Assessment of Cassava Processing Techniques on the Livelihood of Agro-Forestry Farmers in Edo State, Nigeria

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ABSTRACT: Post harvest losses resulting from inadequate processing have been one of the problems affecting farmers' income. This study was carried out to examine the contribution of cassava processing techniques on the livelihood of agroforestry farmers in Edo state. A purposive sampling technique was used to select 125 respondents which served as sample size for the study. Data were analyzed using descriptive statistics and inferential statistics. The results showed that 90.4% were aware of the cassava processing techniques such as the peeling, slicing, grating, sieving and frying machines. Furthermore, majority of the farmers agreed that the processing techniques were effectively in increasing productivity and 45.6% of the farmers had an increase in their annual income of up to ₦200,000. All the farmers attested that their income increased thus resulting in an increase in their livelihood. Chi-square results (p > 0.05) revealed that there was no significant relationship between the personal characteristics of the farmers and the constraints faced in the utilization of the technique. Results of correlation showed that there was a significant relationship between the processing techniques and the constraints faced in the utilization of techniques. Thus, it was recommended thatthe technologies be made simple for effective utilization in order to increase productivity.

Cassava (*Manihot Spp*) is a perennial woody shrub with an edible root, which grows in the tropical and subtropical areas of the world. Cassava production in Nigeria has increased over the years but Nigeria continues to import starch, flour, sweeteners that can be made from cassava (Cassava Master Plan, 2006). This is since cassava is still produced and consumed in Nigeria largely at a subsistence level. In Nigeria, most of the cassava produced (90%) is used for human food (IITA, 2010). Cassava is very versatile, and its derivatives are applicable in many types of products such as foods, confectionery, sweeteners, glues, plywood, textiles, paper, biodegradable products, monosodium glutamate, and drugs. Cassava chips and pellets are used in animal feed and alcohol production. Animal feed and starch production are only the minor uses of the crop in Nigeria. The government of Nigeria considers a transition from the present status of usage to the level of industrial raw material and livestock feed as a development goal that can spur growth with increase in employment. At present, a wide range of traditional cassava forms (such as *gari, fufu,* starch, *lafun, abacha,* etc) are produced for human consumption (Kormawa *et al.,* 2003). In view of the renewed emphasis on cassava production (supply), processing and utilization in Nigeria, it becomes necessary to assess the production, processing and utilization of cassava, and its effects on income generated by households especially in combating hunger and raising food security among vulnerable groups including women and infants. Postharvest losses have been one of the major problems to farmers' income in sub-Saharan Africa, and Nigeria. Poor post-harvest treatment practices have also been known to contribute to postharvest losses (Silayo *et al*., 2007). Since processing adds value to the cassava and also extends their shelf life, the present and common manual cassava processing methods are not good enough and are highly labor intensive and expensive. Manual processing requires a minimum of four person per day to peel and wash, and 23 person per day to chip one tonne of fresh cassava roots, translating to approximately US$65 to prepare a tonne of flour. In contrast, the cost of processing cassava into flour could be approximately $16/tonne with mechanized processing (FAO, 2002). The drudgery associated with traditional processing is enormous and the products from traditional processing methods are often contaminated with undesirable extraneous matters. Some of the products are therefore not hygienic and

have poor market value (Taiwo and Fasoyiro, 2015). The promotion of cassava processing and post-harvest technologies enhance food safety and generate substantial incomes for effective demand of food, goods and services aimed to reduce poverty. Cassava for example, produces more calories per unit of area cropped than most food crops, and at a lower per unit cost than cereals (Bell *et al.*, 2000). The farmers who produce and process cassava tubers efficiently using the modern processing techniques can generate significant incomes with their access to the urban markets. However, interventions in postharvest losses reduction are an important element of the efforts of many agencies to reduce food insecurity, shore up farmers' income and the prosperity of the nation. The utilization of these modern cassava processing techniques will lead to huge reduction in postharvest losses and increase income levels of the farmers and other stakeholders. This study was therefore carried out to assess the contribution of cassava processing techniques on the livelihood of agroforestry farmers in Edo State, Nigeria. The objectives of the study were to identify the socio-economic characteristics of the farmers in the study area; to ascertain farmers' awareness of the cassava processing technique; to determine the contribution of the processing technique on farmers' household income and to identify the constraints faced in the utilization of the processing technique.

