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TECHNOLOGICAL TRAINING NEEDS OF SMALL SCALE OIL-PALM PROCESSORS IN NIGERIA

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ABSTRACT

The study assessed the technological training needs of small scale oil palm processors in Osun State, Nigeria. A well-structured questionnaire was used to elicit information from 140 oil palm processors. The data was analyzed using frequencies, percentages, means, ranking and Pearson Product Moment Correlation Coefficient was used to test the hypothesis. The study revealed that, 98.6% of the respondents use both modern and traditional method of processing and majority of the oil palm processors (87.1%) store their oil palm in rubber containers. Water related challenges, inadequate fund, unstable pricing of products and lack of government support and in appropriate government policy are very severe constraints to their production. The result also revealed that oil palm processors require training for stripping (8.01), digestion (8.71), mixing (7.88), skimming (7.43), and clarification (7.56) during oil palm processing. Accessing loans and grants, marketing information, appropriate policy for price control amongst others are the most important needs area for extension advice in the study area. The test of hypothesis of the study revealed that a significant relationship exist between age, educational level and experience and the extension needs of the respondents(P= 0.020, 0.012:<0.05, 0.002:0.01), while no significant relationship exist between the household size and the extension needs of oil palm processors(P=0.842). The study therefore concludes that, oil palm processors require training as well as advice and technical assistance in a number of areas in order to increase their efficiency. It was thus recommended that Extension Programme should be focused on the need areas of oil palm processors.

KEYWORDS: Oil Palm, Processing. Technological, Training, Needs.

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1. INTRODUCTION

Oil palm is a perennial crop that originated in the tropical rain forest of West Africa and latter spread to South America and Asia in the 16th and 17th century, respectively. It is one of the most productive oil crop and its products (palm oil) ranked high in the list of the world's leading agricultural commodities. According to Basiron (2002), oil palm gives the highest output value compared to major oil seeds such as rapeseed, soyabean and sunflower. Rhett (2006) predicted that a single hectare of oil palm may yield 5,000 kilograms of crude oil or nearly 6,000 litres of crude, while soyabean and corn crops often heralded as top biofuel sources generate only 446 and 172 litres per hectare, respectively. The yield can be up to 10 times as high as that of its closest market rival, the soybean (Wakker, 2000).

Nigeria used to be the world's largest producer of oil palm *(Elaeis guineensis)*, before the crude oil boom era and now Malaysia has taken the leading position (Onwubuya *et al.*, 2012). The crop remains one of the most important economic crops in the tropics. Processing Fresh Fruit Bunch (FFB) to extract the oil is labour intensive and involves the following stages – threshing, picking, parboiling, digestion, extraction and separation (Chinedum *et al.*, 2002). Nigeria is the third largest producer of palm oil in the world after Malaysia and Indonesia (Omoti, 2003). It also accounts for about 72% (1.3 million tonnes per annum) of Nigeria's total vegetable oil production and contributes to the country's foreign exchange earned yearly (Omoti, 2003).

Oil palm is appreciated by most people in the Southern part of Nigeria because of its level of utilization with respect to the various products and by-products that can be obtained from it; such as; palm oil, palm kernel oil and palm kernel cake. Oil palm gives the highest yield of oil per unit area, compared to any other oil producing plant when processed, and it produces two distinct oils; Palm oil and Palm Kernel Oil which are of great importance in the industrial market (FAO, 2002). Palm oil and palm kernel oil were once very vital to Nigeria's export trade, as Nigeria was a leading producer of oil palm products in the world (Ibitoye *et al.*, 2011).

Nigeria recorded increased growth in oil palm production between 1961 and 1965, when the nation accounted for 43% of the world oil palm production. In recent time, however, report shows that out of 14.4 million tonnes of world oil palm production, Nigeria only accounted for 7% (Olagunju, 2008). Oil world Annual (2001), further, indicated that Nigeria had self-sufficiency ratio of 89.1%, an indication that the country has to import about 110.7 tonnes of palm oil to meet her domestic demand. Nigeria is now the third largest producer after Indonesia J

