

FACTORS DETERMINING SELECTIVE ADOPTION OF THE CASSAVA GRATER AND SCREW PRESS IN SOUTHWEST NIGERIA

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ABSTRACT

This study examined factors determining selective adoption of the cassava grater and screw press in southwest Nigeria. It also tested four null hypotheses using data obtained from 265 cassava processors drawn from three States (Ogun, Ondo and Oyo States) in southwest Nigeria. The data were subjected to both descriptive and inferential statistical analyses. The study found that both native and non-natives are involved in cassava processing, but processors across the selected States differ in their membership of groups. Almost all the cassava processors interviewed in Oyo State belonged to *Gari Gbaya*, the umbrella association for all cassava processors in the State. Of the 265 cassava processors, 57.74% adopted the cassava grater and 50.19% adopted the screw press. The adopters of cassava grater are older, with larger household sizes and stayed longer in school than the non-adopters. They also have longer cassava processing experience and run larger cassava processing enterprises where more persons are also employed. A similar trend was obtained for the adopters and non-adopters of the cassava screw press. The findings corroborated the findings of some earlier studies in the region indicating that as cassava processing gets capital intensive, the socio-economic characteristics of processors tend to change. The main reason for the widespread adoption of the cassava grater and screw press were that they require less labour; are easy to practice, give good quality products, faster than manual grating and pressing and compatible with other stages in the cassava processing flow.

Keywords: Adopters, Cassava processing, technologies, Nigeria

INTRODUCTION

Rural Nigeria is dominated by people whose main livelihood revolves around agricultural production and food processing. Even so, poverty, hunger, food insecurity and malnutrition are commonplace. The amount of waste generated by excess agricultural production, inadequate storage and processing facilities, poor infrastructure and poor access to relevant food

processing information are huge (Nweke, 2004; Westby et al., 2001). For instance, Nigeria now produces more than half of total world cassava (Sanni, 2005). But more than one-third of these roots get spoilt before they reach the table. It is important therefore that cassava processors adopt appropriate cassava processing technologies along with cassava cultivating technologies for any meaningful impact to

be made on the food system.

In Nigeria, cassava gained more national prominence following the pronouncement of a Presidential Initiative on Cassava in 2002. The intent of the Initiative was to use cassava as the engine of economic growth in Nigeria. If investments in the downstream sector of the cassava industry are made more effective, cassava is to be used to improve rural and urban income and employment in Nigeria. The current policy environment is working in favour of the cassava industry. In order to achieve the goals of revolutionising the cassava sub sector, the extension service in Nigeria has been recognised as an essential mechanism for delivering information and advice as inputs into the management of the cassava production and processing. These services are essentially targeted at smallholders who constitute over 70% of the Nigerian food sector. This study seeks to contribute to the on-going attempt to enhance the ability of extension agencies to predict the potential for the adoption of new technologies before huge quantities of scarce resources (at most times irretrievable) are expended on their active promotion.

Cassava processing in the rural areas of Southwest Nigeria has gone through several visible changes over time. This is more evident in the range of technologies found in the cassava processing systems. This varies from completely manual processing systems to partially and fully mechanical cassava processing systems. In this study, the cassava grater and screw press were selected because they are the most widely adopted in all cassava processing communities in the study area

(Gebremeskel, 1989) The various forms of cassava grater vary of the petrol engine driven, wood-hold grater used by itinerant grating service providers to the diesel engine metal hold graters found in stationary grating enterprises and large cassava processing centres. These are compelling reasons to share new information and new ideas on the forces driving the food systems. This cannot be done without a proper understanding of the key actors (potential adopters and non-adopters) in the adoption of new technologies and practices in the cassava post-harvest system.

Several studies have indicated that the adoption of an innovation is influenced by several factors which may be social, economic, innovation-related, technology development process related or even exogenous factors such as government policy and developments in the international arena (Bernet et al., 2001; Collinson, 2001; Smith et al., 1995; Agbamu, 1995). Many of these studies have been conducted on new crop varieties and pest control practices. This is simply because several interventions in the food sector have come at the level of agricultural production specifically with respect to germplasm development. Interventions in the post-harvest sector are however required to ensure a supply of safe and acceptable food to the populace. It is important therefore that as these post-harvest technologies emerge, adoption and diffusion researchers need to re-evaluate existing assumptions about the major actors as well as the entire technology adoption and diffusion process.