Hypotheses of the study: H^{o1}: There is no significance relationship between farmers' socio-economic characteristics and constraints in the utilization of the processing technique. H^{o2}: There is no significance relationship between the cassava processing techniques and constraints in the utilization of the processing technique in the study area.

Study Area: This study was carried out in Sakpoba Forest Reserve Area in Orhionmwon Local Government Area of Edo state. It is in Orhionmwon Local Government Area, about 30 kilometers South-East of Benin City. Some of the major villages located within and around the reserve are Ugo, Ikobi, Oben, Iguelaba and Amaladi in Area B.C 32/4, and Ugboko-Niro, Iguere, Idunmwowina, Evbarhue, Idu, Evbueka, Iguomokhua, Ona, Abe, Igbakele, Adeyanba, Evbuosa in Area B.C 29. The people of the area are farmers and traders. Crops grown in the area include yam, cassava, maize, plantain, and cocoyam planted with some tress like *Tectona grandis* (teak), *Gmelina arborea*, *Terminalia ivorenisis*, *Khaya ivorensis* and so on. The primary data were obtained using well-structured questionnaire. A total of 10 villages where agroforestry system is being practiced were purposively selected from the study area after which

13 agroforestry farmers were randomly selected from each of the 10 villages to give a total of 130 respondents. However, only 125 agroforestry farmers gave responses to the questionnaire administered.

RESULTS AND DISCUSSION

Findings from Table 1 revealed the age distribution of respondents, out of 125 respondents that partook in this study, (7.2%) were below 20 years of age, (29.6 %) were within 20 to 29 years age range, (21.6%) were within 30 to 39 years of age, (23.2%) were within 40 to 49 years of age, and (18.4%) were 50 years and above. It could be deduced from the result that the majority of the farmers were between 30 and 49 years of age.

Table 1: Socio-Economic Characteristics of the respondents

Age	Frequency	Percentage (%)
Less than 20 years	9	7.2
20 – 29 years	27	21.6
30 – 39 years	37	29.6
40 – 49 years	29	23.2
Above 50 years	23	18.4
Sex		
Male	75	60.0
Female	50	40.0
Education Qualification		
Formal	81	64.8
Non-formal	44	35.2
Farm size in Hectares		
1 – 5	56	44.8
6- 10	38	30.4
11- 15	20	16.0
Above 15	11	8.8

Source: field survey 2020

Table 2: Farmers Awareness

Responses	Yes	No
	Frequency/Percentage	
Are you aware of some cassava processing techniques?	113 (90.4)	12 (9.6)
If yes:		
Peeling machine	14 (11.2)	111(88.8)
Slicing machine	9 (7.2)	116 (92.8)
Grating machine	125 (100)	-
Solar dryer	2 (1.6)	123 (98.4)
Mechanized pressing machine	81 (64.8)	44 (35.2)
Sieving machine	5 (4.0)	120 (96.0)
Frying machine	13 (10.4)	112 (89.6)

*Source: Field survey, 2020 *parenthesis indicates percentage*

This implies that the respondents were matured enough to participate in this study. Majority of the respondents were males (60%) while females represented (40%) of the total population. This implies that cassava production in the study area is male dominated. According to FAO 2006, lack of access to capital affected woman participation in agriculture.

About (64.8%) of the farmers had formal education while (35.2%) of the farmers had non- formal education.

This implies that the farmers in the study area had the ability to understand and utilize the processing techniques introduced to them. Iwala (2004) admits that education is related not only to the ability to obtain and process information, but also to the use of sophisticated techniques by the farmers. Findings also show that majority of the respondents were small scale farmers which is a characteristic of African farmers.

Table 3: Source of information

Responses	Yes (%)	No (%)
Newspaper	-	125 (100)
Television	32 (24.8)	94 (75.2)
Radio	11(8.8)	114 (91.2)
Social media	8 (6.4)	117 (93.6)
Personal contact	110 (88.0)	15 (12.0)
Extension agent	33 (26.4)	92 (73.6)

Source: Field survey, 2020 parenthesis indicates percentage

The result from Table 4 revealed most of the respondents Fifty two percent have known about the techniques for about 1-5 years, 28% for less than a year while 20% have known about the techniques for 5 to 10 years. This implies that majority of the respondents were fully aware of these techniques and were in a position to either to utilize the techniques or not.

