Research Paper E-ISSN NO : 2455-295X | VOLUME : 11 | ISSUE : 1 | JANUARY 2025

ADOPTION OF MODERN PROCESSING TECHNOLOGIES IN CASSAVA PROCESSING IN THE AGRICULTURAL ZONES OF OSUN STATE

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ABSTRACT:

The exorbitant cost of cassava processing equipment is a threat to food security. This study therefore examined adoption of modern processing technologies in cassava processing in the agricultural zones of Osun State. Multistage sampling technique was used to select one hundred and eighty nine (189) cassava processors in the study area. Data were collected using a well-structured interview schedule. Descriptive statistical tools were used. Majority (87.3%) and 77.8% revealed that revealed that they process cassava tubers into cassava flakes (*garri*) and cassava flour (*elubo*) while 54.5% of the respondents indicate they process cassava flour into fufu. Almost all (96.3%) and 91.5% of the respondents indicated they adopted the usage of *garri* fryer and hydraulic press respectively while 83.6% indicated the adoption of cassava crusher as modern technology used for cassava processing. Various reasons were indicated as factors that influenced their adoption of the modern technologies for cassava processing with all (100.0%) of the respondents indicating that the use of modern technology for cassava processing increased processing efficiency while 90.5% indicated that it reduces labour and stress that comes with cassava processing. It was concluded that cassava processors in the study area are adequately adopted and utilized the modern cassava processing technologies. It was recommended that cassava processors should organize trainings to sensitize and improve their knowledge on the usage of modern cassava processors as this will encourage adaptation of the technology and improve the usage level.

KEYWORDS:

CASSAVA, *FUFU*, *GARRI*, GRATING MACHINE AND PROCESSING EFFICIENCY.

PAPER ACCEPTED DATE:	PAPER PUBLISHED DATE:
27th January 2025	30th January 2025

1. INTRODUCTION

Cassava (Manihot esculenta) provides food and income to over 30 million farmers and large numbers of processors and traders in Nigeria (Abdoulaye *et al*., 2014). The high tendency to serve as a relief crop to food insecurity because of its copious consumption in various forms by people and its ability to subsist and give appreciable yields on soils where many other crops fail to perform, has endeared its cultivation by many smallholder farmers (Anaglo *et al.,* 2020). This was further supported by the assertion of Anyeagbunam, *et al*., (2015), that cassava has become a very popular crop in Nigeria and is fast replacing other traditional local staples in the country (Zie, Manu, and Wouapi 2019).

In Nigeria, modern agricultural technology has contributed significantly to agricultural development and the gap between developed and developing countries in the area of agricultural production can be attributed largely to differences in the level of technological development, adaptation and transfer process. In developed nations, there is an advanced level of technical know-how and widespread application of technological innovations resulting in high productive capability in agriculture as well as in industry. This is not so in Nigeria where these technologies are not often available to farmers. Where they are made available, few farmers, usually excluding the users, which are usually women, have access to them (Meinzen-Dick, *et al.,* 2019).

Cassava processing efforts often suffer from inadequate extension agents which has hampered cassava productivity in Nigeria. The ratio of extension workers to farmers in Nigeria is 1:3,011 as against the 1:1,000 recommended by Food and Agriculture Organization of the United Nations, thus indicating a shortfall of over 200% (The Food and Agricultural Organization of the United

Nations, 2017b). Nigeria's ratio worsened from 1:2,132 in 2009 to 1:3,011 in 2015 due to inadequate recruitment thus resulting in about 67.2% of the extension agents averaging 49 years of age (Haruna & Abdullahi, 2015). This situation has negatively affected the availability of cassava processing innovations to the farmers. Inadequate extension agents have been adduced to the absence of extension service centers for cassava processors, though considerable work has been done on the adoption of modern processing technologies in cassava processing in agricultural zones of Osun State, it is not well documented.

THE SPECIFIC OBJECTIVES ARE TO:

i. identify the products cassava tubers are processed into

ii. examine adoption of modern technologies on cassava processing

iii. describe the reasons for adopting modern technology for cassava processing

2. RESEARCH METHODOLOGY

The study was carried out in all the three Agricultural Zones of Osun State. Osun state is found in the Southwest geopolitical zone of Nigeria, situated between latitude 7°05'N and longitude 4°35'E and is bordered by Kwara, Ekiti, Ondo, Ogun and Oyo. Osogbo is the state's capital while other prominent towns include Ede, Iwo, Ejigbo, Ilesa and Esa-oke.

Osun State Agricultural Development Programme (ADP) classified the State into three agricultural zones based on the variations in vegetation cover. These are: Iwo-Ikire, Osogbo-Ikirun and Ife-Ijesa zones as shown in Figure 1. Osun State has a total of 30 LGAs which include Atakumosa East, Atakumosa West, Ife Central, Ife East, Ife North, Ife South, Ilesa-East, Ilesa-West, Obokun and Oriade consistute the ten (10) blocks in the Ife-Ijesa agricultural zone. Ede South, Ede North, Egbedore, Ejigbo, Ola-oluwa, Iwo, Ayedire, Isokan, Ayedaade and Irewole constitute ten (10) blocks in the Iwo- Ikire agricultural zones. Boluwaduro, Ila, Ifedayo, Ifelodun, Orolu, Olorunda, Osogbo, Boripe, Odo-otin, Irepodun constitutes the ten (10) blocks in Osogbo-Ikirun agricultural zones.

