ECONOMIC DIMENSION OF SUSTAINABLE OIL PALM PRODUCTION BY CO-OPERATIVE SOCIETIES IN IMO STATE, NIGERIA.

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Abstract

This study evaluated the economic dimension of sustainable oil palm production by oil palm co-operative societies in Imo State, Nigeria. A census of 321 registered members in the three zones of Imo State was carried out. Data were collected from secondary and primary sources; Primary data were collected using structured questionnaire. Data were analysed using percentages, frequency distribution tables, means, charts and Multiple Regression Analysis. Results showed that the model reached significance (F $(6, 305)$ = 511.22, p < .001) and coefficient of determination R^2 = .91 which means that the variables in the economic dimension account for 91% of the variations in the average quantity of palm oil produced. Calculation of sustainability index for economic dimension yielded a score of 50.75% which falls within the quite sustainable category. The study concludes that; economic variables significantly influenced oil palm production by members of the co-operative societies in the study area within the study period. Therefore, the co-operative society has contributed positively to increased oil palm production in the study area. The study recommends that; more small holder oil palm farmers should be encouraged to join the co-operative societies by the management so that they can benefit from economies of scale for increased output. Co-operative society should increase their share holding for increased financial base and lending power. A shift in mind set by the co-operative society to adopt the "self-funding and self-help" strategy to overcome funding challenges instead of waiting for government funding which may not be achievable due to the current economic realities.

Key words: economic dimension, co-operative societies, sustainability index, self-funding, self-help.

1.   Introduction

Nigeria's global share of palm oil declined from a leading position of 45% output in the 1960s to about 2% in 2021 (United States Department of Agriculture [USDA] 2021) despite interventions by Federal, State Governments and International donor agencies in the past. Market Development Program in the Niger Delta (MADE, 2020) noted that consumption of palm oil in Nigeria increased from about 1.3 million metric tons in 2010 to about 2.4 million metric tons in 2018. However, output is still lower than demand leading to a supply gap of 1.25 million MT annually (Central Bank of Nigeria [CBN] 2023). The decline of palm oil and palm kernel oil outputs has made Nigeria a net importer of palm oil in the past 20 years. This gap is filled by legal and illegal imports which are valued at over $500 million annually (Emejo, 2022).

The oil palm industry has the potential for effective poverty alleviation, ensuring food security and economic stability in Nigeria Foundation for Partnership Initiatives in the Niger Delta (PIND, 2011). Similarly, Castellanos-Navarrete, de Castro & Pacheco (2021) noted that oil palm crop provides higher streams of income for smallholders, and creates jobs for landless rural families, improves rural livelihoods in the tropical forest landscapes in Latin America. It also makes them more competitive in global agricultural supply chains. Ayodele (2010) observed that palm oil production is a major occupation in many communities in Nigeria and provides income for many farmers and their dependents. It is also a source of revenue for some states and local governments especially in the Niger Delta area. This implies that an efficient and strong palm oil sector in Nigeria will provide a means of livelihood, create more employment and reduce poverty. Oil palm production has contributed immensely in the past to rural development in Nigeria.

Osugiri, Nwaihu, Okwara, Osuagwu & Utazi (2018) noted that Palm oil from palm fruits processing is of socio-economic importance in Nigeria, most especially in the Igbo culture.

In 2017, the production of palm oil and palm kernel oil accounted for about one-third (75.17 million tons) of the world's total fats and oil production (Kushairi, et. al, 2018). Similarly, Adeniyi, Ogunsola & Oluwusi (2014) opined that oil palm is the most efficient and important economic source of oil as it uses less than half the land required by other oil crops such as Sunflower, Rapeseed and Soy bean to produce the same amount of oil. European Palm Oil Alliance (EPOA, 2019) noted that one hectare of oil palm trees can produce about 3.8 tons of palm oil annually. Ukwuteno (2011) opined that oil palm farming is profitable and when grown sustainably, is capable of generating local and international revenue for Nigeria. Palm oil constitutes about 50% of edible oils

consumed worldwide, in 2018, global palm oil consumption increased to 70.5 million tons from 14.6 million tons in 1995, making it the most consumed oil in the world (Voora, Larrea, Bermudez & Balino, 2019). It accounts for about 70% of Nigerian vegetable oil market (Raw Materials Research and Development Council [RMRDC] 2004).