Specifically, the objectives of this study are to examine the characteristics of cassava processors and establish the distinguishing

features of the adopters and non-adopters of the cassava grater and the screw press then explore the constraints to the adoption of cassava processing technologies by looking into the reasons why some processors do not adopt the technologies in southwest Nigeria. The study also compares the characteristics of adopters and non-adopters.

METHODOLOGY

Southwest Nigeria is bounded in the north and east by the Kwara and Kogi States of Nigeria; in the West by the Republic of Benin and in the south by the Atlantic Ocean (Figure 1). Cassava is grown widely in southwest Nigeria, three (Ogun, Oyo and Ondo) of the six (Lagos, Ekiti, Osun, Ogun, Oyo and Ondo) States in southwest Nigeria were therefore selected for this study. Three (3) rural locations were selected from each selected State from the village listing available with their respective Agricultural Development Programmes (ADPs). ADPs are responsible for field level agricultural extension services in Nigeria. Southwest Nigeria is also home to the International Institute of Tropical Agriculture, (IITA) Ibadan; the University of Agriculture, Abeokuta, 8 conventional Universities with faculties of agriculture and 4 National Agricultural Research Institutes. These establishments contribute to the dynamics of technology adoption process in the region.

In each of the 9 locations selected for this study, a sample of 30 rural based cassava processors were selected from a list purposively compiled for this study. This is a large sample size technique when the

population is unknown, $n \geq 30$ (Babbie, 1989). The study thus interviewed 270 rural based cassava processors. Of these, only 265 responses were complete and therefore considered valid for further analysis. An interview guide was used to facilitate interviews with 270 rural based processors. The interview guide was administered by 3 trained enumerators in July/August, 2005. This provided some primary data on the socio-economic characteristics of the cassava processors, and the characteristics of cassava processing technologies that predisposed them to adoption or non-adoption. However, more detailed participant observation and focus group discussions (FGDs) were held in 3 locations (Oja-Agbe Iseyin in the Oyo State; Igbatoro Akure in the Ondo State and Ibiade in the Ogun State) in September, 2005 to obtain descriptive data that provided detailed insights into technology adoption and non-adoption amongst cassava processors. Adoption of the cassava grater and screw press were measured in terms of the length of time the cassava processors devote to the use of the technology and adopters are considered as at least devoting some of their time more than zero to the use of the technology.

Both descriptive and inferential statistical tools were used in this study. The descriptive tools (means, percentages, ranking, and charts) were used on Microsoft Excel[®] while the inferential tool (difference of means using the Students' t-coefficient) for testing the null hypotheses was obtained on the Statistical Package for the Social Sciences (SPSS) version 10.0.

