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ASSESSING THE SOCIOECONOMIC FACTORS INFLUENCING OIL PALM PROCESSORS' USE OF IMPROVED PROCESSING TECHNOLOGIES IN OGBOMOSO AGRICULTURAL ZONE

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Abstract. Oil palm (*Elaeis guineensis*) processing is characterised by low productivity, which can be increased through the adoption of new technology. Several studies have been conducted on the use of improved processing technologies among oil palm processors to increase productivity. However, there is a dearth of knowledge on the socioeconomic factors influencing oil palm processors' use of improved processing technology. Therefore, this study was carried out to assess the socioeconomic factors influencing oil palm processors' use of improved processing technologies in Ogbomoso agricultural zone. A multistage sampling process was used to select 90 oil palm processors in the study area. The primary data for the study were collected using a well-structured questionnaire and were analysed using descriptive statistics and a logistic regression model. The results showed that 62.2% of the processors were female and 94.2% were married. The average age of the respondents was 51, and they came from households with an average of seven members. The results further showed that the majority of the processors are aware of some improved technologies being used in oil palm processing: 67.8% of the processors used the thresher, 63.3% used the sterilizer, and 54.4% used the digester. The logistic regression estimate indicated that age, gender, number of years spent in processing, quantity per annum and extension visits were significant socioeconomic factors influencing oil palm processors' use of improved processing technology. Based on these findings, the study suggests that providing oil palm processors with more extension services will help boost their processing operations by utilizing a variety of improved technology.

Keywords: improved processing technologies, oil palm processor, socioeconomic

INTRODUCTION

Oil palm (*Elaeis guineensis*) is one of the most economically significant oil crops to have been cultivated in Nigeria. The importance of oil palm in the food economy cannot be overstated. In addition to producing raw materials for industry and food for human and animal consumption, oil palm contributes to the country's economy (Onoh and Peter-Onoh, 2012). Due to its cultivation, a larger section of the rural population with limited resources has access to employment. According to Ibitoye et al. (2011), the oil palm is a tree of significant commercial value that contains almost all of the components necessary for daily life, including the roots, leaves, fronds, trunk, and cluster of oil palm fruits. The palm fruit, the principal by-product of the oil palm, is processed to provide various commercial products ranging from palm oil to the palm kernel cake. A large percentage of the rural population also relies heavily on oil palm processing as a source of revenue (Nwalieji and Ojike, 2018). The digestion or pounding of cooked palm fruits, which is either done mechanically or with the use of an electrical digester, is one of the processing

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activities carried out manually to produce palm (Osei-Amponsah et al., 2018 and Alabi et al., 2020). Palm oil processing activities range from harvesting and threshing to palm fruit loosening, boiling of palm fruit, digestion of fruit, palm oil extraction, oil clarification, and storage.

Depending on the degree of complexity of the operating machinery used to process palm oil, oil palm processing technologies can be categorized as conventional methods, small-scale mechanical methods, medium-scale mill methods and large industrial mill methods (Nwaleji and Ojike, 2018). The outdated techniques for processing palm oil are extremely archaic, time-consuming, and inefficient, and they only produce a small volume of palm oil of poor quality (Wahid et al., 2010). In an effort to raise oil palm productivity and farmers' standards of living, improved oil palm processing technologies that are more effective and efficient have been developed and implemented. The output of oil produce and the average income of the processors have both grown as a result, according to studies on the adoption of enhanced oil palm processing technology (Solomon et al., 2011; Sanusi et al., 2022). However, while there are studies (Taiwo et al., 2000; Owolarafe and Oni, 2011; Adah and Obinne, 2015; Adejuwon et al., 2016; Akinwehinmi and Yesufu, 2019; Adah et al., 2019; Ogunmola et al., 2019) on the use of improved processing technologies among oil palm processors, there is a gap in the research when it comes to the socioeconomic factors that influence the use of improved processing technology among processors. The availability of information on socioeconomic factors governing the adoption of improved processing technologies among processors will help to increase productivity.

The objectives of the study were to:

- profile the socioeconomic characteristics of oil palm processors;
- identify various improved oil palm processing technology available in the study area; and
- determine the socioeconomic factors influencing oil palm processors' use of improved processing technologies in the study area.

Hypothesis of the study

In null form, the hypothesis was:

Ho_1: There is no significant relationship between selected socio-economic characteristics of the respondents and the use of improved processing technologies.

