ASSESSMENT OF ADOPTION OF IMPROVED PROCESSING TECHNIQUES AMONG PALM OIL PROCESSORS IN IFE NORTH LOCAL GOVERNMENT AREA, OSUN STATE, NIGERIA

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ABSTRACT

The study was carried out to assess the adoption of improved processing techniques among palm oil processors in Ife North local government area of Osun state, Nigeria. A multi-stage sampling technique was used to select 120 respondents from the study area and data was collected through a well-structured questionnaire. The data were analyzed through descriptive statistics. The result shows that majority of the respondents (74.2%) are female, 42.5% are between the age range of 31-40 and 54.2% are married. The result also shows that some improved techniques have been introduced to the farmers while some have not been introduced to them. A large number of the respondents have access to information mostly from neighborhood farmers, but there was variation in their level of adoption. Majority (75.8%) adopted hydraulic presser which is the highest technology adopted while Malaysian knife have not been adopted by 100% of the respondent. There was high level of challenges faced by the processors in the study area. Therefore it is recommended that more awareness and sensitization on improved processing technique should be given to palm oil processors and also the materials should be constructed by local crude and less sophisticated materials that can be constructed and repaired locally.

INTRODUCTION

Oil palm (*Elaeis guineensis*) is a multipurpose tree crop with almost all parts of the tree having one form of socio-economic value or the other, (*Elaeis guineensis Jacq.*) is a perennial crop that originated from the tropical rain forest of West Africa (Olagunju, 2008). Oil palm is capable of stabilizing global food security especially in developing countries and has become an increasingly important driver of economic development and poverty reduction in the major producing countries of the world, Nigeria inclusive.

Hence, the significance of oil palm to Nigerian economic cannot be over emphasized. For instance, Onoh and Peter-Onoh (2012) stated that, the importance of oil palm to the national economy range from production of food for human and livestock consumption, employment, income to farmers and the nation and raw materials for industries. Oil palm has been a major source of foreign exchange to Nigeria as well as source of revenue to major segment of the rural population of south east Nigeria. Ayinde, *et al.,* (2012) noted that the world's growing population will require more than 230 million tonnes

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of edible oils by 2021, with palm oil contributing more than 100 million tonnes. The principal product of oil palm is palm fruits from which other economics products such as palm oil, palm kernel oil, palm kernel cake and cracked shells are derived through processing. Palm oil is the world's largest source of consumable oil, accounting for about 38.5 million tonnes of the global edible oil and fat. The uses of palm oil are enormous, ranging from cooking to industrial use for soap making, pomade, metal plating, lamp oil, glycerine, butter and manufacturing of paints among others.

Oil palm processing and its value addition have the potential to strengthen national food security and reduce rural poverty. The extra value like vegetable oil, palm kernel oil, native soap, can be used for commercial purposes, which serve as a source of income. Palm fruits are processed by processors into other by-products using traditional and mechanized methods of processing. The traditional method of processing palm fruits is common among the smallholder processors which are carried out by steeping the pounded fruit mash in hot or cold water; removing fibre and nuts in small baskets and hand squeezing; filtering out residual fibre from the oil/water emulsion in perforated metal colanders or baskets; boiling and skimming palm oil from the oil/water mixture and drying the recovered oil (Poku, 1998). The traditional method of palm fruits processing is highly laborious, time consuming and wasteful as about 25% - 35% of the potential palm oil and palm kernel oil are lost during processing. On the other hand, mechanized processing of palm fruits is adjudged to be efficient as it reduces drudgery and increased quality and quantity of processed products. Nwalieji and Ojike (2018) summarized the oil winning process to involve the reception of fresh fruit bunches from the plantations, sterilizing and threshing of the bunch to free the palm fruit, mashing the fruit and pressing out the crude palm oil. The crude oil is further treated to purify and dry it for storage and export. Despite the usefulness of oil palm, record has shown that only few people out of the Nigeria population are actually engaged in oil palm production due to the widely used method for the processing techniques of palm fruits which leads to the low production of oil palm and this has led to several issues which include hike in price of available ones, high demand but little supply which also affects the agricultural sector of the economy of the nation and could lead to having no or low production. Others take it as a part time business and this is because there are predominant factors that prevent farmers from being fully involved in oil palm including the stress of production, low production etc.