Findings from Table 6 revealed that as a result of the use of the techniques, (17.6%) generated less that ₦50,000 annually, (12%) realized between ₦50,000 and ₦100,000 and (45.6%) generated between ₦100,000 and ₦200,000 a year. Furthermore, (14.4%) of the farmers generated between ₦200,000 to ₦500,000 while (10.2 %) made above ₦500,000 per year.

Twenty eight percent increased their farm size between 11 to 15 acres, (40.0%) increased between 16

to 20 acres and (19.2%) increased between 21 to 25 acres.

Table 4: How long have you been aware of the processing techniques?

Responses	Frequency	Percentage
Less than 1 year	35	28.0
1 – 5years	65	52.0
5 – 10 years	25	20.0
TOTAL	**125**	**100**

Source: Field survey, 2020

Furthermore, (12.8%) of the farmers increased their farm size above 25 acres. This is supported by Onubuogu *et al.,* 2014 that increase in capital increases productivity. With the use of the techniques, (0.8%) increased their output with less than 50kg, (33.6%) increased between 50kg to 100kg and (46.4%) increased between 100 to 200kg. Also, (16.0%) of the farmers increased their farm output between 200 to 500kg and (3.2 %) increased above 500kg.

This implies that the techniques had the ability to increase productivity if used. This is supported by Aliyu *et al.,* 2017 that technology usage increases productivity.

All farmers, one hundred percent indicated that the processing technique increased their livelihood. This implies that the utilization of the cassava processing techniques increased their productivity which in turn led to an increase in their farm income. Results in Table 7 showed that 48.8% of the respondents strongly agreed that the techniques are expensive while 4% strongly disagreed.

This implies that most of the farmers agreed that the techniques are expensive, and utilization can be enhanced through farmers' access to credit facilities.

This supports the assertion by Uaiene 2011 that farmers' access to credits increases agricultural technology use. Also, 26.4% strongly agreed that the techniques are complex to operate while 4% strongly disagreed.

Table 5: Are these techniques effective in increasing productivity

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Freq (%)	Freq (%)	Freq (%)	Freq (%)	Freq (%)
Peeling machine	11 (8.8)	13 (10.4)	6 (4.8)	77 (61.6)	18 (14.4)
Slicing machine	6 (4.8)	10 (8.0)	19 (15.2)	68 (54.4)	22 (17.6)
Grating machine	32 (25.6)	36 (28.8)	11 (8.8)	22 (17.6)	24 (19.2)
Solar dryer	7 (5.6)	4 (3.2)	14 (11.2)	83 (66.4)	17 (13.6)
Mechanized pressing machine	3 (2.4)	15 (12.0)	9 (7.2)	70 (56.0)	28 (22.4)
Sieving machine	11 (8.8)	7 (5.6)	17 (13.6)	70 (56.0)	20 (16.0)
Frying machine	7 (5.6)	17 (13.6)	12 (9.6)	76 (60.8)	13 (10.4)

*Source: Field survey, 2020   *parenthesis indicates percentage*

Table 6: Contribution of the techniques to their livelihood

Response	Frequency	(%)
Annual Income		
Less than ₦50,000	22	17.6
₦50,000 – ₦100,000	15	12
₦100,000 – ₦200,000	57	45.6
₦200,000 – ₦500,000	18	14.4
N500,000 and above	13	10.4
Farm Size		
10 – 15 acres	35	28.0
16 – 20 acres	50	40.0
21 – 25 acres	24	19.2
Above 25 acres	16	12.8
Output		
Less than 50kg	1	0.8
50 – 100kg	42	33.6
100 – 200kg	58	46.4
200 – 500kg	20	16.0
Above 500kg	4	3.2
Livelihood		
Increase	125	100
Decrease	-	-

