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Assessment of Cassava Processing Machinery in Akinyele Local Government, Oyo State, Nigeria

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ABSTRACT

The study was conducted to know the state of cassava processing machinery and the knowledge of operators on maintenance of that machinery in Akinyele local government areas of Oyo state. The local Government is currently hosting International Institute of Tropical Agriculture IITA and total number of 50 cassava processors responded to our questionnaires. The distribution was 5 cassava processors per ward. The questionnaires used to collect data consists of the demographic structures, observed cassava processing machinery, methods of operating the machines, assessment of abandoned machines and reasons, ownership of the processing centres, sources of power for operating machines and the relationship between the cassava processors and the machine manufacturers. The results show that 75% of the processors were female, average age between 31-40 years (46%). Most of the machines abandoned were obsolete because of new technology and no capacity development to improve those machines for the cassava processors. This will be needed to boost agriculture and employment.

INTRODUCTION

Economy and unemployment is currently driving Nigerian Agriculture. The Nigerian authority's order of border closure against imported foods is making agriculture more interesting, many are returning to farm unwillingly without proper tools while others became emergency farmers of food crops. There is a need to fully transform agricultural practice from low level of mechanization to the highest level through the introduction of machinery. Tractors per 100 sq. km of arable land in Nigeria was 6.70 as at 2007. Its highest value over the past 50 years was 6.70 in 2007, while its lowest value was 0.21 in 1961 (FOA, 2007). Nigeria needs 750,000 tractors to be at par with global average (Okojie, 2018). Universities, private individuals and organizations are at the fore front of tackling the challenge of producing what we can use. These

institutions have developed tillage, planting, harvesting and processing machines. However, processing machines are of much demand, therefore this paper's focus is on cassava processing machines which come in different capacities and cost range that suit various farmers (Gbadamosi, 2017). Nigeria is currently exporting cassava processing machines to other countries thanks to IITA. Cassava (*Manihot utilisima*) is the most important food crop in Africa after rice and maize. The world's largest producer of cassava is Nigeria with a production of 47,406,770 tons in 2013 (Oishimaya, 2018). Cassava processing has received considerable attention in Nigeria due to increased demand for it as food with governmental policy backing. Farmers look up to the agronomist to provide them with improved varieties; they look up to engineers to help them solve complex issues of value addition by providing appropriate machines and equipment. This challenge has been undertaken by indigenous manufacturers, research institutes, universities and similar higher institutions.

These facilities designed and developed in hand tools format are usually manual, electric and internal combustion engine (ICE) operated machines. Equipment for processing cassava root are not different. All the unit operations involved in cassava processing have been successfully mechanized in Nigeria without exception. The fact that it is a perennial plant makes it easy to harvest when required and treated as a food reserve during droughts and famines. Cassava thus serves as both a cash and a subsistence crop. African nations are the most heavily dependent on root and tuber crops. In some countries of sub-Saharan Africa, cassava is even a staple or a sub-staple. In Ghana, 46% of the GDP of the country is contributed by trade in cassava. In India, cassava is a staple food in the Kerala and Andhra Pradesh states of the country. It is also consumed as an important carbohydrate source in Assam. The cassava produced in Thailand and Vietnam find the largest export market in China. In China, the Guangxi province is responsible for about 60% of the country's cassava production. Several types of alcoholic beverages are also made from cassava. Cassava is also an important part of many cuisines worldwide. Cassava also has certain toxic properties that must be treated before consumption. Cassava roots are also used as an important animal feed. A number of laundry products utilize cassava derivatives as laundry starch.

Cassava root is locally consumed in Nigeria as fufu, gari, or as cassava flour. Its products and by products are utilized in the industry and as livestock feeds. IITA has just introduced naturally fortified variety with β-carotene otherwise known as pro vitamin A. Processing the large tones of cassava in Nigeria to a targeted product for local consumption or export depends on the available machinery inputs. Therefore, the overall goal of cassava processing in Nigeria through agricultural mechanization practice is to enhance productivity, add value to products, reduce losses and drudgery, increase turnover of product which can increase house hold income and improve their overall welfare.

Davies *et a*l (2008) carried out survey of cassava processing machinery in the whole Oyo state as well as in Iwo local government area (LGA) of Osun state. Gbadamosi (2017) carried out appraisal of cassava processing machinery in Oyo town. In continuation of Gbadamosi's work, Akinyele LGA became a subject of these investigations with the objective to know the level of cassava processing mechanization adoption in every LGA of Oyo state for knowledge transfer to vocational students of agricultural science on how to feed the future generation. This paper is an effort to document another LGA report critically, looking at cassava processing machinery in Akinyele LGA of Oyo state.