MATERIALS AND METHODS

The study was carried out in Ife North Local Government Area of Osun state, Nigeria. The headquarters are in the town of Ipetumodu in the North of the area with geographic coordinate of 7.4592°N, 4.4388°E. It has an area of 889 kilometers square and population of 153,694 at the 2006 census. In this town, the wet season is oppressive and overcast, the dry season is muggy and partly cloudy, and it is hot year round. Over the course of the year, the temperature typically varies from 18.889°C to 34.444°C and is rarely below 16.111°C or above. The study population consists of the palm oil processors in Ife North Local Government in Osun state. A multistage sampling procedure was used for this study. Stage 1 involved the purposive selection Ife North LGA due to the abundance of palm oil processors in the area. The second stage involved the random selection of four (4) wards out of the ten wards in the LGA. The third stage involved the simple random sampling of five (5) villages from each of the wards. The fourth and final stage involved the simple random sampling of six (6) palm oil processors from each of the villages giving a total number of 120 respondents used for this study. Data for this study was collected from both primary and secondary sources. The primary source was through the use of well-structured questionnaire with interview. Descriptive statistical tools such as frequency, percentages, e.t.c were used for the study.

RESULTS AND DISCUSSIONS

The results on Table 1 shows the socio-economic characteristics of the respondents as it shows that 74.2% are females and 35.8% are males and this implies palm oil processing in the study area is female dominated. This could be attributed to the fact that females are always involved in equipment and materials washing and several other related jobs are done by females both on farm and in the household and this finding is in agreement with Adah, (2015) who reported that higher percentage of female in palm oil processing based on the nature of work involved in the business. The study further reveals that 42.5% of the respondents are between the age range of 31-40 and 37.5% are between the age range of 41-50 and this indicate that the respondents are in their productive and active age which would further have an impact on their processing which is line with Adaigho (2018) that opined activeness of respondents in oil palm processing will further help to ensure productivity. The distribution of the respondents according to marital status presented in Table 1 reveals that majority (54.2%) are married which means the processors are potential adopters of innovations because married peoples tends to feed more members of the family and would therefore need to adopt innovations to ensure they are able to meet the needs and this correlates with Abdulquadri (2014) that reported that marriage and adoption of innovations is related. In respect to educational level, the respondents were observed to have a food educational background with 50% having primary education and 32.5% having secondary education which indicates that the respondents are literate and can understand innovations brought to processors and this is in tandem with Nwachuckwu, *et.al.,*(2018) who affirmed that literacy helps farmers to understand and adopt

innovations. The result also indicates that 50% of the respondents are muslims and 45.8% are Christians which shows that the study area is of a mixed religion. Furthermore, the table above shows that 67% are having the household size of between 5and 8 members and 27.5% are having the household size of between 1 and 4members and the largest percentage of members with large household size shows that there is availability of labour for operation and this will help to reduce cost of labour. This findings is similar to Adaigho, 2018 who opined that the larger the household the more availability of labour. Table 1 shows the years of experience which indicates 65.0% are having7-9years of experience in processing and 22.3% have experience of 4-6 years and this shows the respondents are experienced in the business and would further be ready to adopt innovation and technique in processing of oil palm

and this result corroborates with Agbamu (2006) who believes that experience impacts positively on innovation adoption. The distribution of methods of processing oil palm among processor varies slightly with 57.5% practicing modern method of processing and 42.5% practice traditional methods of processing and this implies that the respondents still use different methods of processing and could probably be due to not having the information about the modern techniques. The report is similar to Ukpabi, (2004) that reported mixed methods were used among respondents in the study area. The findings of this study shows 95.8% of the respondents produce palm oil on a medium basis which implies that respondents would be able to meet the needs of both the family and the business so as to ensure maximum productivity.

TABLE 1: SOCIO ECONOMIC CHARASTERISTICS OF THE RESPONDENTS

VARIABLE	FREQUENCY	PERCENTAGE
Sex		
Male	31	25.8
Female	89	74.2
Age		
20-30	7	14.2
31-40	51	42.5
41-50	45	37.5
Above 50	7	5.8
Marital status		
Single	1	8
Married	65	54.2
Divorced	32	26.7
Widow	15	12.5
Religion		
Christian	55	45.8
Muslim	60	50.0
Traditional	5	4.2
Education level		
No formal education	17	14.2
Primary education	60	50.0
Secondary education	39	32.5
Tertiary education	4	3.3
Household size		
1-4	33	27.5
5-8	81	67.6
>8	6	5.0
Years of experience		
<3	2	1.7
4-6	22	18.3
7-9	78	65.0
10-12	18	15
Methods used		
Traditional	51	42.5
Modern	69	57.5
Monthly production (Litres)		
<50	18	15.0
50-70	102	85.0
Scale of production		
Small	2	1.7
Medium	115	95.8
Large	3	2.5
TOTAL	**120**	**100**

Source; Field Survey, 2021.

