

Original Research

Women Willingness to Pay for Mechanical Cassava Grater Developed by the National Center for Agricultural Mechanization (NCAM) in Kwara State, Nigeria

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ABSTRACT: This study analyzed women willingness to pay (WTP) for the mechanical cassava grater developed by the National Center for Agricultural Mechanization (NCAM) in selected Local Government Areas of Kwara State, Nigeria. A multistage sampling technique was used to select 52 respondents in the iterative bidding game as sample size for the study. Cross sectional data were collected at the selected cassava processing centers located at Osi, Esie and Sabo Oke in each of the selected local government area using open-ended contingent valuation (CV) questionnaire. Data collected were analyzed using descriptive statistics and multiple regression models. The results revealed that majority (38.5%) of the respondents had average monthly income of N46, 019.33, indicating that they were low income earners. Data collected elicited socio-economic characteristics of respondents and analyzed using descriptive statistics. The results revealed that majority (38.5%) of the respondents were low income earners with average income of N46, 019.33. The study found that only 17.3% of the respondents stated that they were willing to pay the maximum price of N600, 000 for the mechanical grater which is below the actual selling price of N650, 000 proposed by NCAM. The results further indicated that the major constraints militating the respondents' willingness to pay for cassava mechanical Grater include high cost of grater, lack of durability and unawareness of its advantages in the study area.

Keywords: Women, cassava, mechanical grater, willingness to pay, contingent valuation

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INTRODUCTION

Cassava (*Manihot esculenta*) is a versatile root vegetable that is widely consumed in several parts of the world. Cassava is the most widely consumed and traded of all food products made from cassava roots. Over 90% of cassava produced in Nigeria is consumed locally with less than 10% utilized for industrial purposes (Adekeye, 2023). The utilization of cassava has largely explored traditional technologies for processing of its roots into human food such as *gari*, *fufu* and flour (Dada, 2012). However, Asimi (2018) reported that traditional cassava

Processing has a number of undesirable attributes. This justifies the need to mechanize cassava processing to minimize the drudgery, enhance commercial quality of the cassava products. Women are active in cassava industry and play a central role in cassava production, processing and marketing in Nigeria (Asimi, 2018). The present cassava processing methods involve peeling, grating, dewatering and roasting/frying. Peeling is the major bottleneck in cassava processing (Davies *et al.*, 2008). Traditionally, peeling is accomplished by hand and

involves the removal of the outer covering of cassava. Hahn (1977) reported that peeling can also be accomplished mechanically. Women are mostly engaged in using traditional technologies such as kitchen knives for peeling cassava, woven baskets for sieving, cast iron pan over wood fire for frying, sun drying products on platforms or road sides and heavy stones for dewatering in cassava processing operations in Southwest Nigeria. This method is time consuming and endangers the operator's fingers (Kolawole *et al.*, 2010).

Grating is one of the most arduous and laborious cassava processing operations which involve the rubbing of the crops being processed against very rough and sharp surfaces especially in traditional cassava processing. Grating can also be accomplished mechanically. Mechanical graters are the most significant development in the cassava-gari process (Asimi 2018). Mechanical cassava grater is important machine and as an innovation in smallholder cassava-gari processing in Nigeria. This improved technology has been developed by NCAM is being tested in six cassava processing centers located at Osi, Esie, Sabo Oke, Idofian, Iloffia and Ganmon but is yet to be commercially introduced in the local marketplace. The National Center for Agricultural Mechanization (NCAM) is a federal government parastatal under the federal ministry of agriculture and rural development with the overall mandate to mechanize Nigeria agriculture through innovative research leading to the development of simple and low cost technologies (Mohammed *et al.*, 2021). This study focused attention on the NCAM because it is an institution with specialization in the following areas of agricultural technology such as mechanization and processing which is in line with its established mandate.

Improved cassava technologies including machines have high operation cost and lack durability which hinders utilization of these technologies. However, improved practices in cassava processing would help improve palatability, adds value and extends market especially to medium income urban consumers (Asimi, 2018).

The demand for the mechanical cassava grater is still unknown both at the cassava processing centers that are located near and far away from the NCAM in Kwara state. Furthermore, there is limited literature and empirical research on willingness to pay for the mechanical grater under the NCAM and how much women cassava processors will be willing to buy the machine developed by the NCAM. Knowing that women cassava processors are willing to pay maximum price for the machine is not enough for the NCAM (Adekeye, 2023). The question is how much more? Or how high a price NCAM should charge or willing to sell its new machine?