MATERIALS AND METHODS

The study was carried in Ogbomoso agricultural zone of Oyo State, Nigeria. Ogbomoso agricultural zone is comprised of five (5) local government areas. However, in order to select oil palm processors in the zone for the study a multistage sampling procedure was adopted. Three (3) local government areas were randomly selected in the first stage, and three (3) villages from each of the selected local government areas were randomly selected in the second stage. Finally, random sampling was used to select ten (10) oil palm processors for the study from each of the villages across the selected local government areas. A total of ninety (90) oil palm processors from the zone were selected as a representative sample for the study. A well-structured questionnaire was adopted to collect the data, and descriptive statistics and a logistic regression model were used for the analysis. Descriptive statistics were used to profile the socio-economic characteristics of oil palm processors and to identify various improved processing technologies available in the study area, while the socioeconomic factors influencing oil palm processors' use of improved processing technologies were determined using logistic regression.

The logistic regression model is expressed as:

$$Z_t = logit(p) = \frac{P_t}{1 - P_t} \tag{1}$$
$$= B_0 + B_1X_1 + B_2X_2 + \ldots + B_nX_n + e_i$$

Where:

Z_t – dependent variable (i.e binary variable; whether oil palm processors adopt or not; adopt = 1, non-adopt = 0)
P_t – probability of the event's occurrence
X_n – vector of explanatory variables
B_0 – constant
B_n – corresponding vectors of regression
e_i – disturbance term.

The explicit form of the model is expressed as:

$$Z = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + e_i \tag{2}$$

where:

Z – adoption (1 = adopter, 0 = otherwise)

The explanatory variables used in the analysis are:

X_1 – sex of respondent (expressed as a dummy variable; male = 1, female = 0)
X_2 – age of respondent (measured in number of years)
X_3 – educational level (measured as number of years of formal education)
X_4 – household size (number of people living together in the household)
X_5 – number of years in processing (measured in number of years spent)
X_6 – quantity (measured in number of bunches per annum)
X_7 – extension visit (amount of time visited)
X_8 – years in a society (measured in number of years spent in cooperative society)

RESULTS AND DISCUSSION

The socioeconomic characteristics of oil palm processors in the study area are shown in Table 1. Both sexes were active in oil palm processing in the study area. The results show that 62.2% of processors were female. This implies that females are more heavily engaged in palm oil processing than their male counterparts. The finding is consistent with that of Ajani et al. (2012), who claimed that it is mostly women in the villages who are in charge of processing and selling oil palm. The average age of the oil palm processors surveyed was 51 years, while 94.4% of the respondents were married. This implies that married people dominate oil palm processing in the study area. This could be attributed to the fact that married people must take care of other family members. The finding is in line with those of Nwalieji and Ojike (2018) and Ogunsola et al. (2022), who claimed that married people process more oil palm since they typically have to feed more family members and therefore need to adopt new innovations to meet their household needs.

The average family size of the oil palm processors in the study was seven persons; this indicates the availability of labour. This finding is similar to that of Adaigho (2018), who claimed that labor availability increases with household size. The majority (85.5%) of the respondents were literate, having attended formal education, and this is consistent with the results of Ogunsola et al. (2022), who claimed that literacy can aid processors in receiving new ideas introduced to them. Education is a crucial instrument for developing skills and transferring technologies. The average years of experience in processing of the respondents was 22 years. The majority (98.9%) of the processors belonged to cooperative societies. This implies that they could exchange information and obtain ideas that are relevant to them. Moreover, membership in a cooperative group might facilitate access to credit. Also, the majority (71.1%) of the respondents had been visited by extension agents. The spread of new technology is aided by access to extension services provided by the agents.

Table 1. Distribution of respondents by their socioeconomic characteristics

Variables	Oil palm processors
Female (%)	62.2
Age (years)	51.44 (±8.24)
Married (%)	94.4
Household size (number)	7 (±2.36)
Formal education (%)	85.5
Years of processing experience	22.2
Cooperative society (%)	98.9
Extension visit (%)	71.1

Source: field survey, 2022.

Table 2 profiles the various improved processing technologies available and utilized by processors in the study area, It shows that a significant number of processors were aware of some improved technologies. The

Table 2. Distribution of respondents based on available improved processing technologies

Improved technology	Frequency		Percentage (%)	
	utilized	did not utilized	utilized	did not utilized
Digester	49	41	54.4	45.6
Thresher	61	29	67.8	32.2
Sterilizer	57	33	63.3	36.7
Separating engine	47	43	52.2	47.8
Mechanical press	60	30	66.7	33.3

Source: field survey, 2022.

findings indicate that 67.8% of respondents utilized a thresher while 32.2% did not use thresher, and 63.3% of respondents used an improved system of sterilization while 36.7% did not use the improved sterilization technique. The majority (54.4%) of the respondents made use of an digester, while 45.6% did not use an improved digester. 52.2% of the respondents made use of an improved separating engine, while 47.8% did not use an improved separating engine. Also, 66.7% of the respondents made use of an mechanical press, while 33.3% did not use an improved mechanical press.