The results on Table 2 shows the improved processing techniques introduced to the processors in the study area. It indicates that the following processing techniques were introduced to the processors which include Hydraulic presser (100%), Use of Digester (98.3%), Use of cracker and Separator for cracking kernel (88.3%), use of rotating heater (98.3%), use of malysian knife (98.3%)and large tanks or containers for boiling and drying. The higher percentage of users could be attributed to the fact that the techniques introduced to the processors are the ones that will help to reduce drudgery and stress in operations since the operations are labour intensive. This findings is similar to Adeniyi, Ogunsola and Oluwusi (2014) who reported that due to the labour requirement operations like digesting, pressing and cracking of kernel several processing techniques was introduced to the processors to help in operation. Regarding the fact that some techniques were introduced to the processors for oil palm processing, some techniques were not introduced to the a large number of the processors processors which include use of sterilizer (92.5%), use of mechanical and adjustable harvester (81.7%) and Electric heater (60%) and this could be attributed to the fact that the techniques and the machines require much of resources like financial and adequate technical know how to operate. The findings support Agwu (2006) who posited that the low introduction of some techniques could be attributed to high cost, unavailability, as well as complexity in operation.

TABLE 2: Improved processing techniques introduced to respondents.

Variables	No F(%)	Yes F(%)
1. Use of hydraulic Presser	0(0)	120(100)
2. Use of Digester	2(1.7)	118(98.3)
3. Use of Cracker and separator for cracking kernel	20(16.7)	100(83.3)
4. Use of Sterilizer	111(92.5)	9(7.5)
5. Use of rotary beater	2(1.7)	118(98.3)
6. The use of thresher	52(43.3)	68(56.7)
7. The use of improved filter plate	87(72.5)	33(27.5)
8. Use of flushing extractor	58(48.3)	62(51.7)
9. Use of mechanical adjustable harvester	98(81.7)	22(18.3)
10. Use of malysian knife	2(1.7)	118(98.3)
11. Large tank or container for boiling and drying	6(5.0)	114(95.0)
12. Electric heater, motor	72(60.0)	48(40.0)

Source; Field Survey, 2021.

The results on Table 3 reveals the sources of information available to farmers on the techniques of oil palm processing. It shows 63.3.% of the farmers rarely access information through the television while 20.8% often obtain information through the television and the usage of information. Also 55.8% rarely use radio for accessing information with 34.2% of the respondents who often use radio for accessing information. This implies that the respondents obtain information from the sources which could be due to easy accessibility of the sources of information to the processor and based on the programs listened to from the sources. These findings relates with Adekunle *et al.* (2002) who had earlier reported that the television and radio is used as a means of obtaining information on crop processing and production practices like palm oil processing. The study further shows that 57.5% of the respondents never got information from agricultural extension workers and 31.7% only get information rarely through agricultural extension workers and this depleted that dissemination of information by extension services are not readily available and accessible in the study area. It was also indicated that 41.7% of the respondents do not have access to information through exhibitions and demonstrations and this could be attributed to the low services rendered by extension agents which do not give processors access to practice the adoption of the innovations. This finding is in line with Onoh and Peter- Onoh (2012) who reported that respondents were not able to access information through services of extension workers due to poor or low availability of extension agents. The distribution by the accessing of information through neighborhood farmers shows that 69.2% of the respondents always got information from their neighbor and 22.5% often got information through their neighbor and this could be due to the fact that processors trust the information derived from their neighbors and according to Onweremadu and Njoku (2007), who reported that farmers derive the information from their neighbor based on the reliability on the information derived from them.

TABLE 3: SOURCES OF INFORMATIONS AVAILABLE FOR OIL PALM PROCESSORS

Sources of Information	Never F(%)	Rarely	Often	Always
1. Television	9(7.5)	76(63.3)	25(20.8)	10(8.3)
2. Radio	8(6.7)	67(55.8)	41(34.2)	4(3.3)
3. Agricultural extension workers	69(57.5)	38(31.7)	9(7.5)	4(3.3)
4. Agricultural product suppliers	15(12.5)	44(36.7)	55(45.8)	6(5.0)
5. Public libraries	113(94.2)	4(3.3)	1(0.8)	2(1.7)
6. Exhibitions and Demonstrations	50(41.7)	32(26.7)	32(26.7)	6(5.0)
7. Agricultural journals, Magazines and Newsletters.	94(78.3)	19(15.8)	5(4.2)	2(1.7)
8. Leaflets, pamphlets, billboard	7(5.8)	42(35.0)	67(55.8)	4(3.3)
9. Neighborhood farmers	4(3.3)	6(5.0)	27(22.5)	83(69.2)

Source; Field Survey, 2021.