The predominant population of Osun State is Yoruba. The vegetation of the state comprises rainforest zone, derived savannah and savannah. The average rainfall ranges from 1125mm in the derived savannah to 1475mm per year in the rain forest belt. The mean annual temperature ranges from 27^0C in June to 39^0C in December (Agboola *et al.,* 2021). Osun state is an Agricultural and commercial state known for crops such as cassava, cocoa and rice.

Prominent markets such as the Ayegbaju international market, Oja Oba market Osogbo, Oranran market, Aje international market, Oluode market Osogbo, Alamisi market Ikirun, Oja Obi market Ila-Orangun, Sabo market Ile-Ife, Ilesha market, Owena market, Timi market, Orile owu market, Ikire market and the Atakumosa Market in Ilesa attract thousands of buyers and sellers of diverse commodities and contributes to the economy of the state.

The population of the study comprised of all cassava processors in all the Agricultural zones of Osun state. These processors, with their diverse characteristics, experiences, and adoption patterns, form the basis for understanding the effect of modern technologies for cassava processing.

A multistage sampling technique comprising of three (3) stages was employed in selecting the respondents for this study. Osun State has three (3) Agricultural Development Projects Zones and thirty (30) blocks. These are Osogbo-Ikirun agricultural zone which has ten (10) blocks, Iwo-0Ikire which has (10) blocks and Ife-Ijesha which is also made up of (10) blocks (Agboola *et al.,* 2021).

The study was carried out in all the agricultural zones of Osun state. There are ten (10) blocks (Local Government Areas) in each agricultural zones of Osun state. Four (4) blocks with larger number of cassava processors were purposively selected in each agricultural zones of Osun state.Therefore, Orolu, Irepodun, Ifedayo and Odo-Otin were selected for Osogbo-Ikirun agricultural zone of Osun state; Ife-South, Ife-East, Ife-North and Obokun were selected for Ife-Ijesa agricultural zone of Osun state; Iwo, Ayedaade, Ayedire and Olaoluwa were selected for Iwo-Ikire agricultural zone of Osun state for this study.

The second stage involved a random selection of two (2) cells (villages) each from the selected blocks what will sum up to a total of twenty four (24) cells that will be selected. The last stage involve the systematic random selection of 30% of identified cassava processors in each selected cells (at the interval of 3). This implies that a total of one hundred and eighty nine (189) cassava processors will constitute the sample size for this study as presented in Table 1.

TABLE 1: SUMMARY OF SAMPLING PROCEDURE AND SAMPLE SIZE

All zones in Osun state	40% of Selected blocks in each zone	Random selection of cells in each block	Number of registered cassava processors	30% of registered cassava processors (respondents)
Osogbo-Ikirun	Orolu Irepodun Ifedayo Odo-otin	Ifon	29	9
		Onigaari	36	11
		Ilobu	23	7
		Erin osun	12	4
		Aiyetoro	16	5
		Temidire	13	4
		Igbaye	13	4
		Ijabe	9	3
Sub-total	**4**	**8**	**151**	**47**

Ife-Ijesa	Ife south Ife east Ife North Obokun	Mefowarade Abiri ogudu Ilode Yekemi Famia Oyere Ikinyinwa Ilase	26 32 19 16 29 27 13 19	8 10 6 5 9 8 4 6
Sub-total	**4**	**8**	**181**	**56**
Iwo-Ikire	Iwo Ayedaade Ayedire Olaoluwa	Molete Oke Adan Araromi Owu Ode omu Ile ogbo Kuta Ogbaagba Asamu	40 43 47 33 34 31 36 23	12 13 14 10 10 9 11 7
Sub-total	**4**	**8**	**287**	**86**
Grand total	**12**	**24**	**619**	**189**

Source: Osun State Ministry of Agriculture and Food Security, 2024.

Descriptive Statistical Tools that were used include frequency counts, percentages and means. These were used to describe products cassava tubers are processed into, adoption of modern technologies on cassava processing and the reasons for adopting modern technology for cassava processing.

3. RESULTS AND DISCUSSION

PRODUCTS CASSAVA TUBERS ARE PROCESSED INTO

Table 2 reveals the various products that cassava tubers are processed into by the respondents in the study area. Majority (87.3%) and 77.8% revealed that revealed that they process cassava tubers into cassava flakes (*garri*) and cassava flour (*elubo*) while 54.5% of the respondents indicate they process cassava flour into fufu. Meanwhile, 28.6% and 19.6% indicated they process cassava tuber into *pupuru* and starch. This result is an indication that cassava tuber is an economically viable tuber crop which have huge financial implication, an indication that it worth the investment made in it by the cassava processors. This result is also an attestation to the fact that respondents in the study area are aware of various value addition attached to cassava as an arable crop. This result is in line with the findings of Fatuase *et al.,* (2019), who revealed that garri, fufu, cassava flour (Lafun), starch and pupuru were products processed from cassava with modern processing technologies by the cassava processors.