Though small holder oil palm farmers in Nigeria control about 80% of the oil palm market from wild grooves and small holder plantations (Foundation for Partnership Initiatives in the Niger Delta [PIND] 2012), they are faced with challenges. Some of which are; low adoption of modern inputs and slow access to extension information (Eze, Nwoha, & Adiele, 2014), crude and inefficient production and processing methods (Akangbe, Adesiji, Fakayode, & Aderibigbe, 2011). Others are poor access to; funding, farm inputs, professional advice and market information, poor socio-

economic background of farmers, high cost of labour, inadequate infrastructure among others (CBN/NISER, 1992).This situation leads to; low production of fresh fruit bunches per hectare of about 2.5 tons compared to 15 - 25 tons per hectare achievable with best management practices, low oil extraction rates (OER) of about 5 – 10% compared to OER of 24 - 27% obtained with international best practices (MADE, 2020), low quality palm oil with high free fatty acids (FFA) content of between 5 – 10% and 10 – 30% against the international standard of 5% or less. Low quality and quantity of palm oil is the reason for the inability to meet export requirements (Mhanhmad, Leewamch, Punsuvon, Chanprame & Srinives, 2011) and quantity required for household consumption and secondary production.

Increased human population and technological advancement lead to significant increase in global and regional demand for palm oil and this is expected to increase to 85 million tons by 2025. Increased demand will lead to increased cultivated areas which may affect people and nature in most ecological regions of the planet. Nigeria is yet to reach optimal oil palm production as Omoti (2004) noted that the potential land available for oil palm development in Nigeria is 24 million hectares, but only about 600,000 hectares had been cultivated by small holders, and industrial estates. This cannot match over 7.5 million hectares from Indonesia or over 4.9 million hectares of cultivated small, medium and large scale estate holdings in Malaysia which both account for about 90% of global production of palm oil.

As a way of mitigating these problems, some companies and Non-Government Organizations (NGO) synergized in 2004 to establish the sustainability standard to certify the production and use of sustainable palm oil and founded the Roundtable on

Sustainable Palm Oil (RSPO). RSPO is a not-for-profit association that unites stakeholders from seven sectors of the palm oil industry namely; oil palm growers, palm oil processors or traders, consumer goods manufacturers, retailers, banks and investors, environmental and nature conservation NGOs and social or developmental NGOs. This alliance has led to 19 percent of the global palm oil production being RSPO certified (European Palm oil Alliance [EPOA] 2019). The standard for productivity of oil palm varies from one continent, country or locality to another over a period of time. In Asia, Indonesia has its own standards for certified sustainable palm oil known as Indonesian Sustainable Palm Oil (ISPO), while Malaysia has the Malaysian Sustainable Palm Oil (MSPO) aimed at achieving a more sustainable palm oil supply chain.

The industry employs about 4.5 million people in both countries and contributes significantly to the economic growth and poverty reduction in most palm oil producing countries (Kushairi et al., 2018). Gourichon (2013) noted that Palm oil is used in Nigeria for food and non-food consumption and marketed as four main products namely; the low quality oil called Technical Palm Oil (TPO) sold as unprocessed oil mainly consumed by households. The high quality palm oil known as Special Palm Oil (SPO) produced by large oil mills, refined and used by industries. The palm kernel oil (PKO) derived from the palm kernel also used by industries, and the Refined Bleached Deodorised Oil (RBD), which is refined to remove colour and smell. At the farm level, oil palm is intercropped with other food crops and dominated by low oil yielding semi-wild and wild varieties, modern inputs and extension services are either minimal or

absent. There is no unified management structure, processing and marketing of products is undertaken by processors. Nigerian Institute for Oil Palm Research (NIFOR) is the government body responsible for oil palm research in Nigeria.