Sonja and Goad (2006), however, opined that a major opportunity exists to meet the rising demand in an environmentally and socially sustainable manner through expansion and improvement of smallholders' production. Smallholders are becoming a major sector of oil palm production system. Although they are generally characterized by smallholdings, mixed cropping and low application of technological innovation; smallholders' oil palm production play a significant role in the palm oil industry. 80% of oil palm production in Nigeria comes from dispersed smallholders who harvest semi-wild plants and use manual processing techniques (Olagunju, 2008)

Palm oil is used as an energy source in livestock feed. Industrially, it is used in the manufacturing of detergents, cosmetics, shoe polish, magazine and candle sticks. Generally, the oil palm tree is considered a "Complete plant" because all the products and by-products derived from the tree possess commercial importance. Hence, "No part of the tree is wasted". Nigeria

used to produce a large proportion of palm oil sold in the world market (Hartley, 1998). It was a dominant source of foreign exchange for Nigeria before Indonesia and Malaysia took over. The fortunes of Nigeria's palm oil production plunged as a result of the discovery of crude oil and this has caused a major decline in the processing of palm oil in Nigeria (Omoti, 2003).

There are different techniques used in processing palm oil and these range from modern methods to traditional methods. However, the traditional method of processing is more prevalent among small scale processors and these small scale processors are responsible for the bulk of palm oil processed in Nigeria (Olagunju, 2008). For the palm oil processing industry to sustain competitive edge, continued research is very crucial in regard to appropriate processing technology to pave the way forward in shaping the future of the palm oil industry. However, in Nigeria, 80% of palm oil processors comes from dispersed smallholders who harvest semi-wild palm fruits and use manual processing techniques, a processing technique that is labour intensive and highly inefficient, with a low palm oil extraction rate and high free fatty acid content that can be up to 30% in some instances (Orewa *et al.*, 2009; Ugwu, 2009).

2. METHODOLOGY

The study was carried out in Osun State, Nigeria. A four stage sampling procedure was used to select the respondents for the study. The first stage involved the purposive selection of Iwo zone of the Osun state Agricultural Development Programme (OSADP) being the highest oil palm producing area in the state, Iwo zone comprise of Seven (7) local government, the seven local government was selected for the study, two villages were randomly selected from each Local government, resulting into fourteen (14) villages in total, the last stage involve the selection of ten (10) oil palm processors from each of the selected villages. This makes a total of 140 respondents for the study. The data for this study was collected from the oil palm processors through the use of structured questionnaire. Data were analyzed using the descriptive statistical tools of frequency distribution, percentages, and mean, and the needs analyses. The latter analyses comprised of task and gap analyses.

3. MEASUREMENT OF VARIABLES

Variables to be measured are:

The independent variables for the study were measured as follows:

1. Age: Respondents were requested to state their ages in years.
2. Sex: Respondents were requested to indicate whether they are male or female.
3. Marital Status: Respondents were requested to indicate whether they are single, married, divorced or widowed.
4. Educational Level: Respondents were requested to indicate their level of education by ticking whether they have primary education, secondary education, post-secondary education, adult education, or no formal education.
5. Years of Experience in Processing: Respondents were requested to indicate, in years, how long they have been into oil palm processing.
6. Secondary Occupation: Respondents were asked to indicate their secondary occupation by choosing out of the option provided: Petty trading, Hair Plaiting, Artisan, Tailoring, Farming or others.
7. Processing techniques used: The various activities involved in palm oil
8. Extraction and their corresponding practices as carried out by respondents were listed and the respondents were required to indicate the processing techniques used for each activity.

9. Resources used in oil palm processing activities: The respondents were asked to indicate the resources used by them from the list of various resources.
10. Sources of Information: respondents were asked to state how available each source of information were. A 3 point Likert type scale of never available, sometimes and always available was used to measure the availability of each of the information sources.
11. Challenges faced in oil palm processing: A 5 point likert type scale of not severe, a little severe, somewhat severe, severe, very severe was used to measure the challenges faced by the oil palm processors.

4. DEPENDENT VARIABLE

The extension needs of the oil palm processors were measured by conducting the training needs assessment and expressed needs assessment. The training needs assessment involves the Task analysis and skill gap analysis.

4.1. Training needs assessment

Procedure for Conducting a Task Analysis

The following steps provide was used for task analysis.

Step 1: Several "task Analysis worksheets" were duplicated and wrote the name of the job at top of each.

Step 2: One task on the "Task Analysis Worksheets" was written.