The results on Table 4 shows the rate adoption of palm oil processing techniques among palm oil processors. The table identified use of hydraulic presser (75.8%), use of digester (74.8%), use of rotary beater (37.5%), use of large tanks or containers for boiling and drying (44.2%) and use of cracker and separator for cracking kernel were the techniques that were adopted in the study area with use of hydraulic presser having the highest percentage of adoption by palm oil processors. The rate of adoption of these techniques could be attributed to the fact that these techniques help the farmers to have production of oil palm in a hygienic way, reduce stress and drudgery associated with the processing of oil palm and also to ensure fast and productive operation. This findings support several findings on adoption of palm oil processing techniques among palm oil processors like Patience and James (2013) who opined that the usage of modern techniques for processing helps processor in their operations and reducing the stress and several other negative factors that accompany the use of traditional techniques and also(Adejuwon *et al.,* (2016) that affirmed the improved technology users (adopters) either use screw press or the hydraulic press for oil extraction. The study further shows low and no rate of adoption of some techniques like use of sterilizers used at a little extent by 99.2%, 98.3% of respondents at a very little extent use threshers while some techniques was not used at all by some respondents like use of improved filter plate (89.2%), use of flushing extractor (50%), use of mechanical adjustable harvester (94.2%) and use of electric heater (97.5%). This low rate of adoption could be attributed to several reasons like financial, social, the ability of the respondents to understand the techniques and its operation, etc and this findings correlates with Adetunji (2004) who relayed that respondents could experience low adoption of techniques due to reasons like economic, social, political and psychological factors.

TABLE 4: RATE OF ADOPTION OF THE IMPROVED OIL PALM FRUIT PROCESSING TECHNIQUES.

	PARAMETERS	VERY LARGE EXTENT,	LARGE EXTENT	VERY LITTLE EXTENT	LITTLE EXTENT,	NOT AT ALL
1.	Use of hydraulic Presser	7(5.8)	91(75.8)	9(7.5)	8(6.7)	5(4.2)
2.	Use of Digester	25(20.8)	65(54.2)	0(0)	17()14.2	13(10.8)
3.	Use of Cracker and separator for cracking kernel	2(1.7)	75(62.5)	10(8.3)	14(11.7)	14(11.7)
4.	Use of Sterilizer	0(0)	0(0)	0(0)	119(99.2)	1(0.8)
5.	Use of rotary beater	51(42.5)	45(37.5)	14(11.7)	10(8.3)	0(0)
6.	The use of thresher	0(0)	0(0)	118(98.3)	0(0)	2(1.7)
7.	The use of improved filter plate	0(0)	0(0)	4(3.3)	9(7.5)	107(89.2)
8.	Use of flushing extractor	5(4.2)	5(4.2)	13(10.8)	37(30.8)	60(50)
9.	Use of mechanical adjustable harvester	0(0)	0(0)	0(0)	7(5.8)	113(94.2)
10.	Use of malaysian knife	0(0)	0(0)	0(0)	0(0)	120(100)
11.	Large tank or container for boiling and drying	31(25.8)	53(44.2)	24(20.0)	9(7.5)	3(2.5)
12.	Electric heater, motor	0(0)	0(0)	0(0)	3(2.5)	117(97.5)

Source; Field Survey, 2021

The table 5 shows the challenges faced by respondents in the study area in the adoption of improved processing techniques. It shows that 82.5% are faced with exposure to risks and with no or low availability of materials involved in adoption each respectively. It also identified short period of awareness (70.8%), trained personnel are not enough for the training (70%), it takes long time to adopt by 57.5% and also maintenance cost is high (63.3%). This findings implies that the farmers are faced with several challenges in adopting the oil palm processing techniques and it is similar to Amusa, *et.al.,* (2017) who reported that challenges faced by processors in adopting new techniques are exposure of processors to risk, scarcity of farm inputs, and unawareness of farm improved technology with little extension agents available for the dissemination of information.

TABLE 5: CHALLENGES FACED IN ADOPTING THE TECHNIQUES

	PARAMETERS	CHALLENGE	NOT A CHALLENGE
1.	The techniques are expensive to afford	69(57.5)	51(42.5)
2.	Maintenance of the equipment is too high	76(63.3)	44(36.7)
3.	They cannot be operated without technical know how	25(20.8)	95(79.2)
4.	They expose the processors to high risk.	99(82.5)	21(17.5)
5.	They take long time to adopt.	69(57.5)	51(42.5)
6.	They cannot improve the processors knowledge.	82(63.8)	38(31.7)
7.	There is no or low availability of materials involved in the adoption process.	99(82.5)	21(17.5)
8.	There is language barrier	16(13.3)	104(89.7)
9.	Period of Awareness is short	85(70.8)	35(29.2)
10.	Trained personnel are not enough for the training	84(70.0)	36(30.00

