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An Assessment of Processors' Awareness, Perception and Adoption of NIFOR Developed Improved Coconut Processing Technologies in Lagos State, Nigeria

L. Igene*, O. Solomon, E.G. Orji, B.E. Akagbosu and M. Osifo

Extension Division, Nigerian Institute for Oil Palm Research, Benin City, Edo State, Nigeria

ABSTRACT

The study assessed the awareness, perception and adoption of NIFOR developed improved coconut processing technologies in Lagos state, Nigeria. A total of 120 coconut processors were sampled through a multi-stage random sampling procedure. Primary data which were obtained through administration of structured questionnaire were used for this study. Percentages, Weighted mean scores and Chi-square were used for presenting the data. The findings of the study show that majority (77.1%) of the respondents were female, married (88.1%) and belong to age bracket of 31-50 years old (78.9%). Also majority (78%) of the respondents had primary with or without secondary education and larger percentage (89.9%) had between less than 1 and 2 ha. of land with up to 15 years of processing experience (61.8%). The findings also revealed that majority (81.1%), (74.6%), (67.8%) and (60.2%) of the respondents were not aware of husk fiber weaving frame, coconut oil expeller, meat grater and rotary copra dryer. Nevertheless, results support high perception of improved coconut processing technologies but low adoption of NIFOR developed improved coconut processing technologies such as rotary dryer (100%), expeller (100%), meat grater (100%) and husk fiber weaving frame (100%) respectively, while dehusker lever (41.53%) was the only adopted NIFOR developed coconut processing technologies in the study area. Chi-square result showed that age ($\chi 2$ = -7.851, p = 0.049), educational level ($\chi 2$= 27.722, p = 0.000), farm size ($\chi 2$ = 20.460, p =0.000), years of processing experience ($\chi 2$ = 8.454, p = 0.038) and household size ($\chi 2$ = -0.190, p = 0.35) were significantly related to adoption of NIFOR developed improved coconut processing technologies. For coconut processors to be more aware and adopt NIFOR developed improved coconut technologies, the study, therefore, recommends that Extension arm of NIFOR in collaboration with LASCODA should carry out sensitization and training through workshops, seminars etc at least twice in a year in the study area.

Keywords: Coconut, awareness, perception, adoption, NIFOR

INTRODUCTION

The transformation agenda of the Federal Government of Nigeria has unequivocally lent credence to the need to develop the agricultural sector through commercialization of the sector rather than the present and prevailing subsistence nature (Okuneye *et al*., 2014). The drive towards commercialization which is often in consonance with production of large quantities cannot be sustainable without the adoption of processing technologies (Okuneye *et al*., 2014). Moreover, the development of high yielding and disease resistance coconut varieties will be a waste if complementing processing technologies are not developed and adopted. This become imperative as value addition in form of processing is a virile means of preventing deterioration and wastage of coconut fruits after harvesting. Although there are traditional technologies in the processing of coconut, such often lead to low productivity, drudgery, time consuming and generally inefficient. Therefore, coconut processing technologies that ameliorate the above shortcomings in traditional technologies and also have the potential to improve the nation's economy have been developed in Nigeria by Nigerian Institute for Oil Palm Research (NIFOR).

The Nigerian Institute for Oil Palm Research (NIFOR) came into being in 1964 after being formerly known as Oil Palm Research Station (OPRS) in 1939 and West African Institute for Oil Palm Research (WAIFOR) in 1951. It was established to carry out research on Oil palm, Coconut, Raphia

Address for correspondence:

igenelucky@gmail.com

palm, Date palm and Shea trees. Amongst the functions and responsibilities of NIFOR is the design and fabrication of simple implements and equipment for palm processing. In view of the aforementioned function, improved coconut processing equipment such as dehusker lever for coconut husk removal, husk fiber weaving frame for foot mat production, meat grater for coconut milk production, rotary dryer for copra production, expeller for copra oil and cake production, have been developed in NIFOR over the years. However, despite the availability of the above mentioned improved coconut processing technologies in NIFOR, Nigeria still remains an importer of coconut products from Asia and its neighbouring West Africa countries like Benin, Ghana and Côte d'Ivoire (François *et al*, 2010). And again, the traditional techniques which often lead to time wasting, drudgery, low farm incomes, poor quality products etc. are still in use NIFOR (2008).

