PROCESSORS' PERCEPTION OF THE EFFECTIVENESS OF SOME CASSAVA PROCESSING INNOVATIONS IN OGUN STATE, NIGERIA

K. Adebayo and M. A. Sangosina

Paper prepared for presentation at the Farm Management Association of Nigria Conference, Asaba, Nigeria, October 18-20, 2005

PROCESSORS' PERCEPTION OF THE EFFECTIVENESS OF SOME CASSAVA PROCESSING INNOVATIONS IN OGUN STATE, NIGERIA

Adebayo, K. and Sangosina, M. A.
Department of Agricultural Extension and Rural Development, University of Agriculture, PMB 2240, Abeokuta, Nigeria. Email: kolawole_adebayo@hotmail.com

ABSTRACT
The current drive towards higher levels of commercialisation of cassava processing under the Presidential Initiative on Cassava requires that the scale of cassava processing be increased in Nigeria. Primary data obtained from 112 respondents selected from the 4 extension zones of Ogun State was used to examine the perception of effectiveness of innovations by cassava processors and the factors responsible for adoption of these innovations. The processors' perception of effectiveness of cassava processing innovations was measured on a 5-point Likert-type scale containing 20 items. Most of the respondents (75%) are indifferent in their perception of the effectiveness of innovations in cassava processing. All the cassava processing innovations considered in this study are known to some respondents, but their levels of use and acquisition differ from one innovation or the other. There are no significant relationships between the processors' perception of effectiveness of cassava processing innovations and adoption of cassava peeling machine, fortification of cassava with protein rich cereal and use of rotary dryer. There are however significant relationships between the cassava processors perception of the effectiveness of cassava processing innovations and adoption of hand driven grater; power driven grater, hydraulic press and iron frying pot. Also, there are significant relationships between the cassava processors perception of cassava processing innovations and the major product processed and the main occupation. The study concluded 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.

Keywords: Perception, Cassava processing, Innovations, Nigeria

INTRODUCTION

Cassava is one of the most important staple food crops grown in Nigeria. Nigeria grows some 34,000 tonnes of cassava every year which constitute the largest output of the crop from any country in the world. Its importance forms the premise of the Presidential Initiative on Cassava which is one of the major reforms in Nigerian economy from 1999. However several constraints affect cassava processing which limits the contribution that the crop makes to the nations' economy (Hahn, 1989; Henry *et al*., 1999). For instance, the cyanide content in cassava is a major limiting factor to its utilization, but can be reduced by appropriate processing innovations (Oyewole *et al*., 1996; Oyewole and Aibor, 1992).

Previous research on perception of innovations indicated that various farming and post-harvest conditions significantly influence farmer's perception of new agricultural technologies and the probability of adoption (Adesina and Baidu-Forson, 1995; Adesina and Seidi, 1995; Gould *et al*., 1989). Past experiences in extension work also revealed that farmer's perception of technology-specific attributes associated with the use of new technologies significantly influence the adoption process. Cassava processing is a household business and children help in peeling while the women are mostly engaged in the processing. The processing can be cumbersome, often characterised with low quality, low output per unit of time and drudgery. Adebayo *et al*, (2003a) found that cassava processors readily adopt improved processing techniques suited to their location. This is a location-specific attribute of the innovations as perceived by the cassava processors. In addition, processors were found to be open to innovations introduced from the outside if the relevant local resources are available, benefits are evident and markets are secure. The current drive towards higher levels of commercialisation of cassava processing under the Presidential Initiative on Cassava requires that the scale of cassava processing be increased. Thus, the use of appropriate technologies or machinery is essential to meet for home consumption and industrial uses.

This study therefore examines the perception of effectiveness of innovations by cassava processors and the factors responsible for low rate of adoption of innovations among cassava processors in Ogun state. It is envisaged that awareness of the factors that influence perceptions would facilitate the enhancement of the development and transfer of appropriate cassava processing technologies. This is particularly so when studies have shown that the people involved in the adoption of new innovations are not passive elements, they have choices over the technologies they adopt (Adebayo *et al*, 2003b). The study also tested two null hypotheses:

Ho_1 There are no significant relationships between processors' perception of cassava processing innovations and their socio-economic characteristics.
Ho_2: There are no significant relationships between processors' perception of cassava processing innovations and the adoption of selected innovations.

