BADEGGI JOURNAL OF AGRICULTURAL RESEARCH AND ENVIRONMENT, 2024, 06(03), 77-84

NCRI Press

Available online: www.ncribjare.org
ISSN: 2695-2122, e-ISSN: 2695-2114
DOI: https://doi.org/10.35849/BJARE202403/207/09
Journal homepage: www.ncribjare.org

Research Article

# Adoption of Recommended Technologies for Cassava Processing among Women in Ankpa, Kogi State, Nigeria

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## Abstract
Cassava is a vital crop in Nigeria, providing food, income, and employment opportunities for millions of people. However, processing of cassava require a lot of labor and is known for its poor productivity and value. This study investigated the acceptance of recommended modern technologies for cassava processing among women processors in Ankpa, Kogi State, Nigeria. A survey of 152 women cassava processors was conducted using structured questionnaires. The research outcome showed that the sampled respondents were predominantly between 21-40 years old, married, and had primary education. The acceptance rate of recommended technologies for cassava processing was fairly high, with mechanical grater having the highest adoption rate of 100%. The study identified age, household size, and processing experience as significant factors influencing the adoption of recommended cassava processing technologies. The results also showed that women processors with larger household sizes and more processing experience were more likely to adopt recommended technologies. The study concludes that empowering women cassava processors through provision of funds, credit schemes, and extension services can enhance their participation in cassava processing and improve their livelihoods. The study recommends the provision of modern machines and equipment to ease the drudgery associated with cassava processing and improves productivity and quality.

**Keywords** *Adoption, Cassava, Processing, Technologies, Women processors*



## Introduction
Agriculture is the backbone of Nigeria's economy, providing foodstuff, raw materials for industries, and income for the predominant population in the country (NBS, 2016). The sector significantly contributes to the country's foreign exchange earnings, government revenue, and employment opportunities, accounting for nearly a quarter of Nigeria's Gross Domestic Product (GDP) and engaging approximately 70% of the active workforce (NBS, 2016). Cassava, a starchy root crop, is a vital component of Nigeria's agricultural sector. As the world's largest producer of cassava, Nigeria generates an annual output of 60.8 million tonnes of tuberous roots, with a growth rate of 4.20% (FAO, 2022). Cassava serves as a primary raw material for various small and medium-scale enterprises, including cassava flour mills, bakeries, and gari processing firms, thereby providing income opportunities for numerous households (Odii, 2012).

Women play a pivotal role in Nigeria's agricultural production, particularly in cassava processing, which not only provides them with additional income-earning opportunities but also enhances their contribution to household food security (FAO, 2017). According to the Food and Agriculture Organization (FAO) (2022), women account for a significant proportion of the total

Received on 16th October, 2024; Revised on 4th December, 2024; Accepted on 19th December, 2024 and Published on 30 December, 2024

agricultural labor force in Nigeria, contributing about 58% of the total agricultural labor in the Southwest, 67% in the Southeast, and 58% in the central zones. However, traditional cassava processing methods are often labor-intensive, resulting in low quality and output. The adoption of improved cassava processing technologies can significantly reduce processing time and labor, encouraging increased production (Rogers, 1995; Adekoya et al., 2005; Agbamu, 2006). Institutional factors, including access to credit, contact with extension agents, and membership in social organizations, also play a significant role in the adoption of innovations (Rodgers, 1995; Bolorunduro et al., 2005).

This study aims to investigate the factors influencing the adoption of recommended cassava processing technologies by women processors in Ankpa Local Government Area, Kogi State, Nigeria. The findings of this study will provide valuable insights into the challenges faced by women cassava processors and the factors that influence their adoption of improved processing technologies. This research will contribute to the development of effective strategies to enhance cassava production and processing in Nigeria, ultimately improving the livelihoods of women cassava processors and their households.