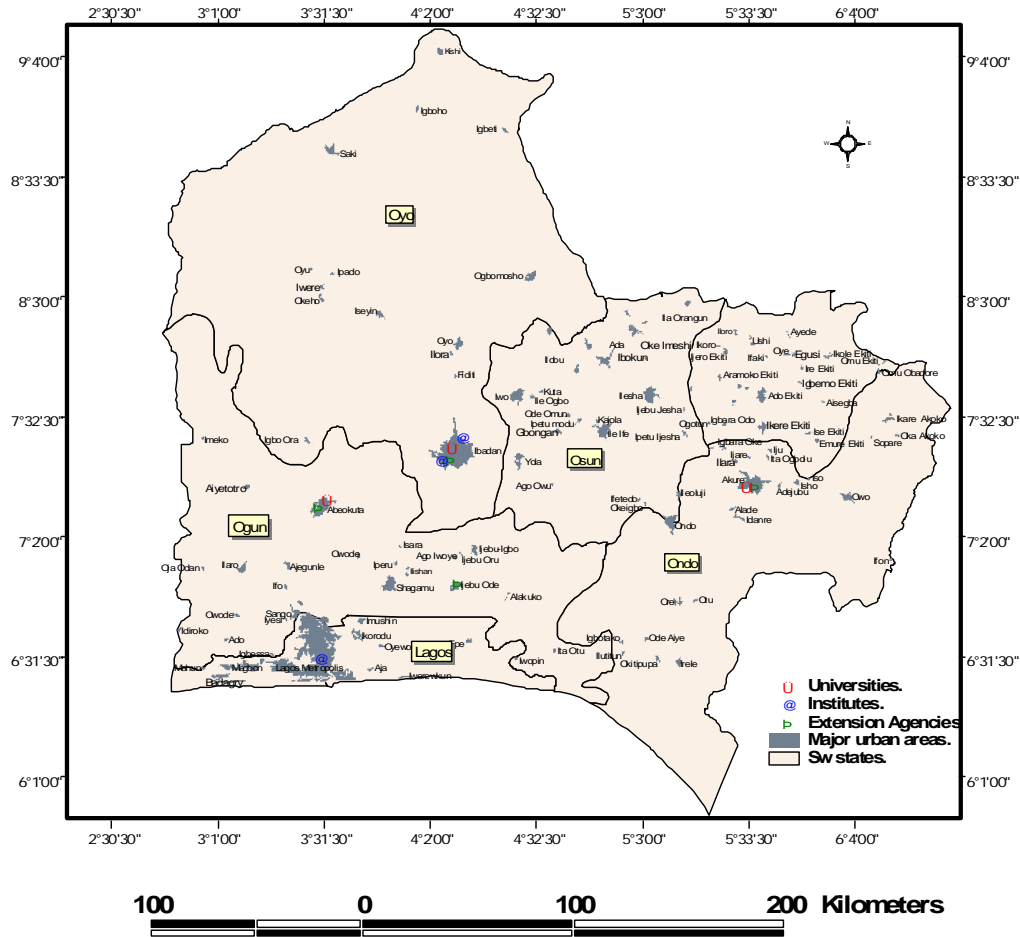


Figure 1: Map of southwest Nigeria showing the relative position of study locations

RESULTS AND DISCUSSION

Characteristics of rural-based cassava processors

Most of the cassava processors interviewed were between 21 and 60 years old (44.5% are 21-40 years old and 52.8% are 41-60 years old), with notable majority in the Ondo State (61.18%) being younger than the processors in the Oyo and Ogun States (Table 1). While the most of processors in the Oyo State (96.67%) are mainly females, over half of the cassava

processors in the Ondo and Ogun States are males. This finding corroborates the findings of some earlier studies in the region indicating that as cassava processing gets capital intensive, the proportion of men involved in the business tend to surge (Adebayo et al., 2003a). Across the agro-ecological zones, married processors were the dominant category. Overall, over 80% of the cassava processors are in this category (Table 1).

Table 1: Some demographic characteristics of cassava processors

Variable	State			Total (N = 265)
	Oyo (N = 90)	Ondo (N = 85)	Ogun (N = 90)	
Age (years)				
Less than 20 years	1.11	0.00	0.00	0.38
21 – 40 years	56.67	61.18	16.67	44.53
41 – 60 years	42.22	37.65	77.78	52.83
Over 60 years	0.00	1.18	5.55	2.27
Sex				
Female	96.67	49.41	44.44	63.77
Male	3.33	50.59	55.56	36.23
Marital status				
Married	60.00	84.71	96.67	80.38
Separated	0.00	0.00	2.22	0.75
Single	24.44	15.29	0.00	13.21
Widow	15.56	0.00	1.11	5.67
Household size (persons)				
Less than 3	5.55	0.00	3.33	2.96
3 - 6	71.11	78.82	33.33	61.09
7 - 9	15.56	16.47	28.89	20.31
10 - 12	7.78	0.00	13.33	7.04
Above 13	0.00	4.71	21.11	8.61
Position in household				
1st	32.22	37.65	52.22	39.62
2nd	54.44	38.82	35.56	44.53
3rd	11.11	9.41	12.22	10.19
Above 3rd	2.22	12.88	0.00	3.39
No response	0.00	1.18	0.00	0.38
Education				
None	2.22	5.88	24.44	10.94
Primary	17.78	32.94	30.00	26.79
Secondary	56.67	42.35	35.56	44.91
Post Secondary	22.22	17.65	10.00	16.60
Higher degree	1.11	1.18	0.00	0.75