MATERIALS AND METHODS

Survey of cassava processing machinery at Akinyele Local Government Area (LGA) as a case study was conducted by means of a structured questionnaire, administered through a participatory learning technique. The Local Government Area was divided into wards with 5 cassava processors. Thus, a total of 50 processing centers were visited. The questionnaire was divided into two sections A and B. Section A consists of social economic characteristics of the cassava processor which are names of the processor, of respondent, age, marital status, religion, sex, educational level and year of experience in processing. Section B consists of the type of machines, gender of operator and the machine manufacturer, the processor and the machine owner. The power sources for the machines, the abandoned machinery and the reason.

The study was carried out at Akinyele local government area of Oyo State, Nigeria. Moniya is the headquarter, its geographical coordinates are 7° 31' 42" North, 3° 54' 43" East. It is about 20 kilometers north of Ibadan, the capital of Oyo state. The altitude is between 300 and 600 meters above sea level. The mean annual temperature is about 27°C while that of rainfall is 1165mm. The vegetation of the area is Southern Guinea Savanna zone of Nigeria (Gbadamosi, 2017).

Population for the Study

The population of the study was all the identified cassava Processors in Akinyele local government with headquarters at Moniya.

Sample and Sampling Techniques

A total of 50 centres were randomly selected, each cassava processor or delegate at each centre was engaged.

Collection of Data

Questionnaires designed by the researchers for the collection of data in this study were used.

Data Analysis

The result collected was analyzed using simple frequencies and percentage.

RESULTS

Table 1 shows the demographic structure of cassava processors as related to their socio-economic characteristics. The results revealed that majority of the cassava processors were female (75%) and married adults (70%) with their ages ranging from 31-40 years. This is an indication that the processors are still more active. The results also revealed that most of the cassava processors were Christians (61%) while least of them were traditionalists (9%) and this implies that the operation is not affected by religious beliefs. The results also revealed that the cassava processors had formal education, 50% attended primary, 40% secondary and 10% tertiary schools. The observation also noticed that the most of the respondents (45%) had been into cassava business for 15 years.

Cassava processing machines in the study area is presented in table 2. The results revealed that machines were not available in most of the processing centres with value of grater at (47.41%), dewaterer (6.61%) and sieves (45.97%), these were common. However, peelers, washer, fryer, dryer and millers were not observed in this present study and this is a strong indication that the cassava processors were still operating at a manual level.

Table 1. Demographic Structure of Socio-economic characteristics.

Parameters	Frequency	Percentage (%)
Sex		
Male	10	25
Female	40	75
Marital status		
Single	03	06
Married	35	70
Divorced	02	04
Widowed	05	10
Separated	05	10
Age		
Below 20	05	10
21-30	07	14
31-40	23	46
40 above	15	30
Religion		
Islam	15	30
Christianity	30	60
Traditional	05	10
Educational Level		
Primary	30	60
Secondary	05	30
Tertiary	10	10
Year of Processing Experience		
Below 20	22	44
21-30	18	36
31-40	05	10
40 above	05	10

Source: Fieldwork, 2019

The methods of processing operation of cassava are presented in table 3. The results show that peeling, washing, grating, dewatering, frying and drying were 100% respectively operated manually by the women and children. The sieving was done both manually (60%) and mechanically (40%) while millings were done mechanically (100%).

Table 2. Cassava Processing Machines in the Study Area.

Machines	Observed	Machines Percentage (%)
Peeler	-	-
Washer	-	-
Grater	165	47.41
Dewaterer	23	06.61
Sieves	160	45.97
Fryer	-	-
Dryer	-	-
Millers	-	-

Source: Fieldwork, 2019

Table 3 Methods *of processing operation of cassava*

Operations	Frequency	Percentage (%)
Peeling		
Manual	50	100
Mechanical	-	-
Washing		
Manual	50	100
Mechanical	-	-
Grating		
Manual	50	100
Mechanical	-	-
Dewatering		
Manual	-	-
Mechanical	50	100
Sieving		
Manual	30	60
Mechanical	20	40
Frying		
Manual	50	100
Mechanical	-	-
Drying		
Manual	50	100
Mechanical	-	-
Milling		
Manual	-	-
Mechanical	50	100

Source: Fieldwork, 2019.

Table 4 shows the participation in washing and drying of cassava. The results revealed that most of the cassava processors washed cassava before grating with value of 80% like previous studies. Drying is done by spreading the residue of the sieved cassava mash into a flat surface in the sun and 100% of the respondent's sundry cassava to form cassava flour in for sale.

Table 4. Participation in Washing and Drying of Cassava.

Operation	Response	Frequency	Percentage
Washing	Yes	40	80
	No	10	20
Drying	Sun drying	50	100
	Mechanical	-	-

Source: Fieldwork, 2019

The abandoned machines and reasons for the abandonment of the machines are presented in table 5. The results revealed that grater, dewater and fryer were 53, 18 and 30 respectively. The reasons for abandonment was due to lack of technicians, as Technical colleges do not produce skilled technicians as expected, old age, high operational cost and non-availability of spare parts while most of the processing centres lack peelers, washers, dryers and millers.