This study was therefore carried out to provide empirical evidence of the state of awareness and adoption of improved coconut processing technologies in Lagos State. Explicitly, it provided answers to questions such as: Are coconut processors aware of improved coconut processing technologies developed in NIFOR? Are the processors using NIFOR developed technologies? The major objective of the study was to determine the adoption of NIFOR developed improved coconut processing technologies in Lagos State while the specific objectives were to

- determine selected socio-economic characteristics of respondents,
- determine the respondents awareness of NIFOR developed improved coconut processing technologies,
- determine respondents possession and functionality of NIFOR developed improved coconut processing technologies,
- determine the respondents level of perception of improved coconut processing technologies,
- investigate the respondents' adoption of NIFOR developed improved coconut processing technologies and
- Determine the relationship between selected socio-economic characteristics of respondents and their adoption of NIFOR developed improved coconut processing technologies.

METHODOLOGY

The study was carried out in Lagos state of Nigeria which is located in South - West Nigeria. The State is made up of 20 Local Government Areas (LGA). It lies within latitude $6^0 2^1$N to $6^0 4^1$N and longitude $2^0\ 45^1$E to $4^0 20^1$E respectively, covers a total landmass of 358, 861 hectares or 3,577 km^2 with a population of 8,048,430 and a population density of 2,594 persons per km^2 National Population Census (NPC), 2006). The dominant vegetation of the state is the swamp forest consisting of the freshwater mangrove swamp forest, both of which are influenced by the double rainfall pattern of the state, which makes the environment a wetland region. Generally, the state has two climatic seasons: dry season (November-March) and wet (April-October). The major water bodies are the Lagos and Lekki lagoons, Yewa and Ogun Rivers. Others are Ologe Lagoon, Kuramo water, Badagry, Five cowries and Omu creeks. In most part of the state, the temperature is characterized by a constant high temperature throughout the year. The average maximum and minimum temperature are about 30^oC and 22^oC respectively, while the relative humidity is high all over the state throughout the year and may not be less than 75 – 80%. In spite of the high level of commercial and industrial activities in Lagos State, a few percentages of the people are engaged in either agriculture or agro related activities. These are localized in the peri-urban and rural settings of the state. Among the crops grown are coconut, tomato, cassava, maize, leafy vegetable etc.

The target population of the study was coconut processors. Multi-stage sampling technique was used to select 120 coconut processors in the study area. The first stage involved purposive selection of Badagry Local Government Area because of the high concentration of coconut production and processing activities. The second stage involved the stratification of the LGA into three Local Council Development Areas ($LCDA_S$) namely: Badagry central, Badagry west and Olorunda. The third stage involved the use of simple random sampling techniques to select five communities from each of the LCDAs, making with a total sum of 15 communities. From each of the community, 8 respondents who were coconut processors were then randomly selected. The study was based on the primary data obtained from coconut processors in the study area using interview schedule with the aid of well-structured questionnaire. Data were collected on selected socio-economic characteristics of the

coconut processors, awareness of NIFOR developed improved coconut processing technologies, posession and functionality of NIFOR developed improved coconut processing technologies, level of perception of respondents' on developed improved coconut processing technologies and adoption of NIFOR developed improved coconut processing technologies in Lagos State. Two out of the one hundred and twenty questionnaires completed were found not useful for the analyses. Data were analysed using descriptive statistic such as frequency counts, percentages and means and Chi-square ($\chi 2$) was used to determine the significance of relationships between selected variables.

RESULTS AND DISCUSSION

Selected Socio-Economic Characteristics of Respondents

Table 1 shows the selected socio-economic characteristics of the respondents. The result shows that majority (77.1%) of the respondents were females, which is an indication that majority of coconut processors are females. The result agrees with that of Ekong (2003) that women are mostly involved in the processing of agricultural products than the men. Another reason could be that the culture of the people in the area do not allowed females to own coconut farms (Taiwo, 2010). Result in Table 1 also indicates that majority of the respondents (77.9%) were between 31 – 50 years old, married (81.1%) with household size of 1 – 4 constituting the highest percentage (67.8%). This study is in line with the National Population Policy (1988) that the ideal family size in Nigeria is four children per women, i.e. husband, wife and four children. Based on this finding, it can be inferred that small household was common in the study area. By implication, majority of the respondents' will use more of hired labour than family labour in the various processing activities. This study agrees with the finding of Odusile (2008) that rural dwellers sometimes do not have large family size contrary to general expectation. Majority of the respondents (78%) had primary and secondary education. This result agrees with Abiodun *et al.*, (2011) that majority of respondents in urban South-west Nigeria had primary and secondary education. Proper education according to Ochu (2000) is important in the use of improved farm practices. As regards years of experience, most of the respondents (66.9%) had processing experience of 11 years and above. Majority (89.9%) of the respondents had between less than 1 and 2 ha. This indicates that majority of the coconut processors in the study area are small scale farmers, which is in line with the view of Erie (1996) as quoted by Ajayi *et al.*, (2010) that small farm holdings constitute more than 70% of all farming activities in Nigeria. Finally, Table 1 reveals that about 65.3% of the respondents were generating up to ₦5, 000 per month from their various processing activities and 33.1% generated between ₦6, 000 - ₦10, 000. It can be inferred from this finding that majority of the respondents cannot afford the purchase of improved coconut processing equipment due to their low income earning from the sales of processed coconut products.