Step 3: All component parts of each task on its respective Task Analysis worksheet were listed.

Step 4: How frequently each part of the component is performed were determined. Use the following scale: Seldom=1, occasionally =2, Weekly to Monthly=3, Daily to Weekly=4, Daily=5

Step 5: Determine the relative importance of each step or component. Steps that are performed seldom may be very critical to one job. Therefore, it is important to gain both an importance rating as well as a frequently rating by using the following scale:

Marginally important=1, moderately important= 2, extremely important=3,

Step 6: Difficulty of learning the task component or step were estimated. An estimate of learning difficulty is one other dimension of the analysis. Task Analysis worksheet were used with the following scale:

1. Easy=1, Moderate difficulty=2, Very difficult=3, extremely difficult=4

Step 7: Total score for each task component or step were tallied by simply adding the scores for frequency, importance and learning difficulty for each component.

4.2. Procedures for Skill Estimating and Gap Analysis

The following steps were used to estimate the skill levels of trainees.

Step 1: The "steps or components" that were identified on the task analysis worksheet onto the Gap Analysis Worksheet were listed.

Step 2: Each "step or component" in terms of the trainees' current proficiency were rated on a scale of 1 to 5, with the following descriptors.

1. cannot complete any part
2. can complete less than half the task
3. can complete more than half but less than the total
4. can complete the entire task but takes too long

5. complete the task within time standard.

Step 3: The proficiency ratings and check those tasks that appear to have low proficiency were reviewed. Low proficiency means that there is a gap between what is desired and what the situation is currently.

4.3. Expressed needs assessment

A 3 point Likert type scale of highly needed, needed and not needed was used to measure the expressed needs areas of the respondents for agricultural advice.

5. RESULTS AND DISCUSSION

5.1. Socio-economic characteristics of respondents

The characteristics of the respondents that are most salient to the study are discussed in this section.

TABLE 1: Distribution of respondents according to their Socio- Economic Characteristics

VARIABLES	FREQUENCIES	PERCENTAGES (%)	MEAN
Age of respondents			
20-40	25	17.9	
41-60	89	63.6	
>60	26	18.6	48.6
Gender			
Male	0	0	
Female	140	100	
Marital status			
Single	15	10.7	
Married	121	86.4	
Widowed	4	2.9	
Educational level			
No formal Education	82	58.6	
Primary Education	54	38.5	
Secondary Education	4	2.9	
Years of experience			
1-10	37	26.5	
11- 20	66	47.1	
21- 30	20	14.3	
>30	17	12.1	16.1
Household size			
1 – 4	59	42.1	
5 – 9	71	50.7	
>9	10	7.1	5.32
Secondary occupation			
Petty Trading	87	62.1	
Hair Plaiting	12	8.6	
Tailoring	14	10	
Farming	27	19.3	

Source: Field survey, 2016

The data in Table 1 showed that majority of the oil palm processors (63.6%) are between the ages 41-60, the mean age being 51, 17.9% of the respondents are between the ages 20- 40 years

and 18.6% of the respondents are above 60years. The mean age is 49 years. This implies that majority of the oil palm processors are aged. This result is in line with the findings of Akangbe, Adesiji, Fakayode and Aderibigbe (2011), who reported that palm oil extractors are generally aged. Dominance of older age processors explains the persistence use of traditional techniques among processors. There is therefore need to make the sector attractive to younger people. All the oil palm processors were found to be female. This implies that oil palm processing is a female dominated practice. Majority of the respondents (86.4%) are married, 3% are widowed while only 10.7% are single. This implies since oil palm processing is a female dominated endeavor, it is very much practiced by married women to make ends meet and cater for their children. Table 1 also shows that more than half of the respondents (58.6%) have no formal education, 38.5% have primary education and only 2.9% have secondary education. This implies a low level of education among oil palm processors. High literacy level is an advantage in that, literate farmers adopt technical knowledge quickly, have more skills and have access to useful information. Majority of the respondents (73.5%) have more than 10years experience in oil palm processing while 26.5% of the respondents have ten years or less experience in oil palm processing. The mean years of experience is 16years. This shows that, the oil palm processors have some level of experience in the practice as stated by Bothoko and Oladele, (2013) that experience is important and that it comes with years of practice. About half of the respondents (50.7%) have household sizes between 5-9, 2.1% have household of between 1- 4 and 7.1% have household sizes greater than 9. The mean household size is 5. This implies that majority of the respondents have access to family labour. Majority of the respondents (62.1%) involve in petty trading as a secondary occupation, 19.3% involve in farming, 10% practice tailoring and 8.6% involves in hair plaiting as an occupation apart from oil palm processing, this is because oil palm processing is seasonal and processors need a source of livelihood to keep up during off season.