The concept of sustainability is multifaceted and can be measured at various spatio-temporal levels to provide a broad view of measurement methods that can address its different aspects (Suardi, Sulistyowati, Noor, & Setiawan, 2022). United Nations (1987) defined sustainability as "development that meets the needs of present generation without compromising the ability of future generations to meet their own needs" The Brundtland Commission in its report 'Our Common Future' enunciated the key role of agricultural sustainability as the basis of sustainable development (World Commission on Environment and Development [WCED] 1987) cited in Singh

(2012). This study is hinged upon Goal 2 of the United Nation's sustainable development goal which seeks to "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" by 2030 (UN, 2015). There is need to overcome the global challenge of meeting the present and future demand for vegetable oil by investing in better social and environmental practices and ensuring efficient and sustainable replanting of existing oil palm plantations.

Cooperative societies can play a very valuable role in achieving sustainable oil palm production. International Cooperative Association (ICA, 2018) described cooperatives societies as an autonomous association of persons who come together voluntarily to meet members' common economic, social and cultural needs and aspirations through a joint-owned democratically managed enterprise. Oil palm cooperative societies have played direct and indirect role in helping rural

communities to flourish through improvement in the availability of quality basic services. Afifah, Nurliza, & Kurniati (2021) opined that cooperatives societies are needed to play a key role and function in the management of oil palm replanting. Cooperative societies help in meeting the joint needs of farmers in managing their plantations, especially in the aspects of crop management and financial techniques despite their challenges.

However, the role of oil palm cooperative societies across producing countries within the recent decades has not been given adequate attention by researchers. Zakaria, Rahim, & Aman (2020) opined that despite the important role played by oil palm cooperatives in the palm oil industry, their potential to engage in sustainability is underrated and few research have examined their sustainability-oriented practices (SOP) implementation. It is globally agreed among geographers and allied observers of space

that productivity within geographical locations vary with time. Such variation especially in agricultural goods of which oil palm production is part can be sustainably enhanced through cooperative societies (Zakaria et al, 2020). EPOA (2019) noted that sustainable palm oil production aims at cultivating oil palm in such a way as to achieve highest yields while impacting less on nature.

Inconsistent Government Policies which lead to constant change of headship of ministries, departments and agencies has led to neglecting of distribution of sprouted oil palm seeds and seedlings to farmers and oil palm plantations in various parts of the oil palm belt of Nigeria. Most of the oil palms growing in the wild groves are not improved varieties, they are aging with declining yields and need replanting. Processing technologies used by most small-scale oil palm producers and processors are a

combination of traditional and modern which produce lower extraction rates than in Indonesia and Malaysia. Most of the large scale oil palm plantations previously owned by government are moribund. Government and donor agency assisted agricultural grants and incentives are usually politicized and may not be accessible to small-scale farmers in rural areas. There is a weak linkage between oil palm co-operative societies and government agencies responsible for agricultural practices. The organization that represents the interest of oil palm smallholder farmers and processors in the oil palm producing states is the Oil Palm Growers Association of Nigeria (OPGAN), (PIND, 2012).

The nine states of the Niger Delta, namely; Imo, Abia, Cross River, Bayelsa, Rivers, Edo, Delta, AkwaIbom and Ondo, account for 57% of the national production (PIND, 2011). Oil palm production is carried out in three production systems; large estate plantations, medium and small holder plantations some of which intercrop with other food or cash crops and, semi/natural groves (PIND 2011). Farmers in the Niger Delta have limited access to arable land to increase their plantation sizes. Majority of the farmers are smallholder farmers who have farmlands ranging from 1 to 50 hectares. Considering the contributions of oil palm in; rural development, national revenue generation, provision of income to actors along the value chain, provision of raw material for industrial and domestic use, there is need to boost oil palm production. Oil palm co-operative societies can be a viable option to achieve this. This is expected to influence the sustainability of oil palm production in Imo State and in Nigeria. The research is aimed at evaluating the economic dimension of sustainable oil palm production by co-operative societies in Imo State.