TABLE 2: DISTRIBUTION OF RESPONDENTS ACCORDING TO PRODUCT CASSAVA TUBERS ARE PROCESSED INTO

Products cassava are processed into	Frequency	Percentage
Cassava flour	147	77.8
Fufu	103	54.5
Garri	165	87.3
Pupuru	54	28.6
Starch	37	19.6

Source: Field Survey, 2024

ADOPTION OF MODERN TECHNOLOGIES ON CASSAVA PROCESSING

Table 3 reveals the various cassava processing technologies adopted by the respondents in the study area. Almost all (96.3%) and 91.5% of the respondents indicated they adopted the usage of garri fryer and hydraulic press respectively while 83.6% indicated the adoption of cassava crusher as modern technology used for cassava processing. This result is an indication that majority of the respondents in the study area are aware of modern technologies involved in cassava processing.

Also, above half (57.1%) and 51.9% of the respondents indicated the adopted the use of cassava grating machine and cassava dewatering machine respectively while 41.8% indicated they adopted the usage of flash dryer. In addition, 21.7% and 12.2% indicated mechanical sifter and fufu pounding machine as modern technologies adopted for cassava processing.

Lastly, only 8.5% of the respondents indicated they adopted the usage of cassava peeler centrifuge as a modern technology for cassava processing. This result is an indication that only minority of the cassava processors adopt the usage of cassava peeler and this could be attributed to the financial implication of the machine and the job lost that might occur if cassava peeler is introduced. Peeling of cassava is traditionally seen as an economic activity for rural women who do not engage in farming as a major occupation.

Generally, this result implies that modern technologies for cassava processing is a widely accepted and adopted innovation among cassava processors in the study area. This is an indication that cassava processors in the study area have access to technological information, technological inputs and extension services that has promote the use of modern technology for cassava processing in the study area.

This result conforms with the findings of Fatuase *et al.,* (2019) who indicated that respondents used for the study have adopted modern cassava processing technologies, the technologies revealed in their study as adopted technologies includes fryer, peeler, hydraulic press, dryer amongst other listed several technologies adopted by the respondents. This have aid the better utilization of cassava tubers in the study area and Nigeria as a whole. This result is also in line with the findings of Ehinmowo and Fatuase (2016) who revealed that hydraulic press, cassava grater, sifter, peeler, and fryer were adopted modern cassava processing technologies.

TABLE 3: DISTRIBUTION OF RESPONDENTS ACCORDING TO MODERN TECHNOLOGIES ADOPTED ON CASSAVA PROCESSING

Technology adopted	Frequency	Percentage
Cassava peeler centrifuge	16	8.5
Cassava grating machine	108	57.1
Cassava dewatering machine	98	51.9
Cassava crusher	158	83.6
Flash dryer	79	41.8
Hydraulic press	173	91.5
Garri fryer	182	96.3
Fufu pounding machine	23	12.2
Mechanical sifter	41	21.7

Source: Field Survey, 2024

REASONS FOR ADOPTING MODERN TECHNOLOGY FOR CASSAVA PROCESSING

Result in Table 4 reveals the major reasons cassava processors in the study area adopted the use of modern technology for cassava processing. Various reasons were indicated as factors that influenced their adoption of the modern technologies for cassava processing with all (100.0%) of the respondents indicating that the use of modern technology for cassava processing increased processing efficiency while 90.5% indicated that it reduces labour and stress that comes with cassava processing.

In addition, 77.8% of the respondents indicated that the use of modern technology for cassava processing improves product quality and increases income of the cassava processors as the major reasons and benefits derived from the adoption of modern technology for cassava processing in the study area. This result is an implication that cassava processors are well aware of the benefit attached to the use of modern technology for cassava processing and this might be a major contributor to the wide acceptability of the technology by all the respondents in the study area.

This result is in line with the findings of Ehinmowo and Fatuase (2016) who revealed that increased quality, reduced labour and increased income were benefits derived from the use of modern cassava processing technologies by cassava processors.

TABLE 4: DISTRIBUTION OF RESPONDENTS ACCORDING TO MAIN REASONS FOR ADOPTING MODERN CASSAVA PROCESSING TECHNOLOGIES

Major reasons for adoption	Frequency	Percentage
Reduced labour	171	90.5
Increase processing efficiency	189	100.0
Improve product quality	147	77.8
Increase income	147	77.8

Source: Field Survey, 2024

4. CONCLUSION AND RECOMMENDATION

It was concluded that cassava processors in the study area are adequately adopted and utilized the modern cassava processing technologies. It was recommended that cassava processors should organize trainings to sensitize and improve their knowledge on the usage of modern cassava processors as this will encourage adaptation of the technology and improve the usage level. Stakeholders involved in agriculture should ensure the availability of modern machines at a subsidized rate to registered cassava processors as this will encourage all cassava processors to get registered and promotes the usage of the machines to achieve a common goal improved productivity.

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