Table1. *Selected Socio-economic Characteristics of Respondents (n=118)*

S/N	Variable	Frequency	Percentage
1	**Age (yrs)**		
	21 - 30	10	8.5
	31 - 40	45	38.1
	41 – 50	47	39.8
	Above 50	16	13.6
2	**Sex**		
	Male	27	22.9
	Female	91	77.1
3	**Marital Status**		
	Single	8	6.8
	Married	104	88.1
	Divorced	3	2.5
	Widowed	3	2.5
4	**Household Size**		
	1-4	80	67.8
	5-8	33	28
	9-12	5	4.2
5	**Educational level**		
	No formal education	25	21.2
	Primary	50	42.4

	Secondary	42	35.6
	Tertiary	1	0.8
6	**Farm Size (ha.)**		
	Less than 1	52	44.1
	1- 2	54	45.8
	3- 4	7	5.9
	Above 5	5	4.2
7	**Years of processing experience**		
	1-5 years	17	14.4
	6-10 years	22	18.6
	11-15 years	51	43.2
	Above 15 years	28	23.7
8	**Monthly generated income**		
	Up to ₦5, 000	77	65.3
	₦6, 000 – ₦10, 000	39	33
	₦11, 000 - ₦15, 000	2	1.7

Source: *Field survey, 2014*

Awareness of Improved Coconut Processing Technologies

The result on Table 2 indicates that majority of the respondents were not aware of the following improved coconut processing technologies such as husk fiber weaving frame for foot mat production (88.1%), expeller for milk and cake production (74.6%), meat grater for coconut milk production (67.8%) and rotary dryer for copra production (60.2%). However, about 60.2% of the respondents were aware of dehusker lever. This may be due to the fact that the most available tool for processing coconut in the study area is dehusker lever.

Table2. *Respondents awareness of NIFOR developed improved coconut processing technologies (n = 118)*

Nifor developed improved coconut processing technologies	Aware	Not Aware
Dehusker lever for coconut husk removal	71 (60.2)*	47 (39.8)
Rotary dryer for copra production	47 (39.8)	71 (60.2)
Expeller for copra oil and cake production	30 (25.4)	88 (74.6)
Meat grater for coconut milk production	38 (32.2)	80 (67.8)
Husk fiber weaving frame for foot mat production	14 (11.9)	104 (88.1)

** Figures in parenthesis are percentage*

Source: *Field survey, 2014*

Respondent's Possession and Functionality of Nifor Developed Improved Coconut Processing Technologies

Table 3 shows respondent's possession and functionality of NIFOR developed improved coconut processing technologies. The table revealed that majority of the respondents do not possessed rotary dryer (100%), expeller for copra oil and cake production (100%), meat grater for coconut milk production (100%) and husk fiber weaving frame for foot mat production(100%) with dehusker lever for coconut husk having the highest (6.8%) of possession. This implies that there is little or no possession of the various NIFOR developed improved coconut processing technologies by the respondents. This may be as a result of the low awareness of NIFOR developed improved coconut processing technologies necessitated by lack of sensitization of respondents of NIFOR developed improved coconut processing technologies by NIFOR either through radio, television, newspapers, extension bulletins or fliers etc. Similarly, the high possession of mechanical dehusker amongst the processing technologies by the respondents may be due to the fact that dehusked coconuts are the most processed coconut products found in the Nigeria market. Furthermore, result in Table 3 shows that out of the (6.8%) of the dehusker lever possessed by the respondents only (3.4%) are functioning. This may be as a result of lack of technical know-how of the technologies by the respondents hence when the technologies or devices are damaged the respondents may not be able to repair them. Another reason could be lack of extension training on improved technologies since improved technologies requires some basic skills and knowledge before it can be operated on.