METHODOLOGY
The study was conducted in Ogun State. The State lies within latitude 6^0N and 8^0N and longitude $2^1/_2{}^0$E and 5^0E. It has an area of about 16, 409, 29 square kilometres and experiences rainfall pattern similar to other s in the southern parts of the country, characterised by two peaks. The vegetation is typical of the rainforest. The main occupation of the people is farming, dyeing, trading, and pottery and fishing. The major food crops are cassava, maize, yam, cocoa, kola nut, oil palm and citrus. The state was divided by Ogun State Agricultural Development Project (OGADEP) into four operational zones namely Abeokuta Zone, Ijebu Ode zone, Ikenne zone and Ilaro zone.

The sample size for this study is one hundred and twenty (120) cassava processors in Ogun State. Thirty (30) interview guides were administered in each of the four operational zones of OGADEP One cassava processing community was randomly selected for this study in each OGADEP Zone. These are: Owe (Abeokuta zone), Ibiade (Ijebu zone), Kobape (Ikenne zone) and Ilaro, (Ilaro zone). Only 112 interview guides were used for further analysis in the study. Both descriptive (frequency distribution, percentages and mean) and inferential (Chi square) statistical tools were used to analyse the data obtained in this study.

RESULTS AND DISCUSSION
Description of respondents
Table 1 shows some selected socio-economic characteristics of the respondents in the area of study. Most of the respondents are females (81. 2%) thus confirming the findings of earlier studies that women form the bulk of the cassava processors in Ogun State (Adebayo *et al*, 2003a; Afolami and Ajani, 1995). Therefore attempts to introduce new innovations should be made in such a way that women would be able to operate the new technologies and effectively use the new ideas introduced. Table 1 also indicates that majority of those involved in cassava processing (88%) are within the active age bracket of 21 – 60 years. In addition, most of the respondents are in nuclear families (53%), married (80.4%) with family sizes of 3 – 6 persons (55%). This may be due to the labour-intensive nature of cassava processing where family labour plays a key role in processing activities. This is found especially in peeling, dewatering, fermentation and roasting. The need for family labour such as children and relatives may limit the number of singles engaged in cassava processing. Finally, Table 1 shows that *gari* is the major cassava product processed by 62% of the respondents many of who have had less than 10 years of cassava processing experience. Similar results were found in Adebayo *et al.*, (2003b) As shown in Figure 1, only 4% of respondents have recently acquired a machine (power driven grater). This result shows that few respondents could afford the new innovations probably due to the cost of acquiring one.

Table 1. Some selected socio-economic characteristics (N = 112)

Variable	Mode
Gender	81% Female
Age	88% 21-60 years old
Marital Status	80% Married
Family Size	55% 3 – 6 persons
Family Type	53% Nuclear
Major Product	62% *Garri* only
Cassava Processing Experience	49% Less than 10 years

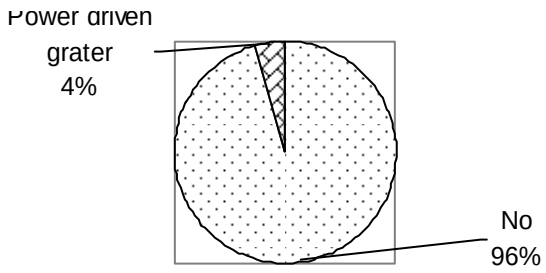

Figure 1. Proportion of respondents who recently acquired a machine

Key cassava processing innovations in Ogun State

Table 2 shows that all cassava processors use knife and sack as major tools in their processing activities. Planks hand screw press, cane sieve, and power driven grater are also regularly used. This shows that most of the cassava processors can not do without the use of these material and equipment. In case of frying pot, respondents either use the iron (28.6%) or the earthen pots (30.4%). The use of stone for dewatering cassava mash is also almost extinct as 5% of respondents still use it. Only 1.8% of the respondents use the hydraulic jerk. About 42.9% use other materials such as (plastic bowls, Ada fufu, plastic sieve, concrete drum, plastic drum).