For the purpose of this study the following variables make up the economic dimension; (1) size of oil palm farm (Ha), (2) number of stands of oil palm tree, (3) quantity of palm oil produced in the past five years, (4) average monthly income derived from oil palm production, (5) proportion of palm oil sold through the co-operative, (6) proportion of fresh fruit bunches bought through the oil palm co-operative, and (7) proportion of income earned from oil palm production through the co-operative. Data on quantity of palm oil produced in each zone was delimited to five years from 2016 to 2020 due to inefficient record keeping by members of the co-operative society. The main product of oil palm which was considered in the study is palm oil. The results of the study are expected to help the Federal Government in formulating policies which will accommodate the peculiarities of small holder oil palm farmers of which the co-operative is a subset and reveal the attributes of the economic dimension of sustainability which require improvement by relevant stakeholders in sustainable oil palm production in Imo state.

2. Materials and Methods

The study was carried out in Imo State, one of the thirty six (36) states of Nigeria located in the South Eastern part of the country and Niger Delta where oil palm is predominant. It is made up of three senatorial zones namely; Okigwe, Orlu and Owerri. Geographically, it lies between Latitude 5° 12'N and Latitude 5° 57'N and Longitude 06° 35'E and Longitude 07° 27'E. It occupies a total land area of 5,288 km^2 (Dada, 2011).

The population of the study was three hundred and twenty one (321) registered members of the oil palm co-operative society distributed among the three senatorial zones. Owerri zone has one hundred and twenty (120) members, Orlu zone has one hundred

and sixty seven (167) members, while Okigwe zone has thirty four (34) members. The sampling technique used in this study and secondary sources. Primary data was collected using structured questionnaire and personal observations. Secondary data was acquired by reviewing existing literature and publications from the Central Bank Nigeria (CBN), Imo State Agricultural Development Programme (ISADP), books, journals, articles, periodicals, and records from the co-operative society in Imo State. Questionnaire were administered in the following proportion; Owerri zone 120, Orlu zone 167, while Okigwe zone 34. A total of 321 questionnaire were administered out of which 312 (97%) were returned. Questionnaire items on economic dimension were based on the seven variables.

Data were analyzed using descriptive and inferential statistics. Descriptive statistics used were; frequency tables, percentages, means and charts. Inferential statistical

was a census of all registered members of the co-operative society in the three zones. Data for the study was acquired through primary analysis used was Multiple Regression Analysis carried out in SPSS environment.

Multiple Regression analysis of data was carried to determine the extent to which the variables in the economic dimension influence sustainable palm oil production by co-operative society members. This was also used to test the null hypothesis which states that; economic factors have no statistically significant influence on sustainable oil palm production by co-operative society members in Imo State.

To evaluate the status of economic dimension of sustainable oil palm production by members of the co-operative society in the study area, the following procedure was followed; (1) Responses to questionnaire items were rated on a 4-point Likert scale of: poor - 1, fair - 2, good -3 and very good -4.

(2) Descriptive statistical tool on SPSS package was used to calculate mean scores of variables from responses which had been rated on a four point Likert scale. This shows the level of each variable on a scale of 4. (3) Calculation of the sustainability index score of the economic dimension was done by dividing the total mean scores by the number of variables. (4) The resulting value was then converted to percentage to get a sustainability index score of the economic dimension. The sustainability index status is categorized into four on a scale of 0 – 100 (Hariyanti et. al, 2022) see table 2.1.

Table 2.1: Sustainability Index Value Scale

Index Value	Status
0.00 – 25.00	Unsustainable
25.01 – 50.00	Less sustainable
50.01 – 75.00	Quite sustainable
75.01 – 100.00	Highly sustainable

Source: Hariyanti, et. al (2022).

(5) To determine the extent to which economic variables influence average palm oil production by co-operative society members, and test hypothesis, multiple regression analysis was used to analyse date in SPSS environment. The general form of the model is;

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + e \quad (1)$$

Where, y is the outcome, a, is the intercept, b are the coefficients and x are the predictors and e is error term.

The study sought to know how average quantity of palm oil produced (y) depends on the following economic variables;

x_1 = Size of members oil palm plantation

x_2 = No of stands of oil palm tree

x_3 = Average monthly income earned from oil palm

x_4 = Proportion of palm oil sold through the co-operative

x_5 = Proportion of ffb purchased through the co-operative

x_6 = Proportion of income earned from oil palm production.