**Materials and Methods**

This research was conducted in Ankpa Local Government Area, Kogi State, Nigeria, which is situated in the north-central region of the country (NPC, 2006). Kogi State comprises 21 Local Government Areas, covering a total land area of 28,313.53 square kilometers, with a population of 3,595,789 as of 2006 (NPC, 2006). Based on an annual growth rate of 2.5%, the projected population of Kogi State in 2015 was approximately 4,225,052. Ankpa Local Government Area was selected for this study due to its significant cassava production and processing activities. The area is located in the eastern part of the state, covering approximately 482.5 square kilometers. According to the 2006 census, the population of Ankpa Local Government Area was 266,176 (NPC, 2006), with a projected population of 312,756 in 2015.

A total of 152 women cassava processors were randomly selected from three villages (Ikanekpo, Inye, and Awo-Akpali) in Ankpa Local Government Area, representing 10% of the total women cassava processors in the area. The selection of respondents was based on a reconnaissance survey conducted in 2013, which identified 1,520 women cassava processors in the area. Primary data were collected using structured questionnaires administered to the respondents by well-trained enumerators. The questionnaires gathered information on the socio-economic characteristics of the respondents, including demographic information, educational background, and processing experience. Institutional characteristics, such as access to extension services, credit facilities, and membership in associations, were also collected. Additionally, data on technological characteristics, including the affordability, compatibility, and complexity of cassava processing technologies, were gathered.

The data collected were analyzed using descriptive statistics, multiple regression analysis, and paired t-test. Descriptive statistics involved the calculation of means, frequencies, and percentages to summarize the data. Multiple regression analysis was used to determine the factors influencing the adoption of recommended cassava processing technologies among women processors in the study area. The model is thus specified as linear production function as follows:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + \ldots\ldots + b_{11} X_{11} + e \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where.

$X_1$ = Age (in years)

$X_2$ = Marital status (married =2 ,single, divorced and widowed = 1)

$X_3$ = Educational level (Number.of years spent in school)

$X_4$ = Household size (in number)

$X_5$ = Processing experience (Number of years spent in processing)

$X_6$ = Contact with extension agents (No. of visits)

$X_7$ = Access to credit (amount in N)

$X_8$ = Membership of association (Number of years)

$X_9$ = Affordability of technologies (5- point Likert scale)

$X_{10}$ = Compatibility of technologies (5 – point

Likert scale)
$X_{11}$ = Complexity of technologies (5- point Likert scale)
$b_1 – b_{11}$ = regression coefficients
a = Constant
e = error term

**T-test of significance**

The t-test of significance was used to, that is, whether there is significant difference between output and income of the respondents. It is a useful technique for comparing mean values of two sets of numbers. The formula is given by:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \quad \text{.....(2)}$$

Where:
$\overline{X}_1$ = average output (kg) and income (N) of respondents before adoption
$\overline{X}_2$ = average output (kg) and income (N) of respondents after adoption
$\sigma_1^2$ = Variance for respondents before adoption
$\sigma_2^2$ = Variance for respondents after adoption
n = sample size of respondents

**Results and Discussion**

The socio-economic and institutional characteristics of women in cassava processing were examined in this study. The age distribution of the cassava processors revealed that 68% of the respondents were between 21 and 40 years old, with a mean age of 36 (Table 2). This suggests that the processors are in their youthful and active ages, characterized by high production energy, which is consistent with the findings of Mahdi Egge et al. (2012). The marital status of the respondents showed that 68% were married (Table 2). This finding is in agreement with Bakut (2013), who reported that the majority of married women in rural areas engage in agricultural activities. Moreover, the educational level of the respondents revealed that 44% had primary education, 31% had secondary education, and 9% had tertiary education (Table 2). This suggests that the respondents require more enlightenment from extension agents on the importance and usage of recommended technologies. Sofoluwe et al. (2011) also confirmed that education influences people's perception and adoption of innovations.

The household size of the respondents showed that 47% had a household size of 6-10 (Table 2). This suggests that larger household sizes are associated with increased labor availability and higher income requirements to meet household needs, which is consistent with the findings of Augustine (2015). The processing experience of the respondents revealed that 72% had 6-20 years of processing experience (Table 2). This finding is consistent with Mignouna et al. (2011), who reported that farmers with longer years of farming experience are more conversant with production constraints and are more likely to adopt new ideas to overcome these constraints.