In recent years, a proposed study on farmers'

willingness to pay and commercializing innovations from agricultural research in Kwara state is being undertaken by the planning, monitoring and evaluation department under the NCAM and is in progress and not yet completed (Mohammed *et al.*, 2021). Efforts have not been made to analyze willingness to pay among women cassava processors under the NCAM in Kwara state, Nigeria. Information on willingness to pay for this machine is crucial as estimates of women willingness to pay for new designed mechanized grater are important determinants for the machine adoption. Furthermore, the estimates of the willingness to pay are tools that would guide the NCAM in its pricing and marketing decisions. This particular study is an attempt to fill the information gap. With increased skyrocketing prices of goods and services and inflation in the country, there is need for this study and analysis of willingness to pay for mechanical grater should be a priority

Theory

The contingent valuation method is an economic, non-market-based valuation method normally used to predict individual preferences for public goods. The method relies on directly querying individuals about their willingness to pay (WTP) for a specified improvement in the course of processing. Contingent valuation method is a stated preference technique, whereby individual states his or her preference. Willingness to pay may specifically be defined as the amount that must be taken away from the person's income while keeping his utility constant (Varian, 2010). Willingness to pay is the maximum amount that a buyer will pay for a good. The willingness to pay measures how much that buyer values the good. Each buyer's maximum price is called his willingness to pay or reservation price (Varian, 2010). The willingness to pay can be calculated by the researcher or stated by the respondent. In this study the respondents were directly asked to state their willingness to pay for the mechanical grater.

Review of NCAM indigenous technologies

The NCAM was established in 1974 in Ilorin, Kwara State, Nigeria, an institution like it has been established in any other African country since then. So, it has a unique position on the African continent (Adekimi *et al.*, 2014; Ogunyemi and Adedokun, 2018). The exact objectives of the center are: to encourage and to engage in adaptive and innovative research towards the development of indigenous machines for farming and processing techniques; to design and to develop simple and low-cost equipment which can be manufactured with local

materials, skills and facilities; to standardize and certify, in collaboration with Standards Organization of Nigeria (SON), agricultural machines, equipment and engineering practices which are in use in Nigeria; to bring into focus mechanical technologies and equipment developed by various institutions, agencies or bodies, and to evaluate their suitability for adoption; to assist in the commercialization of proven machines, equipment, tools, and techniques; to disseminate information on methods and programmes for achieving speedy agricultural mechanization; to provide training facilities by organizing courses and seminars, specially designed to ensure sufficiently trained manpower for appropriate mechanization; and to promote cooperation in agricultural mechanization with similar institutions inside and outside of Nigeria and with international bodies, connected with issues of agricultural mechanization (NCAM, 2013).

The NCAM has developed technologies that have encouraged the use of mechanized tools and technologies through the fabrication of a great number of machines.

Some of these technologies include manual yam chipping machine, Bench Mounted Maize Sheller, Manual Seed and Fertilizer Broadcaster, Seed Treatment Drum, Manual Melon Washer, Farm Level Paddy Par-boiler, Hand-Push Weeding Hoe, Hand Seed Planter, Pedal Cassava Operated Grater and Palm-nut Cracker (Azogu, 2009).

Improved cassava processing technologies

In a bid to overcome the inherent problems of the traditional cassava processing giant strides have been made towards mechanizing several labor-intensive operations notably grating, water expression and milling. Various agro-engineering centres such as Rural Agro-industrial Development Scheme (RAIDS), Product Development Agency (PRODA), Federal Institute of Industrial Research (FIRO), National Root Crop Research Institute (NRCRI) and International Institute for Tropical Agriculture (IITA), as well as the Agricultural Engineering Departments in several universities in the country, have developed many mechanized units designed to remove the constraints that processors face at the household level (FAO, 2005).

The application of improved cassava processing technology results in reduced processing time and labour (Nweke, 1997). Under the transformation regime, high yielding cassava varieties have been developed to improve yield while labour saving and improved processing technologies have been put into place thus reducing the cost of producing and processing cassava products (Nweke et al., 2002).

METHODOLOGY

Study area

The study was carried out in Ekiti, Irepodun and Ilorin East Local Government Areas of Kwara state, North central geopolitical zone of Nigeria. Its capital is Ilorin. Kwara state was created on 27th May, 1967 as one of the twelve states that replaced the former four regional structures. Kwara state with a total land size of 3,682,500 hectares and with a total of sixteen Local Government Areas has a population of 3,273,610 (2019 projected population figure from 2006 census). Kwara state is located between latitude 8° 30 and 5°00'E and longitude 8.500°N 5.000°E. The topography is mainly plain lands to slight gentle rolling. In Kwara state, a humid tropical climate prevails and it has two distinct seasons; the wet season and the dry season. The wet season lasts April and October during which there is rain, while the dry season with no rain is between November and March. The average temperature in Kwara state ranges between 30°C and 35°C. The annual rainfall ranges between 1,000mm and 1,500mm. Kwara state is divided into four zones by the Kwara State Agricultural Development Project (KWADP) in consonance with ecological characteristics, cultural practices and convenience in administering project.

Sampling procedure and sample size

A multi stage sampling technique was used to sample women cassava processors in the study area. Three cassava processing centers in Esie, Osi and Sabo Oke were selected each in Ekiti, Irepodun and Ilorin East Local Government Areas of Kwara State, for the study. A sample size of 52 women cassava processors were sampled for the study.