The socioeconomic factors influencing oil palm processors' use of improved processing technologies in the study area is depicted in Table 3. The log-likelihood (–13.4351) demonstrates the overall significance of the model. The chi-square value was 92.46 and was significant at the 1% confidence level. The pseudo R^2 value suggests that 77% of the variance in palm oil processors' use of improved processing technology was explained by the variance in specific explanatory variables. Five of the eight explanatory variables (age, sex, years spent in processing, extension visit, and number of bunches processed annually) that were incorporated into the model were statistically significant. The result shows that age, gender, quantity per annum, and extension visit were positively related to oil palm processors' use of improved processing technology while household size, number of years spent in school, number of years spent in processing, and number of years spent in a cooperative society were negatively related to oil palm processors' use of improved processing technology. The coefficient of the sex of the processors was positive and statistically significant at the 1% confidence level. This result indicates that a 1% increase in the number of male processors will lead to a 21% increase in the likelihood that oil palm processors will utilize improved processing technology. This implies that men are likely to use improved processing technology while female processors are less likely to utilize improved oil palm processing technology. This might depend on the kind of technology accessible to them and which they can operate.

Age was also a positive and statistically significant variable at the 5% confidence level. The result indicates that a 1% increase in the age of oil palm processors will lead to a 1.9% increase in the likelihood that they will embrace new processing technology. Similarly,

Table 3. Socioeconomic factors influencing oil palm processors' use of improved processing technology

Variables	Odd ratio	Std error	$p > [z]$	Marginal effect
Sex	109.9109	211.8286	0.006	0.2101084*
Age	1.544818	0.3004899	0.0120	0.0194434**
Educational level	0.9147284	0.1472194	0.5810	–0.0039847
Household size	0.8879507	0.1866473	0.564	–0.0053129
No of years spent in processing	0.6758641	0.1206152	0.014	–0.0175146**
Quantity processed per annum	1.000183	0.0000629	0.000	8.17e-06*
Extension visit	25.75231	51.12735	0.090	0.1452319***
No of years in cooperative society	0.8029293	0.1545951	0.240	–0.0098127
Constant	4.28e-08	3.39e-07		
Number of observation	90			
LR chi^2[8]	92.46			
Prob>chi^2	0.000			
Pseudo R^2	0.7740			

* Significant at 1% level. **Significant at 5% level. ***Significant at 10% level.
Source: field survey, 2022.

extension visit was positive and statistically significant at the 10% confidence level. This result indicates that a 1% increase in the number of times the oil palm processors are visited by an extension agent will lead to a 14.5% increase in the likelihood that oil palm processors will use improved processing technology. This is in line with the findings of Adah et al. (2022), who claimed that contact with an extension agent will boost the likelihood that a farmer will adopt new technology.

Furthermore, quantity per annum of bunches of palm fruit processed was positive and statistically significant at the 1% confidence level. This result reveals there is a 0.000817% greater chance that oil palm processors will utilize improved processing technology for every 1% rise in the quantity of bunches they process annually. On the other hand, the coefficient of the number of years spent in processing by the processors was negative and statistically significant at the 5% confidence level. This result indicates that the likelihood that oil palm processors will utilize better processing technology will rise by 1.75% for every 1% decrease in the number of years they spend processing oil palm.

CONCLUSION AND RECOMMENDATIONS

This study investigated the socioeconomic factors influencing oil palm processors' use of improved processing technologies in Ogbomoso Agricultural zone. A multistage sampling procedure was used to select respondents for the study. The data for the study were analysed using descriptive statistics and a logistic regression model. The study concluded that the majority of the oil palm processors are of a productive age, female and married. The study showed that the majority of processors in the study area used threshers, sterilizers, and mechanical presses, among other improved processing technologies. The logistic regression estimate revealed that age, gender, the number of years spent in processing, the number of bunches of palm fruit processed annually and extension visits were socioeconomic factors significantly influencing oil palm processors' use of improved processing technologies. Based on the findings of this study, it is recommended that when oil palm processors are visited, extension services should be made available to them through extension agents. This will allow them to acquire excellent information that will enable them to improve their processing activities with the use of various improved technologies. To promote the use of these technologies, the government could also assist in making them accessible and inexpensive for the processors.

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