Source: Field survey, 2020

Table 7: Constraints of the utilization of the processing techniques

Statements	Strongly Disagree Freq (%)	Disagree Freq (%)	Neutral Freq (%)	Agree Freq (%)	Strongly Agree Freq (%)
The techniques are expensive	5 (4.0)	7 (5.6)	9 (7.2)	43 (34.4)	61 (48.8)
The techniques are complex to operate	5 (4.0)	20 (16.0)	17 (13.6)	50 (40.0)	33 (26.4)
The techniques have high labour requirement	5 (4.0)	27 (21.6)	21 (16.8)	53 (42.9)	19 (15.2)
The techniques save time and energy	7 (6.6)	19 (15.2)	8 (6.4)	38 (30.4)	53 (42.4)
The techniques reduce health hazards	8 (6.4)	8 (6.4)	24 (19.2)	25 (20.0)	60(48.0)

*Source: Field survey, 2020   *parenthesis indicates percentage*

Furthermore, 15.2% strongly agreed that the techniques have high labour requirement and 42.9% agreed. This implies that the techniques are labour intensive. In addition, 42.4% of the respondents strongly agreed that the techniques save energy and time while 6.6% strongly disagreed. This is supported by Abdullahi *et al.,* 2015 that technology usage saves time. Forty eight percent strongly agreed that the techniques reduce health hazards.

Results of Hypotheses: H^{o1}: Result of Chi-square analysis of the personal characteristics of the respondents and the constraints in the utilization of the techniques. The result of the Chi-square analysis in Table 8 showed that there was no significant relationship (p > 0.05) between sex (χ^2= 0.023), marital status (χ^2 = 3.161), Educational level (χ^2 = 0.052) and farmers awareness (χ^2 = 3.745) and constraints faced by farmers in the utilization of the techniques. The result of the analysis revealed that, sex, marital status, educational level and farmers' awareness had no relationship with the constraints faced in the utilization of the techniques. This implies

that their personal characteristics are not factors that determine the constraints in the utilization of the techniques in the study area. This supports the assertions by Abu Samah *et al.,* 2009 that socio-economic characteristics of farmers do not determine agricultural technology utilization.

Table 8: Chi - square result of relationship between personal characteristics of the respondents and constraints in utilization of the processing techniques

Variables	χ^2-value	Df	P-value	Decision
Sex	0.023	1	0.878	NS
Educational level	0.052	1	0.329	NS
Farmers' awareness	3.745	2	0.154	NS
Marital status	3.161	3	0.367	NS

Correlation result on relationship between personal characteristics of respondents and constraints to in the utilization processing techniques: Result of Correlation analysis on the personal characteristics of the respondents and the constraints in the utilization of the techniques. The result of the Correlation analysis in Table 9 indicated there is no significant relationship (p> 0.05) between age (r = 0.006), Household size(r =

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-0.089), Farm size (r = -0.168) and labour size (r = -0.028) and constraints in the utilization of the processing techniques. The result of the analysis revealed that variables such as age, household size, farm size and labour size had no relationship with the constraints faced in the utilization of the techniques. This implies that their personal characteristics are not factors that determine the constraints in utilization of the techniques in the study area.

Table 9: Correlation result on relationship between personal characteristics of respondents and constraints to in the utilization processing techniques

Variables	R-value	P-value	Decision
Age	0.006	0.90	NS
Household size	- 0.089	0.086	NS
Farm size	- 0.168	0.082	NS
Labour size	- 0.028	0.91	NS

H^{o2}: Results from correlation analysis showed that there is a significant relationship ($p<0.005$) between that cassava processing techniques and the constraints faced in the study area. The result showed a negative value which means that the cassava processing techniques is inversely proportional to the constraints in utilization of the processing techniques. Hence, the higher the processing techniques, the lower the constraints in utilization

Table 10: Correlation result on relationship between cassava processing techniques and the constraints in utilization of the technique

Variables	R-value	P-value	Decision
Cassava processing techniques VS constraints in utilization	-0.202	0.003	S

Conclusion: This study has shown that majority of the cassava farmers in the study area were fully aware of these techniques and agreed that the utilization of the processing techniques increased their productivity which in turn led to increase in their farm income and livelihood. In addition, most of the farmers agreed that the techniques are expensive and complex to operate, though the usage saves time, energy and reduces health hazards. It is therefore recommended that improved techniques should be introduced through the extension agents and other agencies to the users.

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