Table3. *Respondent's possession and functionality of NIFOR developed improved coconut processing technologies (n=118)*

Improved coconut processing technologies	Possession		Functionality	
	Yes	No	Yes	No
Dehusker lever for coconut husk removal	8 (6.8)*	110 (93.2)	4 (3.4)*	4(3.4)
Rotary dryer for copra production	-	118(100)	-	-
Expeller for copra oil and cake production		118(100)	-	-
Meat grater for coconut milk production		118(100)	-	-
Husk fiber weaving frame for foot mat production		118(100)	-	-

** Figures in parenthesis are percentage*

Source: *Field Survey, 2014*

Respondents Level of Perception of Improved Coconut Processing Technologies

The result shows a high level of perception of improved coconut processing technology. Specifically respondents show high level of perception of improved coconut processing technologies such as it will always contribute to Nigeria's GDP (weighted mean score = 4.96), could lead to increase in productivity (weighted mean score = 4.94), always enhance good quality products (weighted mean score = 4.92), household income could improve through the use of improved technologies (weighted mean score = 4.91), improved processing equipment are too expensive for individual processor to own (weighted mean score = 4.75), it is very difficult to find modern processing equipment to buy in the market (weighted mean score = 4.64), if processors adopt modern technologies, there will always be coconut products to buy in the market (weighted mean score = 4.53), improved technologies could be less hazardous than traditional technologies (weighted mean score = 4.01), i will always recommend modern technologies for commercial processing of coconuts (weighted mean score = 3.94), i like traditional technologies because they are easy to use (weighted mean score = 3.56), traditional technologies are only meant for poor people (weighted mean score = 3.16). However, some respondents also show low level of perception of improved coconut processing technologies such as improved technologies are always easy to use (weighted mean score = 2.95), improved technologies are usually operated on individual basis because of its complexities (weighted mean score = 2.69), Improved technologies could be less hygienic than traditional technologies (weighted mean score = 2.34), processors standard of living will be improved through traditional technologies (weighted mean score = 1.48), improved technologies will only provide job opportunities for women (weighted mean score = 1.32), products from traditional technologies usually stored longer than the ones from improved technologies, processors will not adopt modern technologies even if they are properly informed about it and extension agents always visit us to give more information about improved technologies (weighted mean score = 1.20)

Table4. *Level of perception of respondents towards improved coconut processing technologies (n=118)*

S/NO	Statement	Total Score	Weighted Mean Score
1	Improved technologies could lead to increase in productivity	583	4.94
2	The cost of production in modern technologies can be very low	124	1.05
3	Improved technologies could be less hazardous than traditional technologies	473	4.01
4	Improved technologies are always easy to use	348	2.95
5	Improved technologies always enhance good quality products	581	4.92
6	It is very difficult to find modern processing equipment to buy in the market	548	4.64
7	Improved technologies could be less hygienic than traditional technologies	276	2.34
8	Improved processing equipment are too expensive for individual processors to own	561	4.75
9	Using improved technology has greatly decreased my	129	1.09

	socio-economic status in the community in the last few years		
10	Products from traditional technologies usually stored longer than the ones from improved technologies	142	1.20
11	Household income could improve through the use of improved technologies	579	4.91
12	Improved technologies are usually operated on individual basis because of its complexities	317	2.69
13	Improved technologies will always contribute to Nigeria's GDP	585	4.96
14	Group organization is the only viable option for decreasing processors access to improved coconut processing technologies	139	1.18
15	If processors adopt modern technologies, there will always be coconut products to buy in the market	534	4.53
16	Processors will not adopt modern technologies even if they are properly informed about it	142	1.20
17	The use of internet will only inform me about the latest information on modern technologies	361	3.06
18	Extension agents always visit us to give more information about improved technologies	142	1.20
19	Improved technologies will only provide job opportunities for women	156	1.32
20	I like traditional technologies because they are easy to use	420	3.56
21	Processors standard of living will be improved through traditional technologies	174	1.48
22	The traditional technologies are only meant for poor people	372	3.16
23	I will always recommend modern technologies for commercial processing of coconuts	465	3.94
24	I use improved technology because it is not capital intensive Total mean perception score Weighted mean score X	118	1.0 77.06 2.96

Decision Rule: ≥ 2.96 = High perception, < 2.96 =Low perception

Source: *field Survey, 2014*

Respondents' Adoption of Ni for Developed Improved Coconut Processing Technologies

Table 5 reveals that only 41.53% of the respondents had adopted dehusker lever technology while majority (100%) of the respondents do not adopt the following NIFOR developed improved coconut processing technologies: rotary dryer, expeller, meat grater and husk fiber weaving frame. The low adoption may be as a result of low awareness of NIFOR developed improved coconut processing technologies in the study area. The adoption of dehusker lever (41.53%) by the respondents could be due to the fact that most of the processed coconuts products find in the Nigeria markets are the de-husked coconut fruits. The low level of adoption of NIFOR developed improved coconut processing technologies by the respondents implies that the traditional technologies are still prevalent in the study area. This finding agrees with (NIFOR, 2008)