In terms of household size, the dominant sizes are households of 3-6 persons, even though a wider spread is observed in the Ogun State. This finding is similar to that

of Adebayo et al. (2003b) in Ogun State of Nigeria where the average household size was found to be 7 persons. Most of the respondents claim to occupy the first or

second position within their households. This signifies the relative position of income from cassava processing within the cassava households in southwest Nigeria. The involvement of heads of households (first position) and their immediate lieutenants (first wife or first sons) in an economic activity is an indication of the role of that activity in sustaining the livelihood of members of that household (Fabusoro, 2005). Table 1 also shows that the possession of a secondary education is common amongst the cassava processors interviewed. This finding is similar to those of others in the region (Adebayo et. al., 2003b). In fact, some of the cassava processors hold higher degrees in the formal education system. This may be due to recent focus of national policy on the cassava post-harvest sector as a key industrial and export sector under the Presidential Initiative on Cassava.

This study found that both native and non-

natives are involved in cassava processing across the three agro-ecological zones studied. However, unlike in the Oyo State, where there is a clear dominance of native in cassava processing, almost two-fifth and one-quarter of the respondents in the Ondo and Ogun States respectively are non-natives (Table 2). While there are more Muslims in cassava processing in the Oyo and Ogun States, Christians are the dominant group in the Ondo State. All the processors seem to travel regularly to and from there areas of residence. Finally, as shown in Table 2, most of the respondents travel less than 40km/week. Fabusoro (2005) noted that regular trips of more than 5km is an indication of low level of livelihood diversification hence, shows the relative importance of the main economic activity engaged in by the respondent. In this case, it seems that the findings of this study may indicate that the cassava processors' livelihood is mainly focussed on cassava processing with little diversification.

Table 2: Some social characteristics of cassava processors

Variable	State			Total N = 265
	Oyo N = 90	Ondo N = 85	Ogun N = 90	
Ancestry				
Native	97.78	54.12	72.22	76.23
Non-Native	2.22	40.00	24.44	21.89
No response	0.00	5.88	3.33	3.02
Religion				
None	0.00	1.18	0.00	0.35
Christianity	36.67	65.88	45.56	49.06
Islam	52.22	29.41	53.33	45.26
Traditional	0.00	1.18	1.11	0.78
No response	11.11	2.35	0.00	4.53
Average distance regularly travelled (km/week)				
Less than 10	4.44	35.29	17.78	18.87
11 – 20	27.78	4.71	5.55	12.83
21 – 30	24.44	3.53	6.66	11.70
31 – 40	23.33	7.06	4.44	11.70

Cassava processors across the three agro-ecological zones studied differ in their membership of groups. Figure 2 shows that except in the Oyo State, group membership is unpopular among the cassava processors. This is similar to the findings of Adebayo et al (2003a). In the Oyo State, it seems that the activities at Oja-Agbe in Iseyin are a strong force for keeping cassava processors more active in

group membership than other zones. Almost all the cassava processors interviewed in the Oyo State belonged to *Gari Gbayi*, the umbrella association for all cassava processors in the zone. Other groups found in the study are various forms of cooperatives in the Ondo State and Ogun State zone the farm settlements' framers' group at Ibiade, various farmer's groups and cassava Growers' Association.