Source; Field Survey, 2021

CONCLUSIONS AND RECOMMENDATIONS

Based on the outcome of these findings on the socio-economic characteristics of the respondents, it was observed that oil palm processing in the study area is female dominated, they are married, experienced adults with good educational background while they use both traditional methods and modern methods of processing. The study revealed that various techniques was introduced to the processors for the processors to adopt and they were introduced based on their relationship to the productivity and relevance to oil palm processing. The farmers affirmed that they have access to information through their neighborhood farmers majorly while receiving information from radio, television, but claimed they did not have access to information from extension services and also print media like newspaper, journals e.t.c due to high cost of acquiring and turn around maintenance of the gadget. However, the processors face several challenges in adopting the improved processing techniques which include taking long time to adopt and also lack of trained personnel with no or low availability of materials involved in adopting the innovations.

The study therefore recommends the following:

➤ There should be continuous awareness of improved processing techniques to processors so as to ensure consistent and increase rate of adoptions.

➤ There should be proper recruitment, training for extension agents on improved process techniques while also ensuring adequate and necessary processing materials are provided for the extension agents for adoption of the techniques by oppressors.

➤ Likewise, some of the machineries should be constructed with local, crude and less sophisticated materials which the processors can access and could be easily maintain and repair.

➤ There should also be provision of support like finance and other supports like providing machines and implements to processors at a subsidized and affordable rate.

REFERENCES

Adah, O. C and Obinne, C. O., 2015. Analysis of Extent of Awareness and Adoption of Improved Oil Palm Fruit Processing Technology in Kogi State, Nigeria, Journal of Biology, Agriculture and Healthcare. Vol.5, No.20. Pp 5-10

Adaigho D. and Nwadiolu R., 2018. Adoption of Recommended Palm Oil Processing Technology in Isoko North Local Government Area, Delta State, Nigeria, Asian Journal of Agricultural Extension, Economics and Sociology 24(1): 1-8.

Adeniyi, O. R., Ogunsola, G. O and Oluwusi, D., 2014. Methods of Palm Oil Processing in Ogun state, Nigeria: A Resource Use Efficiency Assessment. American International Journal of Contemporary Research, 4 (8): 173 – 179.

Adetunji, M. O., 2004. Post-harvest technology as a panacea to food security and economic development. Paper presented at Regional Workshop on Food Security as a Panacea for Poverty Eradication and Development of Rural Economy. 2-3.

Agwu, A. E., 2006. Adoption of improved oil palm production and processing technologies in Arochukwu Local Government Area of Abia State, Nigeria. Agro-science: Journal of Agriculture, Food, Environment and Extension .5(1) 25-35.

Agbamu J. U., 2006. Essential of agricultural communication in Nigeria. Malthouse Press Ltd, IIB Gorola Street off Adeola Victoria Island, Lagos; 2006.

Amusa, T. A., Anugwo, S. C. and Esheya, S. E., 2107. Factors influencing processors willingness to engage in mechanized palm fruits processing in Abia State, Nigeria. Nigeria Agricultural Journal, 48, 236-247.

Ayinde, O. E., Muchie, M., Adenuga, A. H., Jesudun, M. O., Olagunju, F. I and Adewumi, M. O., 2012. Food Security and Emerging Innovations in Oil Palm Production in Osun State, Nigeria. Pakistan Journal of Nutrition, 11 (11): 1009 – 1013.

Olagunju, F. I., 2008. Economics of Palm Oil Processing in Southwestern Nigeria. International Journal of Agricultural Economics and Rural Development 1 (2): 69 - 77.

Onoh, P. A and Peter-Onoh. C. A., 2012. Adoption of Improved Oil Palm Production Technology among Farmers in Aboh Mbaise Local Government Area of Imo State. Int'l Journal of Agric. and Rural Dev. 15 (2): 966 – 971.

Gunn P. and Nandi J. A., 2013. The Role Of Information On Adoption Of Improved Palm Oil Processing Technologies In Delta State, Nigeria. Int. J. Agric. Sc and Vet. Med. Vol 1. Pp 81-86

Poku, K., 1998. Oil Palm Smallholder Development. Rome: Food and Agriculture Organization.

Ukpabi, U. J., 2004. Sustainable Post Harvest Technologies for the Major Food Crop and Flesh. A Paper Presented at the Workshop for Abia State Local Government Agricultural Officers, NRCRI, Umudike, 10th –12th May, pp   1   -   13.