Table 2. Equipment and materials used in cassava processing

Equipment and Material	Function	Frequency	Percent
Knife	Peeling cassava roots	112	100.0
Basket	Container	111	99.12
Sack	Dewatering	112	100.00
Plank	Dewatering	96	85.71
Hand screw press	Dewatering	90	80.36
Cane sieve	Sieving	90	80.36
Power driven grater	Grating	96	85.71
Iron frying pot	Garifying	32	28.57
Earthen frying pot	Garifying	34	30.36
Stone	Dewatering	6	5.36
Hydraulic jerk	Dewatering	2	1.79
Others (Plastic bowls, *Ada fufu*, Plastic sieve, concrete drum, plastic drum)	Measurement, sieving etc.	48	42.86

Table 3 shows that all the cassava processing innovations considered in this study are known to some respondents, but their levels of use and acquisition differ from one innovation or the other. The table reveals that 89.3% of the respondents had no idea of what a peeling machine is, while the remaining 10.7% have heard of it but none of the respondents had either tried, used nor acquire it. A similar trend is observed for fortification of cassava with protein-rich cereals and use of a rotary dryer. Even though, a large proportion of the respondents (72.3%) have never heard of an hydraulic jerk, 3.6% claim to have acquired one. In essence, Table 3 shows that more effort is required by research and extension agencies to promote innovations such as the peeling machine, hydraulic jerk, fortification of cassava and rotary dryer, all of which have some potential for improving the envisaged higher levels of commercialisation of cassava products desired in the Presidential Initiative on Cassava.

Table 3. Level of adoption of selected cassava processing innovations (N = 112)

Innovation	Not applicable	Know about it	Tried it	Using it (Rental)	Acquired it
Cassava peeling machine	89.3	10.7	-	-	-
Hand-driven grater	50.9	49.1	23.2	-	-
Power-driven grater	10.7	89.3	89.3	71.4	15.2
Hand-screw press	39.3	53.8	52.0	22.5	29.5
Hydraulic jerk	72.3	27.7	6.3	1.8	3.6
Fortification of cassava with protein –rich cereals	99.1	0.9	-	-	-
Rotary dryer	95.5	4.5	1.8	-	-
Iron pot fryer	22.3	77.8	76.0	14.3	55.4

Factors influencing the adoption of cassava processing innovations

Respondents' adoption decision-making is influenced by certain factors, either-self dependent, relatives, neighbour, other processors or a combination of these factors together. Table 4 shows that most respondents (53.6%) take their own decision without being influenced by anybody. This might be due to the fact that cost of production is influenced by individual methods of production and other market indices. Associated with this is that most respondents do not belong to any farmer/processor group/society that could influence their decision. In fact, only 25% of the respondents claim that their decision is influenced by their relatives. This finding further reinforces the

individual differences theory and older innovation-decision theories that argue that adoption decision making are deeply personal (Rogers and Shoemaker, 1973; Polson and Spencer, 1991).

Table 4. Factors influencing adoption decision making (112)

Factor	Frequency	Percent
Accept technology through own decision	60	53.6
Accept technology through own decision and discuss with wife and children before adoption	26	23.2
Accept technology through own decision and discuss with wife and children before adoption, and discuss with neighbours/relatives/other processors	15	13.4
Accept technology through own decision and discuss with neighbours/relatives/other processors	10	8.9
Discuss with wife and children before adoption, and discuss with neighbours/relatives/other processors	1	0.9

Figure 2 shows the qualities that processors look for in cassava processing innovations. The result shows that most of the respondents quite agree that an innovation must be cheap to maintain, easy to operate, requiring less technical know how and less energy. Only a few agree that innovations must be cheap to acquire. This implies that most respondents are aware of the fact that cassava processing innovations are usually costly to acquire but they will opt for one that is relatively cheap to maintain.