5.2. Processing techniques used by oil palm processors

TABLE 2: Distribution of respondents according to the processing techniques used.

	FREQUENCIES	PERCENTAGES (%)
Processing method used		
Traditional	2	1.4
Modern	0	0
Both	138	98.6
Storage method used		
Drum	18	12.9
Rubber containers	122	87.1

Source: Field survey, 2016

Table 2 presents the results of the processing techniques used by oil palm processors. The result shows that 98.6% of the respondents use both modern and traditional method of processing and 1.4% of the respondents use only traditional method. This implies that, majority of the respondents use both processing machines and traditional method in oil palm processing. Majority of the oil palm processors 87.1% store their oil palm in rubber containers and 12.9% of the respondents stores their oil palm in drums. This implies that, the respondents store the palm oil in rubber containers and sell it almost immediately.

5.3. Recourses used by oil palm processors

TABLE 3: Distribution of Respondents Based on the Resources Used

RESOURCES	FREQUENCIES	PERCENTAGES
SOURCE OF FARMLAND		
Inheritance	105	75
Purchase	31	22.1
Rent	4	2.9
MODE OF TRANSPORTATION		
Head Portage	2	1.4
Motorcycle	55	39.3
Vehicle	83	59.3
SOURCE OF EQUIPMENT		
Owned	13	9.3
Hired	127	90.7
SOURCE OF LABOUR		
Family	17	12.1
Hired	123	77.9
Both	14	10

Source: Field survey, 2016

Table 3 presents the result of the resources used in oil palm processing. The table shows that, 75% of the respondents inherited the farmland from where they get their palm fruit, 22.1% of the respondents purchased the farmland and 2.9% of the respondents rented the farmland. Majority of the respondents 59.3% transports their palm fruit and other resources using vehicles, 39.3% transport their palm fruit with motorcycle while only 1.4% transport their palm fruit by head portage. Majority of the respondents 90.7% hire their processing equipment while only 9.3% owns their processing equipment. This implies that majority of the respondents pay to use the improved processing machines in processing their palm oil at oil mills. Majority of the respondents 77.9% use hired labour in the processing of oil palm while 2.1% uses family labour and 10% of the respondents use both family and hired labour.

5.4. Information sources available to oil palm processors

TABLE 4: Sources of information available to oil palm processors

/N	INFORMATION SOURCE	ALWAYS	SOMETIMES	NEVER	MEAN	RANKING
1.	Radio	112 (80%)	28 (20%)	0	2.80	2nd
2..	Television	23 (16.4%)	117 (83.6%)	0	2.16	5th
3.	Agric. Shows	0	122 (87.1%)	18 (12.9%)	1.87	6th
4.	Meetings	0	140 (100%)	0	2.00	3rd
5.	Extension agents	2 (1.4%)	138 (98.6%)	0	2.01	4th
6.	Neighbors /friends	136 (97.2%)	2 (1.4%)	2(1.4%)	2.96	1st

Source: Field survey, 2016.

Table 4 presents the results of the sources of information available to oil palm processors in the study area. 97.2% of the respondents indicated that neighbors/friends and 80% of the respondents indicated that radio are always available as sources of information in oil palm

processing. Majority of the respondents indicated that meetings, extension agents, agricultural shows, television, are sometimes available as sources of information to oil palm processors in the study area. This finding implies that processors are inclined to information sources that are cost effective. Processors should be introduced to other information sources so that processors can have access to relevant information.