Table5. *Adoption of NIFOR developed improved coconut processing technologies (n = 118)*

Improved technologies	Adopted (%)	Adopted but abandon (%)	Not adopted (%)
Dehusker lever	49 (41.53)*	3 (2.54)	66 (55.93)
Rotary dryer			118 (100)
Expeller for copra oil and cake production			118 (100)
Meat grater for coconut milk production			118 (100)
Husk fiber weaving frame for foot mat production			118 (100)

**Figures in parenthesis are percentages*

Source: *Field survey, 2014*

Relationship between some Selected Respondent's Socio-Economic Characteristics and their Adoption of Improved Coconut Processing Technologies.

Table 6 shows the relationship between respondents' some selected socio-economic characteristics and their adoption of improved coconut processing technologies. The result shows that there was a negative significant relationship between age of respondents' and adoption of improved coconut processing technologies ($\chi 2$ = -7.851, p = 0.049). This signifies that the younger the processors the more they will adopt improved coconut processing technologies. This study is in consonance with Oladoja *et al.*, (2008) that age is negatively related to adoption of new technologies. Similarly, there was a significant relationship between respondents' educational level ($\chi 2$= 27.722, p = 0.000) and their adoption of improved coconut processing technologies as shown in table 6. This result is not unexpected as people with good educational background are expected to adopt improved technologies than those with low education. This finding conform with findings of Nkonya *et al* (1997) which state that utilization of some agricultural technologies in Tanzania was positively related to farmers' educational level. Attributes and usefulness of any technology are better appraised by highly educated end users who also show more positive attitude towards the innovation. Table 6 also shows that there is a positive relationship that was significant between respondents farm size and their adoption of improved coconut processing technologies ($\chi 2$ = 20.460, p =0.000). This implies that an increase in the size of farm land of farmer will result in an increase in the adoption of improved coconut processing technologies. In the same vein, years of processing experience ($\chi 2$ = 8.454, p = 0.038) was also significantly related to respondents' adoption of improved coconut processing technologies. This implies that the more experienced a respondent is the more his adoption of improved coconut processing technologies and the more he will be willing to take risks associated with the adoption of improved technologies. This result agrees with those of Onyenweaku and Effiong (2005). Furthermore, there was a negative significant relationship between respondents' household size and adoption of improved coconut processing technologies ($\chi 2$ = -0.190, p = 0.35). It can be inferred from the result that adoption of improved coconut processing technologies by the respondents' will decrease as their household size increases while adoption of improved coconut processing technologies will increase as respondents' household size decreases.

Table6. *Relationship between respondents' selected socio-economic characteristics and adoption of improved coconut processing technologies.*

Variables	$\chi 2$	df	p-value	Decision ($p \leq 0.05$)
Age	-7.851	1	0.049	Significant
Educational level	27.722	3	0.000	Significant
Farm size	20.460	3	0.000	Significant
Years of processing experience	8.454	3	0.038	Significant
Household size	-0.190	1	0.35	Significant

$\chi 2$ = Chi-square, df = Degree of freedom, p = probability level of significance $p \leq 0.05$ (significant).

Source: Field survey, 2014

CONCLUSION

Based on the findings of this study, it can be concluded that the processors were mostly female, married, had primary with or without secondary education and a processing experience of up to 15 years. The processors in the study area are not aware of some NIFOR developed improved coconut processing technologies such as husk fiber weaving frame, coconut oil expeller, meat grater and rotary copra dryer. Evidence also suggests that majority of the processors had favourable perception towards improved coconut processing technologies but low adoption of NIFOR developed improved coconut processing technologies.

RECOMMENDATIONS

Based on the conclusion of this study, the following recommendations are made:

1. NIFOR in collaboration with LASCODA and ADPs should embark on massive sensitization drive in order to create awareness of its developed improved coconut processing technologies among the processors in the study area.
2. Processors should be motivated through credit facilities and series of training on technical-know-how of NIFOR developed improved coconut processing technologies in order to ensure sustainable

production of coconut products, since the processors have favourable perception towards improved coconut processing technologies.

3. Finally, it is recommended that adequate support in terms of funds by the Federal Government should be provided for NIFOR to aid or facilitate the dissemination of its developed improved coconut processing technologies in the study area.

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