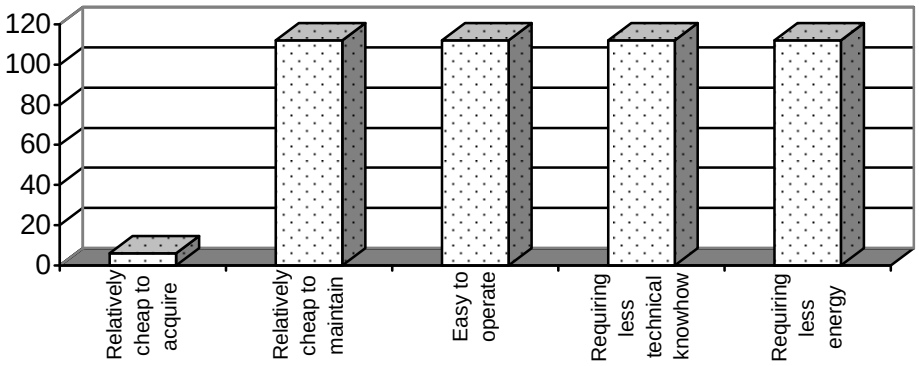

Figure 2. Qualities of cassava processing innovations desired by processors

Factors influencing processors perception of cassava processing innovations

The processors' perception of effectiveness of cassava processing innovations was measured on a 5-point Likert-type scale containing 20 items (Table 5). The summary of the responses is shown in Figure 3. Respondents who have a score of less than 25 are considered to have a negative perception, while those that score between 26 and 75 are deemed indifferent. A score of above 75 points is considered a positive perception. Figures 3 shows that none of the processors have a positive perception that traditional technologies are better than improved ones. Most of the respondents (75%) are indifferent in their perception of the effectiveness of innovations in cassava processing. It seems that the general attitude is that of: "if it works, I use it, if it doesn't, I don't."

Two null hypotheses were tested in this study. The first states that there are no significant relationships between the processors perception of effectiveness of cassava processing innovations and their socio-economic characteristics. The second states that there are no significant relationships between the processors perception of the effectiveness of cassava processing innovations and the adoption of selected innovations. Table 6 shows the results of Chi square analysis comparing total perception score for effectiveness and use cassava processing innovations and adoption of selected cassava processing innovations. There are no significant relationships between the processors perception of effective cassava processors innovations and adoption of cassava peeling machine, adoption of fortification of cassava with protein rich cereal and use of rotary dryer. This confirms the results in Figure 3 that most respondents have an indifferent attitude to these innovations.

There are however significant relationships between the cassava processors perception of the effectiveness of cassava processing innovations and adoption of hand driven grater; power driven grater, hydraulic press and iron frying pot. When compared with the results in Table 3, it appears that cassava processors adopt innovations not only

because they know it but that they are able to try it, have an opportunity to use it (even through rental) and have the capacity to acquire it.

Of the socio-economic characteristics, the null hypotheses were accepted that there is no significant difference between the cassava processors' perception of cassava processing innovations and gender, marital status, family type and education. On the contrary, there are significant relationships between the cassava processors perception of cassava processing innovations and the major product processed and the main occupation.

Table 5. Cassava processors' perception of effectiveness of improved cassava processing technologies

Statement	NA	SD	D	U	A	SA
The knife and the cassava-peeling machine performs the same functions therefore the cassava processing machine is not an innovation	0.0	44.6	16.1	39.3	0.0	0.0
The use of cassava peeling machine as compared to the use of knife for peeling does not necessarily reduce drudgery associated with cassava processing	0.0	36.4	21.4	40.2	0.0	0.0
The power-driven grater performs the same function as the traditional metal sheet manual grater and does not have any significant difference	11.6	50.9	31.3	6.3	0.0	0.0
The power-driven grater is not more effective than the manual metal sheet grater fastened on wooden platform	17.0	67.0	14.3	0.9	0.0	0.9
The hand screw press and the hydraulic jerk perform the same function of dewatering therefore, the hydraulic jerk is not an innovation	17.0	33.9	14.3	33.9	0.0	0.9
The hydraulic jerk is more effective than the hand screw press	16.1	25.0	17.0	41.1	0.0	0.9
The hand screw press is more labour intensive than traditional use of stone and wooden platform	17.0	20.5	16.1	17.0	22.3	7.1
The use of power-driven grater does not have any relative advantage over the manual metal sheet grater	16.1	62.5	20.5	0.9	0.0	0.0
The power-driven grater is not complex for rural women to operate	18.8	30.4	21.4	1.8	18.8	8.9
The hydraulic press is not easier to operate than the hand screw press	17.0	26.8	22.3	30.4	0.0	3.6
Fermentation of cassava does not require any machine	28.6	13.4	2.7	8.0	7.1	40.2
Traditional method of submerging or solid state fermentation is not an innovation	28.6	16.1	3.6	8.9	8.0	34.8
The length of time of fermentation and changing fermentation water daily to remove the characteristic odour of fufu is not an innovation	31.3	14.3	13.4	5.4	7.1	28.6
The use of rotary dryer as compared with sun-drying is not more effective in drying cassava wet paste	30.4	13.4	17.0	37.5	1.8	0.0
Fortification of wet or dry cassava paste with protein-rich cereal to increase its nutritive value is not a new innovation	36.6	5.4	2.7	47.3	6.3	1.8
The sue of hammer mill instead f pounding mortar in milling cassava to flour does not safe labour or cost	47.3	18.8	22.3	4.5	7.1	0.0
The sue hammer mill is not more effective than pounding in mortar in converting dries cassava to flour	49.1	27.7	19.6	3.6	0.0	0.0
Mechanical drying is not better than traditional sun-drying of placing over a fire	50.0	17.9	22.3	8.0	0.0	1.8
The use of iron frying pot in frying or roasting gari perform the same function as traditional earthen pot, therefore the iron pot is not an innovation	15.2	58.0	20.5	5.4	0.0	0.9
Packaging of gari and fufu in cellophane bag is not an innovation	13.4	70.5	14.3	0.9	0.0	0.9