Table 5: CHALLENGES FACED BY OIL PALM PROCESSORS

S/N	CHALLENGES	VERY SEVERE	SEVERE	SOMEWHAT SEVERE	A LITTLE SEVERE	NOTSEVERE	Mean	Ranking
1.	Transportation problems	82(58.6%)	58(41.4%)	0	0	0	4.59	**7th**
2.	Water Availability	140(100%)	0	0	0	0	4.94	**1st**
3.	Labour supply	0	2(1.4%)	9(6.4%)	129(92.1)	0	2.09	**8th**
4.	Contact with extension	0	0	0	0	140(100%)	1.00	**10th**
5.	Marketing system	0	0	5(3.6%)	17(12.9%)	117(83.6%)	1.20	**9th**
6.	Inadequate fund	140(100%)	0	0	0	0	5	**2nd**
7.	Low yield of oil palm	97(69.2%)	24(17.1%)	8(5.7%)	6(4.4%)	5(3.6%)	4.44	**6th**
8.	Lack of access to credit	130(92.8%)	10(7.2%)	0	0	0	4.46	**5th**
9.	Unstable pricing of products	140(100%)	0	0	0	0	5	**3rd**
10.	Lack of Government support and inappropriate Government policy.	140(100%)	0	0	0	0	5	**4th**

Source: Field survey, 2016

Table five presents the challenges faced oil palm processors in their processing activities. All of the respondents (100%) indicated that water related challenges, inadequate fund, unstable pricing of products and lack of government support and in appropriate government policy are very severe constraints to their production. This is because water and funding are very important in nearly every stage of the process. Majority of the respondents also indicated that lack of access to credit (92.8%), low yield of oil palm (69.2%), and transportation (58.6%) are very severe challenges. 92.1% of the respondents indicated that labour supply is a little severe challenge. Majority of the respondents also indicated that contact with extension agents and the marketing system are not severe challenges. This agrees with the findings of Dimelu and Anyaiwe in 2011 where they stated that good transportation facilities undermine the productivity of smallholder oil palm producers and directly affect the economic return to farmers. It also agrees with the work of Kei *et al.* in 1997 who remarked that the stagnation in the oil palm sector in Nigeria was influenced by the overall agricultural policies.

TABLE 6: Task analysis assessment of oil palm processing activities of respondents

S/N	TASK	FREQUENCY OF PERFORMANCE (a)	IMPORTANCE (b)	LEARNING DIFFICULTY (C)	TOTAL	FOCUS
1.	Chopping	2.18	2.62	1.00	5.80	Do not Require Training
2.	Stripping	3.44	2.85	1.71	8.01	Require Training
3.	Boiling of Fruits	1.15	3.00	1.00	5.15	Do not Require Training
4.	Digestion	3.86	3.00	1.85	8.71	Require Training
5.	Mixing	3.73	2.14	2.01	7.88	Require Training
6.	Skimming	3.73	2.70	1.00	7.43	Require Training
7.	Clarification	4.01	2.55	1.00	7.56	Require Training
8.	Storage	1.42	1.84	1.00	4.26	Do not Require Training

Source: Field survey, 2016

Table 6 presents the results of the task analysis assessments of oil palm processors in the study area. The analysis covers the frequency of performance of each task, the level of importance of such task and the level of difficulty encountered in learning the task. The result shows that oil palm processors require training for stripping, digestion, mixing, skimming, and clarification during oil palm processing. The total mean scores of these operations were above the threshold score of 6. Tasks whose scores tend towards 12 imply that those that carry out the tasks require appreciable amount of training in order to increase their production level while those with scores below 6 require no training. However, they will also require some level of improved technology in order to increase their productivity. However, the result indicated that no training is necessary for chopping, boiling of fruits, and storage operations carried out during oil palm processing. The processors do not require training in these areas because of the experience they have gathered over the years that has increased their proficiencies.

TABLE 7: Gap analysis of oil palm processors

	STEPS - COMPONENTS	LEVEL OF PROFICIENCY	IS PROFICIENCY A PROBLEM	CAN PROBLEM BE SOLVED BY TRAINING
1.	Stripping	1 2 3 4 5	1.94	YES
2.	Digestion	1 2 3 4 5	1.72	YES
3.	Mixing	1 2 3 4 5	1.76	YES
4.	Skimming	1 2 3 4 5	1.63	YES
5.	Clarification	1 2 3 4 5	1.64	YES

Source: Field survey, 2016

Table 7 presents the results of the frequency rating of tasks requiring training during oil palm processing. The gap analysis indicates whether or not a task can be improved upon by training the processors. The gap analysis result shows the magnitude of the requirement for training of each task, it shows the gap between actual performance and the standard, the tasks according to the magnitude include stripping (1.94), mixing (1.76), digestion (1.72), clarification (1.64), and skimming (1.63). The gap analysis results showed that all the task deficiencies can be addressed via training the performers of the task, as all task scores were below average.

