ranks seventh, as noted by 31.7% of respondents. Access to improved palm oil varieties is critical for higher yields and better-quality oil. Addressing this constraint can lead to increased productivity and enhanced profitability over time.

3.4 Factors Influencing Profitability of Palm Oil Production

Age, as a predictor, showed a negative coefficient of -17,244.39, indicating that there may be a tendency for profitability to decrease as producers grow older. However, the result indicates that this relationship is not statistically significant (p-value = 0.1581), indicating that age alone may not have a significant relationship with profitability in this context. Education level has positive relationship with profitability with the coefficient (63,194.09), is not statistically significant (p-value = 0.5291). This implies that, in this study, the level of education does not have a substantial and measurable impact on palm oil profitability. Farming experience, with a positive coefficient of 29,762.70, indicates that as producers gain more experience, profitability tends to increase. However, similar to education level, this relationship is not statistically significant (p-value = 0.1540), implying that farming experience alone may not be a significant predictor of profitability. Household size, with a positive coefficient of 83,813.91, suggests that larger household sizes are associated with higher profitability. Nevertheless, similar to the previous variables, this relationship lacks statistical significance (p-value = 0.1230), indicating that household size alone may not be a significant predictor of profitability.

Table 3. Constraint to palm oil production

Constraints	Yes	No	Rank order
Insufficient funds	84 (83.3)	36 (36.7)	4th
Infrastructure	79 (65.8)	41(34.2)	3rd
Land	52(43.3)	68(56.7)	5th
Selling price	96 (80.0)	24(0.0)	9th
High cost of labor	88 (73.3)	32 (26.7)	8th
Inaccessibility to credit	42 (35.0)	78 (65.0)	6th
Lack of improve varieties	82(68.3)	38(31.7)	7th
Inadequate processing facilities	84 (70.0)	36 (30.0)	2nd
Inadequate storage facilities	84 (70.0)	36 (30.0)	2nd
High cost of equipment	105 (87.5)	15 (12.5)	1st

Source: Field Survey, data

Table 4. Factors Influencing Profitability of Palm Oil Production

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1277085.	576862.0	2.213848	0.0289
Age	-17244.39	12133.75	-1.421192	0.1581
Education Level	63194.09	100092.5	0.631357	0.5291
Farming Experience	29762.70	20737.72	1.435196	0.1540
Household Size	83813.91	53928.63	1.554164	0.1230
Labour Cost	4.702723	2.377837	1.977731	0.0504
Loading and offloading	-22.79217	26.58606	-0.857298	0.3931
Market Levi	98.40053	84.26630	1.167733	0.2454
Transportation Cost	-31.89753	15.61462	-2.042799	0.0434
R-squared	0.110065			
Adjusted R-squared	0.045926			
Log likelihood	-1844.311			
F-statistic	1.716026			
Prob(F-statistic)	0.102342			
Dependent Variable: Profitability				

In contrast, labor cost displays a significant and positive relationship with profitability. The positive coefficient of 4.702723 signifies that higher labor costs are linked to increased profitability in palm oil production. This finding is statistically significant (p-value = 0.0504) and suggests that optimizing labor resources and potentially investing in skilled labor may lead to improved profitability. Loading and offloading costs, market levies, and transportation costs do not show statistically significant relationships with profitability. These factors do not appear to be strong determinants of profitability in this specific context (p-values > 0.05).

4. Conclusion and Recommendations

The profitability of palm oil production in Delta State was influenced by a multitude of factors, including socio-characteristics, cost and return dynamics, and constraints. While there is diversity in producer characteristics, the sector faces challenges in terms of access to credit, modern equipment, and post-harvest facilities. Efforts should be directed towards addressing these constraints and promoting best practices. Additionally, providing tailored training and extension services to producers with varying educational backgrounds can enhance productivity. It is recommended that there should be collaboration with financial institutions and government agencies to provide affordable and accessible credit options to palm oil producers. This can empower them to invest in critical areas and improve overall productivity. Also to facilitate modern equipment and machinery access through cooperative efforts or government initiatives. This can alleviate the burden of the high cost of equipment and enhance efficiency. Furthermore, to invest in processing and storage facilities to reduce post-harvest losses. This will help preserve the quality and quantity of palm oil products, ultimately boosting profitability. Lastly to develop tailored training programs and increase the availability of extension services to cater to producers with varying educational backgrounds.

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