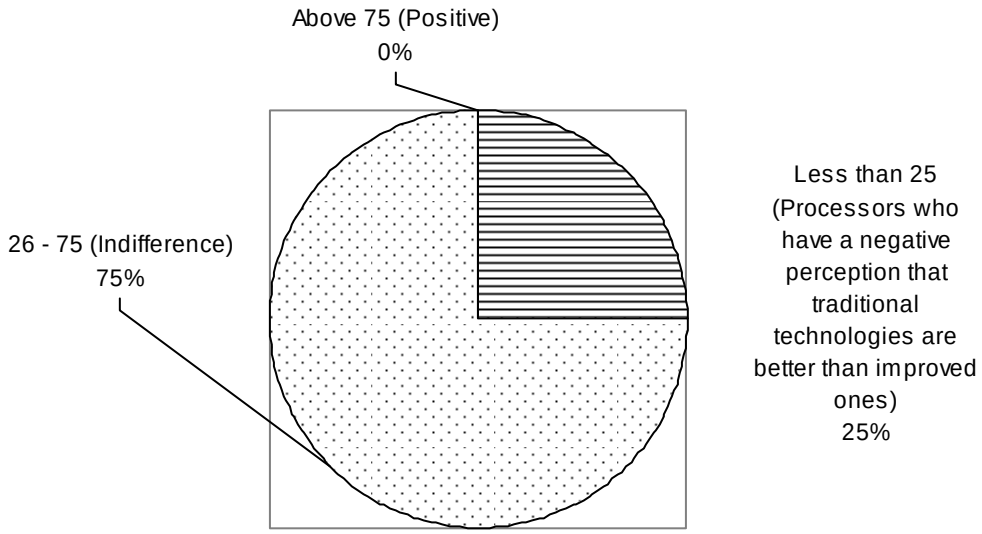

Figure 3. Distribution of respondents based on their total perception score for comparing traditional versus improved cassava processing technologies

Table 6. Relationship between cassava processors' perception of effectiveness of innovations and adoption of selected innovations

Independent variable	X^2 - calculated	Degrees of freedom	Asymp. Sig. (2-sided)	Decision
Adoption of cassava peeling machine	1.47	2	0.48	Accept Ho
Adoption of hand driven grater	15.92	4	0.00	Reject Ho
Adoption of power driven grater	33.65	6	0.00	Reject Ho
Hand screw press	18.17	8	0.02	Reject Ho
Adoption of Hydraulic jerk	15.26	8	0.05	Reject Ho
Adoption of fortification of cassava with protein-rich cereal	0.35	2	0.84	Accept Ho
Adoption of rotary dryer	1.83	4	0.77	Accept Ho
Adoption of iron frying pot	41.39	8	0.00	Reject Ho

Test statistic – Chi square coefficient
Level of significance – 0.05
Decision criteria – When Asymptotic significance is less than 0.05, reject Ho

Table 7. Results of Chi square test of the relationship between perception of effectiveness of innovations and selected socio-economic characteristics of cassava processors