The extension services received by the respondents showed that 73% had not received any visits from extension agents, while 27% had received visits within the past two years (Figure 1). This finding is consistent with Ajala et al. (2013), who observed that half of the respondents in their study on extension service delivery for improved cassava technology in Osun State had no extension contact. The association membership of the respondents revealed that 77% did not belong to any association, while only 23% belonged to an association. This finding agrees with Chikezie et al. (2012), who reported that 81% of respondents in their study on factors influencing rural youth adoption of cassava recommended production practices did not belong to any association. The rate of adoption of recommended cassava processing techniques showed that the mechanical grater had the highest adoption rate of 100%, followed by the screw press (83%), mechanical sifter (22%), and fryer (toaster) (9%) (Table 3). The average adoption rate is 53%, indicating a fairly high rate of adoption of recommended cassava processing technologies.

The factors influencing the adoption of recommended cassava processing technologies were examined using regression analysis (Table 4). The results showed that three out of five socio-economic variables are significantly influential to the adoption of recommended cassava processing

technologies. Age has a negative regression coefficient of 0.048 and is significant at the 1% level, indicating that adoption decreases with increasing age. Household size has a positive regression coefficient of 0.118 and is significant at the 10% level, indicating that adoption increases with increasing household size. Processing experience has a positive regression coefficient of 0.086 and is significant at the 1% level, indicating that adoption increases with increasing processing experience. Marital status and education are not significant influencers of adoption.

## Conclusion

This research underscores the vital role of cassava production and processing in Nigeria's economy, with a specific focus on Ankpa Local Government Area. Despite the advent of modern cassava processing technologies, a significant knowledge gap persists regarding the factors that influence the adoption of these technologies by women cassava processors. This study seeks to investigate the complex interplay of socio-economic, institutional, and technological factors that affect the adoption of recommended cassava processing technologies. Furthermore, it aims to elucidate the impact of these factors on the quality and quantity of processed cassava products. Gaining a deeper understanding of these factors is essential for developing targeted strategies that can enhance cassava production and processing in Nigeria, ultimately contributing to the country's economic growth and development.

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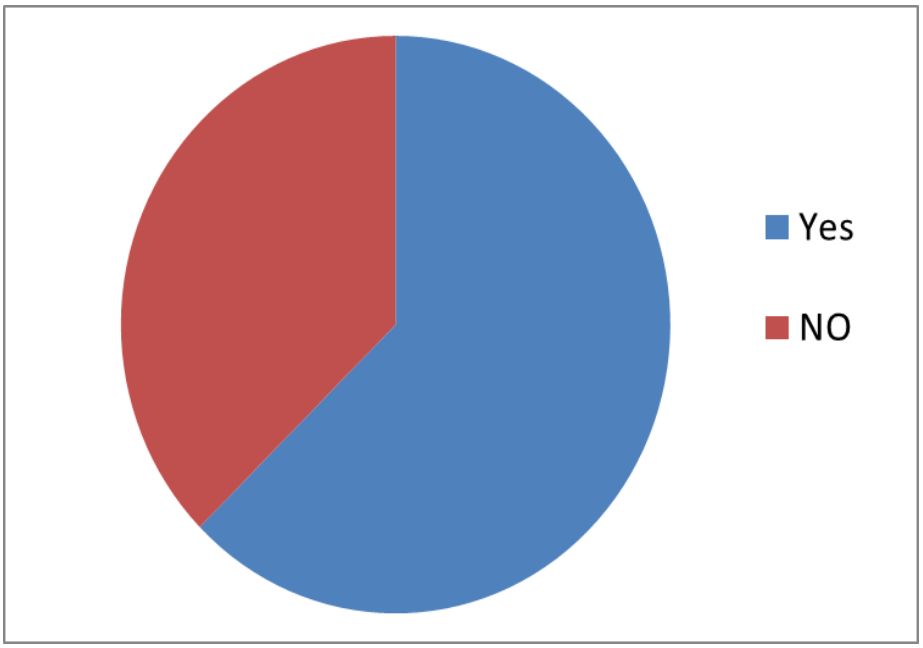


**Fig 1: Distribution of the respondents according to extension contacts**

**Table 1: Sampled Respondents based on the Districts and Villages**

| Districts | Selected villages | Population of women cassava processors | sample size (10 percent) |
|---|---|---|---|
| Ankpa | Ikanekpo | 508 | 51 |
| Enjema | Inye | 392 | 39 |
| Ojoku | Awo-Akpali | 620 | 62 |
| **Total** | | **1520** | **152** |

Source: Field survey.