Majority of the respondents in table 8 indicated that accessing loans and grants (100%), marketing information(100%), appropriate policy for price control (100%), formation of agricultural cooperatives (82.8%), hygienic handling of oil palm(73%), storage of oil palm (72.8%), more productive processing techniques(70%) are highly needed areas for agricultural advice. Majority of the respondents also indicated that less labour intensive machine (65%) and training on marketing and management skills (50%) are needed areas for extension service. However, 90% of the respondents indicated that access to improved oil palm seeds is not a need area. This implies that apart from training in the various oil palm processing tasks, oil palm processors require agricultural advice on accessing loans and grants, marketing information, appropriate policy for price control, formation of agricultural cooperatives, hygienic handling of oil palm, storage of oil palm, more productive processing techniques in order to increase their productivity.

TABLE 8: Expressed needs areas for agricultural advice from the extension service by oil palm processors in Osun state.

s/n	Expressed Need Areas	Highly Needed	Needed	Not needed	Means	Rank
1	More productive processing techniques.	98(70%)	31(22.1%)	11(7.9%)	2.62	7th
2	Hygienic handling of oil palm	102(72.8%)	38(27.2%)	0	2.73	5th
3	Formation of agricultural cooperative.	116(82.8%)	21(15%)	3(2.2%)	2.81	4th
4	Storage of oil palm	102(72.8%)	38(27.2%)	0	2.73	6th
5	Less labour intensive machine	42(30%)	91(65%)	7(5%)	2.25	9th
6	Packaging and Branding of palm oil	63(45%)	53(37.8%)	24(17.2%)	2.28	8th
7	Accessing loans and grants	140(100%)	0	0	5	1st
8	Access to improved oil palm seeds	0	14(10%)	126(90%)	1.1	11th
9	Training on marketing and management skills	14(10%)	70(50%)	56(40%)	1.7	10th
10	Marketing information	140(100%)	0	0	5	2nd
11	Appropriate policy for price control	140(100%)	0	0	5	3rd

Source: Field survey, 2016.

5.5. Test of hypothesis of the study

TABLE 9: Test of significant relation between selected socio-economic characteristics and the extension needs of oil palm processors

Variables	Coefficients(R)	P-Value	Remark
Age	0.197*	0.020	Significant
Educational Level	-0.212*	0.012	Significant
Experience	0.256**	0.002	Significant
Household Size	-0.017	0.842	Not Significant

*Correlation is significant at 0.05 Level.

**Correlation is significant at 0.01 Level.

Table 9 reveals the summary of Pearson Product Moment Correlation analysis results on the test of significant relationship between some selected Socio-economic characteristics and the extension needs of the respondents. The result of the analysis shows that there is a significant relationship between Age, Educational Level, Experience and the extension needs of the respondents. This implies that the age of oil palm processors will determine their extension needs, also, the educational level of processors will significantly influence their extension needs. The years of experience of a processor will also go a long way in determining their extension needs. However, the household size has no significant relationship with the extension needs, this implies that, the household size of oil palm processors does not have effect on their extension needs. In this case, we accept the null hypothesis.

6. CONCLUSION

The main objective of this study has been to assess the extension needs of small scale oil palm processors in Osun state. Based on evidence in the study, the following conclusions were drawn:

Majority of the respondents were aged, married and highly experienced in Oil palm processing. Only women are involved in oil palm processing. Majority of the respondents use both modern and traditional method of processing. Majority of the respondents use hired equipment and hired labour. Radio and neighbors are the available sources of information to processors. The major challenges faced by oil palm processors are water related and transportation problems. Respondents require training for stripping, digestion, mixing, skimming, and clarification. The expressed needs areas of oil palm processors for agricultural advice from the extension service includes accessing loans and grants, marketing information, appropriate policy for price control, formation of agricultural cooperatives, hygienic handling of oil palm, storage of oil palm, more productive processing techniques among others. Age, experience and educational level significantly influence the extension needs of oil palm processors.

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