3.   Results.

Results from the multiple regression analysis of economic variables showed the coefficient of determination $R^2 = .91$. This implies that these variables account for 91% of the variations in the average quantity of palm oil produced by the co-operative society members. The model reached significance at a = 0.05, showing that it successfully predicted average quantity of average palm oil produced from 2016 - 2020 ($F_{(6, 305)}$ = 511.22, $p < .001$). Size of members' oil palm plantation was significant at $p = 0.05$. Number of stands of oil palm tree was significant at $p < .001$ and proportion of income earned from oil palm production was significant at $p < .001$. Other variables which were not significant at a = 0.05 were; average monthly income earned from oil palm, proportion of palm oil sold through co-operative society and proportion of ffb sold through the co-operative society.

The mean scores for each variable in table 3.1 show the extent of its influence in the dimension on a scale of 4, figure 3.2. Sustainability index score obtained for economic dimension is 50.75% and the status which is within the quite sustainable category.

Table 3.1: Sustainability Index Calculation for Economic Dimension

Economic Dimension Variables	Mean Score
Size of members oil palm plantation	1.81
No of stands of oil palm tree	2.71
Average palm oil production for 5 years	2.55
Average monthly income from oil palm	2.79
% palm oil sold through the co-operative	1.30
% ffb purchades through co-operative	1.29
% income from oil palm production	1.77
Total mean score	**14.23**
Average mean score	**2.03**
Sustainability index	**50.75%**

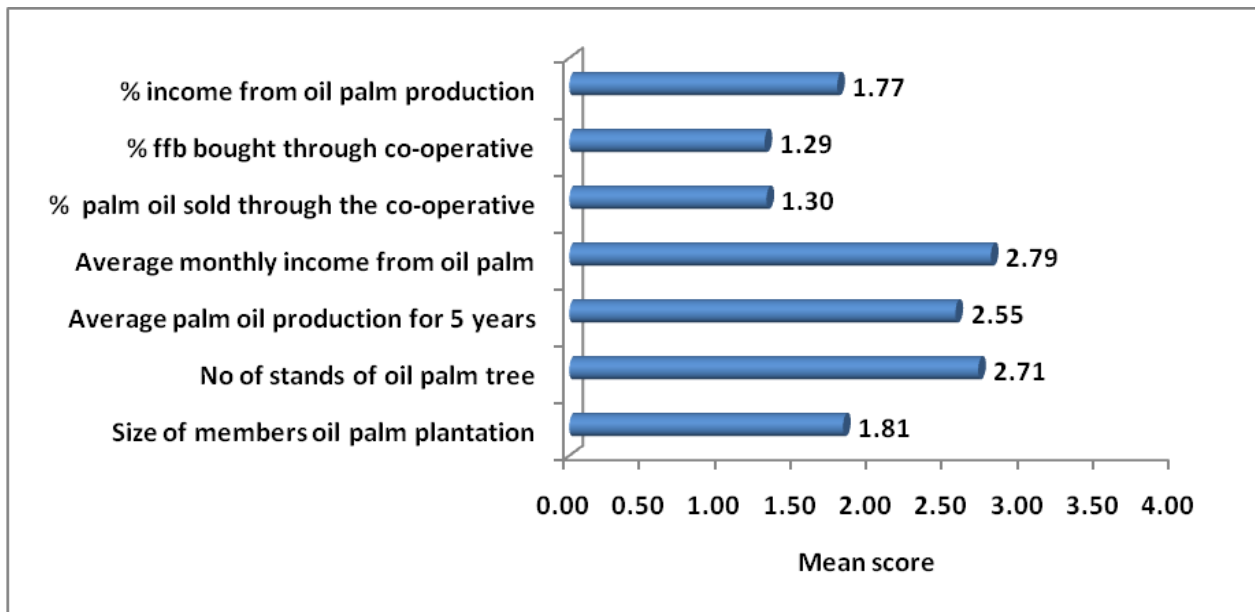**Source: Researcher's calculations, 2023.**

Figure 3.2: Level of economic variables stated in form of mean scores.

Source: Researcher's calculations, 2023.