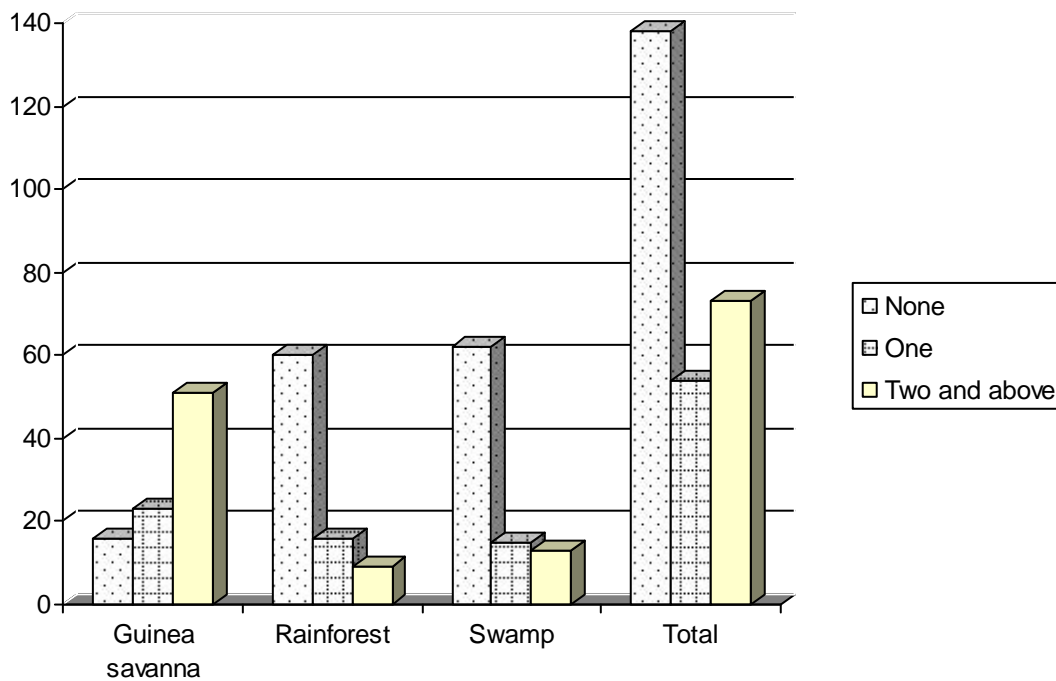


Figure 2: Distribution of cassava processors interviewed in southwest Nigeria by their membership of groups

Distinguishing features of the adopters and non-adopters of the cassava grater and the screw press

Two cassava processing technologies were most widely adopted by cassava processors in Southwest Nigeria. These are the cassava grater and the cassava screw press. These technologies were

rated first and second across the three agro-ecological zones (Table 3). In addition, the improved method of gari processing had a fair mention in the Ondo and Ogun States. The reasons for the widespread adoption of these technologies were explored during the focus group discussions (FGDs). These are that “they require less labour”; “they

are easy to practice”, “they give good quality products” they are faster than the old method and compatible with existing practice”. These reasons are consistent with characteristics of a good innovation as evident in the literature (Adebayo, 1997; Adams, 1988). These other reasons were further explored in the focus group discussions. Three themes emerged as the most important reasons for not adopting the innovations. They are: “it is not readily available”, the cost is too high and it is risky” and “I am not interested”. It can be inferred from these responses that it is important that cassava processors have access to trying and using cassava processing technologies under convenient arrangements to stimulate a positive attitude towards such innovations. Such convenient trial period can also reduce the fear of risk and stimulate processors’ interests in the innovations. Similar inferences have been made in Adebayo and Sangosina (2005).

The two most widely adopted cassava processing technologies were selected for the purpose of describing adopters and non-adopters and comparing them to the entire sample. These are the cassava grater and the cassava screw press. Of the 265

cassava processors whose responses were subjected to further analysis in this study, 153 (57.74%) adopted the cassava grater and 133 (50.19%) adopted the screw press. As shown in Table 4, the adopters of cassava grater are older, with larger household sizes and stayed longer in school than the non-adopters. They also have longer cassava processing experience and run larger cassava processing enterprises where more persons are also employed. The adopters travel more widely than non-adopters and consider the innovation more compatible to their existing practices perceives the use of the innovation as fewer complexes than existing practice and have been in contact with the innovation for longer than non-adopters. The average proportion of the adopter’s time devoted to the use of the innovation is 64.76%.

Similarly, the results in Table 5 describe the adopters and non-adopters of the cassava screw press. The adopters of the screw press have larger household sizes; have spent longer time in the formal school system and runs larger cassava processing enterprises with larger number of employees. They travel longer distances regularly and have a lower perception of complexity of the innovation than non-adopters.

Table 3: Innovations adopted by cassava processors

Innovation adopted	State			Total N = 265
	Oyo N = 90	Ondo N = 85	Ogun N = 90	
Cassava grater	86.67	41.18	44.44	57.74
Screw press	11.11	14.12	10.00	11.70

Table 4: Mean of selected variables for adopters and non-adopters of the cassava grater