Data collected were analyzed using different analytical tools based on the objectives of the study. These tools include descriptive statistical analysis and Contingent Valuation Method

RESULTS AND DISCUSSION

The result in (Table 1) shows that the maximum age of the respondent was 70 years and minimum age of the respondents was 25 years. The result also shows that majority of the respondents' falls in the age bracket of 37-53 with a mean age of 45.13 years. This implies that women in the age group are the ones that have greater value for the machines as compared to other groups. The result also shows that all (100%) of the respondents were females. This is because the study focused largely on women cassava processors. The implication of this is that

Table 1: Socio-economic characteristics of respondents.

Parameters	Frequency	Percentage
Age (years)		
20-36	17	32.7
37-53	22	42.3
54-70	13	25
Gender		
Male	0	0
Female	52	52
Monthly income (N)		
30000-40000	20	38.5
41000-50000	9	17.3
51000-60000	23	44.2
Level of Education		
Informal Education	11	21.2
Primary Education	21	40.4
Secondary Education	15	28.8
Tertiary Education	5	9.6
Total	52	100

Table 2: Distribution of respondents willingness to pay for NCAM mechanical cassava grater.

Amount willing to be paid(#)	Frequency	Percentage
≤300,000	6	11.5
301,000-400,000	8	15.4
401,000-500,000	30	57.7
501,000-600,000	9	17.3
Total	52	100

Table 3: Constraints to willingness to pay for the NCAM mechanical cassava grater.

Constraints	NC (%)	LS (%)	S (%)	VS (%)	MS
High cost of the mechanical grater	6(11.5)	6(11.5)	22(42.3)	18(34.6)	2
It is not readily available	5(9.6)	23(44.2)	14(26.9)	10(19.2)	2.44
Unawareness of advantages of the mechanical grater	4(7.7)	16(30.8)	11(21.2)	21(40.4)	2.06
Availability of hand grater	25(48.1)	8(15.4)	10(19.2)	9(17.3)	2.96
Lack Durability	4(7.7)	7(13.5)	23(44.2)	18(34.6)	1.94
Failure of the grater to add value in the processing	1(1.9)	10(19.2)	17(32.7)	24(46.2)	1.77

Source: Field survey, 2021. NC=Not constraint, LS=Less Severe, S=Severe, VS=Very Severe, MS=Mean Score, F=Frequency.

the female shoulders heavy responsibility in terms of household food processing, preparation and purchase as well as decisions and therefore should be targeted for information on processing. The average monthly income of respondents interviewed was N46, 019.23. The result also shows that the minimum monthly income was N30,000 and the maximum monthly income was N60,000. Furthermore, only 21.2% of the respondents had no formal education in the study area.

Willingness to pay for the mechanized grater

The result in the (Table 2) shows that majority of the respondents are willing to pay for mechanical cassava

grater. The average amount willing to be paid by the respondents interviewed was N436, 346.15. The result also shows that the maximum amount willing to be paid was nN600,000 and the minimum amount was observed to be N0.00. The modal amount willing to be paid by the respondents for mechanical cassava grater is between N401,000- N500,000; this is because about 57.7% of the respondents fall between that amount willing to be paid.

Constraints to Willingness to Pay for the NCAM Mechanical Cassava Grater

Table 3 shows the identified constraints and their respective mean score. Availability of other grater was

ranked the most constraining factor. This may be associated with the abundance of varieties of graters like manual grater. Another constraints to pay for the NCAM mechanical cassava grater as observed by the respondents was that NCAM mechanical cassava grater is not readily available with a mean score value of 2.44. This may be associated to the fact that the organization has restricted the sale of the mechanical cassava grater only to her organization and not making provisions on how they are to be marketed elsewhere.

Unawareness of advantages of the NCAM mechanical cassava grater with a mean score value of 1.92. Unawareness of any product can or will consequently hinder its consumption. Also, high cost of the NCAM mechanical cassava grater is a constraints. Unavailability of any product can lead to high price of that product which will consequently hinder its purchase. The more available a product is, the cheaper it will be. Other identified constraints to pay for the NCAM mechanical cassava grater are non-durability of the mechanical grater and failure of the grater to add value in the processing with mean scores of 1.94 and 1.77 respectively.

Conclusion and recommendations

The study concluded that few respondents are eager to buy the mechanical cassava grater at less than the willing to sell price of NCAM in the study area. The study also concluded that the respondents are facing constraints of lack of durability, high cost of mechanical grater, and unawareness of its advantages, which militate against their willingness to pay for the grater. It is recommended that NCAM should consider the reservation prices of each respondent in its policy decision in order to make the machine affordable in the study area. There is need for NCAM to look into the constraints militating the willingness to pay for the mechanical grater with a view to review downwards its willingness to sell the grater in the study area.

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