**Table 2: Distribution of respondents according to their Socio-Economic Characteristics.**

| Age (years) | Frequency | Mean | Percentage |
|---|---|---|---|
| 21-30 | 63 | | 41.4 |
| 31-40 | 40 | | 26.3 |
| 41-50 | 37 | | 24.3 |
| 51-60 | 11 | | 7.3 |
| 61-70 | 1 | | 0.7 |
| | | 35.82 | |
| **Marital Status** | | | |
| Single | 22 | | 14.5 |
| Married | 104 | | 68.4 |
| Divorced | 10 | | 6.6 |
| Widowed | 16 | | 10.5 |
| **Education** | | | |
| No formal education | 25 | | 16.4 |
| Primary education | 67 | | 44.1 |
| Secondary education | 47 | | 30.9 |
| Tertiary education | 13 | | 8.6 |
| **Household size** | | | |
| 1-5 | 35 | | 23.0 |
| 6-10 | 72 | | 47.4 |
| 11-15 | 37 | | 24.2 |
| 16-20 | 8 | | 5.3 |
| | | 6 | |
| **Processing experience (years)** | | | |
| 1-5 | 32 | | 21.1 |
| 6-10 | 38 | | 25.0 |
| 11-15 | 46 | | 30.3 |
| 16-20 | 25 | | 16.4 |
| 21-25 | 11 | | 7.2 |
| | | 11.73 | |

| Membership of association (years) | Frequency | Percentage |
|---|---|---|
| No membership | 121 | 79.6 |
| 1-5 | 11 | 7.1 |
| 6 – 10 | 8 | 5.3 |
| 11 – 15 | 8 | 5.3 |
| 16 – 20 | 4 | 2.7 |
| Total | 152 | 100 |

**Table 3: Sampled Respondents based on the Rate of Adoption of Technologies Recommended for Cassava processing.**

| Technologies for Cassava Processing | Rate | Proportion *Multiple |
|---|---|---|
| Motorized grater | 152 | 100 |
| Screw press | 126 | 82.71 |
| Power-driven sifter | 33 | 21.71 |
| Fryer (toaster) | 13 | 8.55 |
| Total | 324 | 212.97 |

*Frequency greater than 152 due to multiple responses.

**Table 4: Variables of social, economic, institution and technologies influencing the adoption**

| Variable | Coefficient | Standard error | t-value |
|---|---|---|---|
| Intercept | 3.427 | 0.570 | 6.01*** |
| **Social and Economic variables** | | | |
| Age of the respondent | -00.048 | 00.017 | -2.84*** |
| Marital status of the respondent | -00.070 | 00.081 | -0.86NS |
| Education status | 00.019 | 00.017 | 1.14 NS |
| No. of persons per Household | 00.118 | 00.064 | 1.83* |
| Years of Processing experience | 00.086 | 00.029 | 2.99*** |
| Institutional variables | | | |
| Access to credit | 1.42e-06 | 1.46e-06 | 0.97 NS |
| Membership of association | 0.036 | 0.017 | 2.02** |
| Extension contact | 0.131 | 0.083 | 1.57 NS |
| Technological variables | | | |
| Affordability | 0.049 | 0.017 | 2.76*** |
| Compatibility | 0.017 | 0.018 | 0.96 NS |
| Complexity | -0.051 | 0.023 | -2.17** |

**Source: Field survey, 2014**
*** Significant at 1% level of probability
** 5% level of probability
* Significant at 10% level of probability
NS = Not Significant

$R^2 = 0.47$
$R^{-2} = 0.41$
F value = $4.778^{***}$