4. Discussion

Results obtained from the multiple regression analysis show the attributes which are sensitive in the model and contribute significantly to the economic dimension, they are; size of members' oil palm plantation, number of stands of oil palm tree and proportion of income earned through oil palm production. A higher percentage (68.59%) of the farmers have oil palm plantations within the category of 1ha – 10ha while 27.24% have farms of 1 ha and less showing that they are small holder oil palm farmers. This finding agrees with Olagunju (2008) which observed that 64% of small scale oil palm processors in the South western Nigeria had farms less than two hectares while 36% had farms between three and four hectares. Most of these farms are fragmented due to the nature of the traditional land holding. There is need for the farmers to expand their plantations in other to increase production.

On the number of stands of oil palm tree, 41% of the farmers have between 52 - 100 stands while 28.80% have 151 stands and above. There is need for the farmers to increase the number of stands of oil palm trees cultivated by replacing old oil palm trees and planting new ones with Tenera specie obtained from NIFOR. NIFOR should therefore, reduce the bottlenecks in the process of procuring new seedlings by oil palm co-operative members. Data shows a steady annual increase in quantity of palm oil produced from 2016 – 2020 in Okigwe, Orlu and Owerri. As production increases, it is expected that their income will increase as reflected in the average monthly income earned from oil palm production by members. 40.40% of members earn between N51,000 – N100,000 while 36.53% earn from N151 and above momthly. Proportion of income earned from oil palm production by members implies that most of the farmers do not practice oil palm production on full time basis and may

be engaged in other agricultural activities or business ventures to augment their income. 62.50% and 30.13% of members indicated that they earn 26 – 50% and 25% or less of their income through the oil palm co-operative respectively. The above findings agree with Eze, Nwoha, &Adiele (2014) which identified critical factors that influence sustainable oil palm processing in Imo state as; income, cost of processing activities, membership of cooperative societies and size of oil palm plantation. On the other hand, there is need for the oil palm co-operative society to strengthen their activies to enable their members buy and sell fresh fruit bunches (FFBs)and palm oil through the co-operative society so as to enable them buy at cheaper prices to make profit. Currently, prices of FFBs and palm oil is determined by market forces which may lead to losses by the farmers sometimes. Availability of FFBs is very critical to the quantity and quality of palm oil produced. This finding is line with

Olatunji (2020) which noted that quantity of fresh fruit bunches, variety of oil palm fruits, method of processing adopted, processing period, and level of education impacted significantly on the quantity and quality of palm oil produced.

The sustainability index for economic dimension is 50.75% which falls within the quite sustainable category. This is a moderate score showing that there is need for improvement of the economic dimension by improving the variables that were sensitive in the model. This finding agrees with Nasution, Fajri, Karim, & Romano (2021) which found out that the economic dimension of sustainability index of Aceh palm oil in Central Production of West Region Nagan Raya District, Indonesia is 64.66 showing a sufficient sustainable status. Average monthly income earned by members can be increased if the co-operative society does the following; increasing the sale and purchase of FFB

through the co-operative society and encouraging members to increase their shareholding in order to increase borrowing limit. This will help the members to increase their production capacity.

In the regression model, $p < 0.001$ which is less than $a = 0.05$, we therefore, fail to accept the null Hypothesis which states that "economic factors have no statistically significant influence on sustainable oil palm production by co-operative society members in Imo State" and accept the alternate hypothesis which states that "economic factors have statistically significant influence on sustainable oil palm production by co-operative society members in Imo State."

5.   Conclusion

This study evaluated the economic dimension of sustainable oil palm production by oil palm co-operative societies in Imo State, Nigeria. Results obtained show that economic

variables account for 91% of variations in palm oil production. Null hypothesis testing led to the conclusion that economic factors have statistically significant influence on sustainable oil palm production by co-operative societies in Imo State. The sustainability index for economic dimension is 50.75% which falls within the quite sustainable category. There is need to improve the status of the economic dimension.

6. Recommendations

The study recommends the following;

1. More small holder oil palm processors should join the co-operative societies to increase their number to benefit from economies of scale.

2. The co-operative society management should increase their share holding so as to increase financial base and lending power of the co-operative society which is more affordable than borrowing from external sources.

3. A shift of mind set by the co-operative society to adopt the "self-funding and self-help" strategy instead of waiting for government funding which may not be achievable due to the current economic realities.

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