Variable	All groups (N = 265) Mean	Adopters of grater (N = 153) Mean	Non-adopters of grater (N = 112) Mean
Age (years)	41.97	43	41
Household size (persons)	7	7	6
Education (years)	9	9	8
Number of cassava training attended	1	1	1
Income (N/month)	18,989.73	19,007.43	18,977.27
Cassava processing experience (years)	14	15	12
Number of employees in enterprise (persons)	6	7	5
Estimated value of enterprise (Naira)	3,017,802.24	5,221,391.84	1,548,742.52
Number of groups affiliated to	1	1	1
Average distance regularly travelled (km/ week)	66.96	70.44	64.53
First contact with innovation (years)	11	13	10
Proportion of time devoted to the innovation (%)	57.14	64.76	0

Table 5: Mean of selected variables for adopters and non-adopters of the screw press

Variables	All groups (N = 265) Mean	Adopters of Screw press (N = 133) Mean	Non-adopters of Screw press (N = 132) Mean
Age (years)	41.97	42	42
Household size (persons)	7	7	6
Education (years)	9	9	8
Number of cassava training attended	1	1	1
Income (N/month)	18,989.73	16,709.02	21,323.08
Cassava processing experience (years)	14	15	12
Number of employees in enterprise (persons)	6	7	4
Estimated value of enterprise (Naira)	3,017,802.24	4,227,667.07	1,798,020.49
Number of groups affiliated to	1	1	1
Average distance regularly travelled (km/ week)	66.96	69.28	64.57
First contact with innovation (years)	11	12	10
Proportion of time devoted to the innovation (%)	57.14	58.59	0

Key factors influencing the adoption of the cassava grater and screw press

Studies have shown that the factors influencing technology adoption can be social, economic, innovation related, process related or exogenous (Chickwendu et al, 1995; Collinson et al., 2001; Agbamu, 1995, Adebayo et al., 2002). In order to identify those factors that tend to influence the adoption of the cassava grater, a correlation analysis was carried out to determine the relationship between selected social, economic and innovation related characteristics of cassava processors and

their adoption of the technology. Table 6 presents the results of the Student’s t-test for the hypotheses that there are no significant differences between the social, economic and innovation related characteristics of adopters and non-adopters of the cassava grater. In this case, it was found that adopters and non-adopters of the cassava grater differ significantly in most of their social, economic and innovation related characteristics. The two exceptions are the estimated value of cassava processing enterprise (Naira) and the average distance regularly travelled (km/week).

Table 6: Test of difference of means between adopters and non-adopters of cassava grater

Independent variables	t	df	Decision*
Age (years)	-8.311	264	Reject Ho
Household size (persons)	-28.563	264	Reject Ho
Education (years)	-27.239	255	Reject Ho
Number of cassava training attended	-32.820	264	Reject Ho
Income (N/month)	10.591	262	Reject Ho
Cassava processing experience (years)	-23.456	264	Reject Ho
Number of employees in enterprise (persons)	-25.607	264	Reject Ho
Estimated value of enterprise (Naira)	1.801	244	Do not reject Ho
Number of groups affiliated to - Adoption Pro- portion of time devoted to the innovation (%)	-33.011	264	Reject Ho
Average distance regularly travelled (km/ week)	1.741	261	Do not reject Ho
First contact with innovation (years)	-25.871	264	Reject Ho

* = Decision criterion is reject null hypotheses when $p < 0.05$
df = Degrees of freedom

Constraints to the adoption of cassava processing technologies

This study determined the reasons adduced by cassava processors for not adopting some cassava processing innova-

tions despite their awareness of such innovations. Some of the emerging themes are that: “they are not readily available”, “the cost involved is too high”, “it is risky”, and “I am not interested”. These themes sug-

gest that despite the relevance of knowledge in stimulating adoption of innovations, ease of access to such innovations in terms of availability and relative cost, perception of risk in the change to and the use of the innovation and interest are core components that innovation developers, promoters and policy makers need to influence to stimulate adoption of such innovations.

CONCLUSION AND RECOMMENDATIONS

This study had examined factors determining selective adoption of the cassava grater and screw press in southwest Nigeria. The findings corroborated the findings of some earlier studies in the region indicating that as cassava processing gets capital intensive, the socio-economic characteristics of processors tend to change. It was established that the cassava grater and the screw press were the most widely adopted cassava processing technologies by cassava processors in Southwest Nigeria. It seems that the main reason were that they require less labour; are easy to practice, give good quality products, faster than manual grating and pressing and compatible with other stages in the cassava processing flow.

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