Table 5. Abandoned Machines and reasons for the Abandonment of the Machines.

Key Number of Abandoned (NA) Lack of Good Technician (LGT) Old Age (OA) Un-Availability (UA) High Operation Cost (HOC) Total Spare Part (TSP)

Machine	NA	LGT	OA	UA	HOC	TSP
Peeler	-	-	-	-	-	-
Washer	-	-	-	-	-	-
Grater	15	10	16	16	06	53
Dewater	06	04	-	-	08	18
Sieves	-	-	-	-	-	-
Fryer	10	-	16	04	-	30
Dryer	-	-	-	-	-	-
Miller	-	-	-	-	-	-

Source: Fieldwork, 2019.

Table 6 indicated the gender in relation to cassava processing operations. The result shows that some cassava processing operations are gender dependent.

Men engaged in processing operations like grating, dewatering and milling while women were predominant in peeling, washing, sieving, frying and drying.

Table 6. Gender in Processing

Operation	Frequency	Percentage
Peeling		
Male	05	10
Female	35	70
Male and female	10	20
Washing		
Male	05	10
Female	45	90
Male and female	-	-
Grating		
Male	50	100
Female	-	-
Male and female	-	-
Dewatering		
Male	50	100
Female	-	-
Male and female	-	-

Table 6. Continues

Operation	Frequency	Percentage
Sieving		
Male	10	20
Female	36	72
Male and female	04	08
Frying		
Male	-	-
Female	50	100
Male and female	-	-
Drying		
Male	-	-
Female	50	100
Male and female	-	-
Milling		
Male	50	100
Female	-	-
Male and female	-	-

Source: Fieldwork, 2019.

Table 7 revealed the ownership of the processing centres in the study area. The results indicated that processing centres were predominantly owned by individuals (50%) while 30% were owned by cooperative societies and 20% were controlled by non-governmental organizations with non-involvement of the government.

Table 7. Ownership of the Processing Centre.

Ownership	Frequency	Percentage
Individual	25	50
Cooperative societies	15	30
Non-government	10	20
Government	-	-

Source: Fieldwork, 2019.

The source of power for operating the machines is shown in table 8. The results indicated that most of the engines were running on diesel (70%) while petrol, electricity and both electricity and diesel operations were 10%, 06% and 14% respectively.

Table 8. Sources of Power for Operating the Machines.

Source of Power	Frequency	Percentage
Diesel	35	70
Petrol	05	10
Electricity	03	06
Electricity/diesel	07	14

Source: Fieldwork, 2019.

Table 9 shows the relationship between the cassava processors and machine manufacturers. The result revealed that the most machines observed were manufactured by welders. The relationship between the cassava processors and manufacturers were moderate (75%), poor (20%) and high (5%).

Table 9. Relationship between the Cassava Processors and Machine Manufacturers.

Relationship	
High	05
Moderate	75
Poor	20

Source: Fieldwork, 2019.

DISCUSSION

The current findings on demographic structure of cassava processors in relation to socio-economic characteristics, that favoured female, married, adults with age were in line with Gbadamosi (2017).

Similar range of values for gender, marital status, age and religious as observed has been reported. Due to the level of graduate unemployment, the researcher was expecting to see more operators with tertiary qualifications than what was reported. Researchers documented a range of values in favour of educational level and year of processing experiences but this was not the case. However, he noticed that males dominated cassava processing machine operations in this current study, that grater, dewater and sieves were commonly used in harmony with previous documented findings.

Gender, in cassava processing operations shows that females are always ready to switch their role for males to take over whenever machine is involved.

CONCLUSION

This paper discusses delivery activities in agricultural machinery in Akinyele LGA of Oyo state Nigeria, placing emphasis on cassava tuber processing machines. It is worthy to mention that the researchers are lecturers that have direct contact with students and are also involved not only in cassava tuber processing research but also in other agro-production machine research. This study shows that the people involved in the processing of cassava were females, married with formal educational background however, grater operators, dewaterers and sieves were the major machines while most of these machines were operated manually and some were abandoned due to obsoleteness and old age. Ownership was through individuals with moderate relationship between the processors and the machine manufacturers and the machines were operated with fossil fuels nonrenewable energy source.

RECOMMENDATIONS

Based on these findings, government involvement will be needed in the setting-up or ownership of cassava centres as a way to create more employment among the young. They should assist in educating the cassava processors in the new innovation and implementation of modern tools. Most recent machines discovered should be introduced in order to assist modern peelers, washers, fryers, dryer and millers.

Government can assist in the introduction of modern processing of cassava mechanically through extension agents and loans could be given to the people involved in the cassava processing to expand their work.

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