Independent variable	X2 - calculated	Degrees of freedom	Asymp. Sig. (2-sided)	Decision
Gender	2.61	2	0.27	Accept Ho
Marital status	1.30	4	0.86	Accept Ho
Family type	3.57	2	0.17	Accept Ho
Education	11.66	8	0.17	Accept Ho
Major product	72.53	20	0.00	Reject Ho
Main occupation	60.63	28	0.00	Reject Ho

Test statistic – Chi square coefficient
Level of significance – 0.05
Decision criteria – When Asymptotic significance is less than 0.05, reject Ho

CONCLUSION AND RECOMMENDATIONS

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. This study have shown that cassava processing innovations such as peeling machine, hydraulic jerk, fortification of cassava with protein-rich cereals and the rotary dryer would only receive positive cognition and higher adoption rates when this has happen. In order to create the right environment for engagement, facilitation and cultivation of positive attitudes towards cassava processing innovations, it is opined that there is a need to improve the contact between extension officers and cassava processors. This may be achieved by improving extension officers to client ratios or enhancing the visibility and mobility of extension officers.

It is also important that processors' access to resources needed to acquire and maintain innovations be improved. As such, credit facilities, good road network, access to potable water, appropriate energy sources and trained personnel should be made available within easy reach of the processors. Finally, research institutes and universities should encourage more research into pragmatic cassava processing innovation and better ways of making them available to end-users.

ACKNOWLEDGEMENT

This research was supported by the International Foundation for science, Stockholm, Sweden, through a grant given to Dr. K. Adebayo

REFERENCES

Adebayo, K. White, J. L., Ayinde, I. A., Sanni, L. O., Oyewole, O. B., Dipeolu, A. O. and Westby, A. (2003a). "Fufu processing and sustainable livelihoods in Southwest Nigeria" Paper presented at the Foodafrica Initiative held at the Palais du Congres, Yaounde, Cameroon. May, 2003 pp. 15-20.

Adebayo, K., Anyawu, A. C. and Osiyale, A. O. (2003b). "Perception of environmental issues by cassava processors in Ogun State Nigeria, implications for environmental extension education" *Journal of Extension Systems* Vol. 19 pp. 103-112

Adesina, A. A. and Baidu-Forson, J. (1995). "Farmers perceptions and adoption of new agricultural technology: evidence form analysis in Burkina Faso" *Agricultural Economics* Vol. 13, pp. 1-9

Adesina A. A. and Seidi S. (1995). "Farmers perceptions and adoption of new agricultural technology: Analysis ad modern mangrove rice varieties in Guinea Bissau" *Quarterly Journal of International Agriculture* Vol. 34 pp. 358-371

Afolami C. A. and Ajani, O. I. (1995). "Gender participation, group formation and adoption of cassava processing technology in Ogun State". Adedoyin, S. F. amnd Aihonsu, J. O. Y (eds.) *Proceeding of the eight Annual Conference of the Nigeria Rural Sociological Association* Pp. 88-102.

Gould, B. W., Saupe and Klemme R. M. (1989). "Conservation tillage: the role of farm and operator characteristics and the perception of erosion." Journal *of Land Economics*. Vol. 65 pp 167 – 182.

Hahn, N. D. (1989). "An overview of Africa traditional cassava processing and utilization" *Outlook in Agriculture Journal* Vol. 18 No. 3, pp. 110-118

Henry , S. K. Westby, A. and Collinson, C. (1999). *Global cassava end-uses and Markets: Current situation and recommendation for further study* FAO publication Rome.

Oyewole , O. B. Sanni, L. O., and Ogunjobi, M. A. (1996) "Production of biscuits using cassava flour" *Nigerian Food Journal* Vol. 14, pp. 25-30.

Oyewole O. B., and Aibor, A. M. (1992): Fermentation of cassava with cowpea and soyabean for an enriched "fufu" *Journal of Tropical Science* Vol. 33, pp 9.15.

Polson, R. A and Spencer D. S. C. (1991): "The technology adoption process in subsistence agriculture: The case of cassava in South Western Nigeria" *Agricultural System* Vol. 23. Pp. 65-78.

Rogers E. M. and Shoemaker, F. F. (1973): *Communication of Innovation*. The Free Press, New York.