ADAN J. Agric. 2021, 2 (1): 70-81 **DOI:10.36108/adanja/1202.20.0170**
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ISSN 2736-0385

Perception of the role of agricultural extension services by cassava processors in Edo State, Nigeria

Onemolease, E.A.*, Ehilenboadiaye, C.O. and Omoregie, O***
**Department of Agricultural Economics & Extension, Ambrose Alli University, Ekpoma (e-mail: onemolease@yahoo.com)*
***Edo State Post Primary Education Board, Edo State, Nigeria (e-mail: manjohnel4luv@yahoo.com; gsm: 08050736095)*
****** Corresponding Author:** Department of Agricultural Economics and Extension, University of Benin, Benin, Nigeria*
***e-mail:** omo2ogie@yahoo.com; **Telephone Number:** 07062257308*

Abstract
This study assessed cassava processors perception of the role of the agricultural extension service in cassava processing in Edo State, Nigeria. Specifically, it ascertained the present role or services rendered by the agricultural extension service to cassava processors and explored the latter's expectations or extension needs. Data were collected from 167 cassava processors in the State, and analysed using descriptive statistics, multiple regression, Friedman, and Cochran tests. The major cassava products processed were gari (95.8%) and fufu (69.5%). Cochran result (χ^2 = 221.57; p<0.01) revealed that linking processors to cassava tuber producers (0.790), providing information on processing technologies (0.677), organizing trainings in processing methods (0.617) and disseminating information on storage methods (0.545) were the most significant roles presently played by the extension service in cassava processing. Friedman test result (χ^2 = 122.21; p<0.05) showed the most significant extension needs of the processors included providing information on credit sources (mean rank = 6.82) and cassava processing technologies (6.67) and facilitating excursions to processing industries (6.61). Income (b=0.68) and education (b=0.69) were significantly related to the processors agricultural extension service needs in cassava processing. Major constraints faced were high diesel cost (mean = 3.80), irregular electricity (mean = 3.80), inadequate finance (mean = 3.77) and high equipment maintenance cost (mean = 3.75). To this end, processors should be linked to credit providers and exposed to trainings to manage modern processing facilities.

***Key words:** cassava processing, agricultural extension needs, expectations, roles*

Introduction

The amount of food available per person on a global basis is 18% higher than 30 years ago, and most developing countries benefited from this increase in world food production (Kemi, 2019; Orji, Ogbuabor, Okeke & Anthony-Orji, 2018; Uma *et al*., 2019). As impressive as this improvement is, above 820 million people worldwide still suffer from chronic hunger; and one quarter of this population resides in Africa (FAO, 2019). This situation is growing worse yearly and can lead to catastrophe if food supply fails to meet up with world population increase (Oyekale, Ayegbokiki and Adebayo (2017). To address this problem, increased production of food crops such as cassava, has been recommended as a food poverty alleviation strategy (Otachi, 2017). The high dependence on cassava for daily sustenance both in Africa and in Nigeria in particular, is a pointer to the critical role this crop can play in ameliorating food poverty (Kemi, 2019).

This situation demands that conscious

efforts be taken to accelerate cassava production. This will require that the associated value chain process be investigated. The extent to which the full potential of the crop is harnessed, according to Nwosu and Ogbonnaya (2014), will require exploiting the benefits of the crop at both the production phase as well as exploiting other derivable products because of processing. This understanding, presumably, lead to the Federal Government selecting cassava as one of its mandate crops in the then Agricultural Transformation Agenda initiated in 2010 (FMARD, 2013). Unfortunately, the nation still battles with food poverty, with 52% described as poor which probably suggest a poor development of the cassava value chain process (Temidayo, 2019).

Despite the increase in production recorded, against several crops in the country such as maize, oil palm and cassava, the production is fluctuating rather than progressive (CBN, 2018); the performance of the agricultural sector is still considered less than satisfactory. This is because the sector has been unable to keep up with the increasing population demand, leading to a food import deficit. The food import bill of the country was estimated at ₦1.34 trillion in 2017 (CBN, 2018). This poor performance, despite output increases, simply shows that productivity increases is necessary but insufficient condition for agricultural development. A major missing link, Ahmadu and Idis (2014) noted, is the value chain development in the agricultural production process. Value chain simply refers to the transformation of agriculture or farm produce from its original form to other forms, usually through processing (Ahmadu and Idris, 2014). The cassava crop is not left out. Despite being the leading producer of the crop, the local demand for the crop and its derivatives, product of value chain, never seem to be satisfied (Temidayo, 2019). This is an indication that a gap exists in the production potential of/ the crop in the country, which requires an intervention.

A key factor in the development of the cassava value chain is the agricultural extension service. Any strategy attempting to enhance the cassava value chain will require input from the extension service. The success of such a strategy will require understanding the present role of the agricultural extension in cassava processing as perceived by the processors, and their expectations of the extension service in enhancing cassava processing i.e., their extension needs. However, a major challenge has been that the role of the extension service is in the entire cassava value chain process, particularly processing, is not clearly defined (Temidayo, 2019). In fact, some argued and even insinuated that the extension service has played little role in cassava value chain development, with more emphasis on the production of the crop, to the neglect of the processing arm or component of the value chain process (Unaeze and Umeh, 2020). Thus, while one can come across studies of the extension activities in cassava cultivation management, there is a dearth of information regarding extension activities in relation to its value-chain development such as processing (Nwosu and Ogbonnaya, 2014, Unaeze and Umeh, 2020).

There is therefore a gap between the extension service and the stakeholders in the cassava value chain process. This gap is likely due to the inadequate and improper/partial involvement of the extension service (Obinna and Chukwu, 2015). It is in the light of all the above that it becomes necessary and important to examine the extension service present and potential role in the cassava value chain process (processing) in Edo State, and investigate possible factors that has or may impinge on the agency intervention in this process.

Objectives of the study

The overall aim of the study is to assess cassava processors' perception of the role of the agricultural extension service in Edo State, Nigeria. The specific objectives are to:

a. Describe the socio-economic characteristics of cassava processors' in selected areas of Edo State;
b. Identify the cassava processing products produced by the processors;
c. Examine the cassava processing technologies adopted by the processors in the study area;
d. Identify the agricultural extension services currently accessed by cassava processors in the study area;
e. Ascertain the agricultural extension needs of the cassava processors in the study area;
f. Examine the constraints associated with the processing of cassava in the study area.

Hypotheses of the study

The following null hypotheses were tested:

Ho_1: There is no significant relationship between the socio-economic characteristics of the cassava processors and their agricultural extension needs.

Ho_2: There is no significant differences among the services currently provided cassava processors by the agricultural extension agency in the study area.

Ho_3: There is no significant differences among the extension service needs of cassava processors in the study area.

Methodology

This study was conducted in Edo State of Nigeria. The state is made up of three geo-political zones namely Edo south, Edo Central and Edo North with 18 local government areas (LGAs). The 2020 projected population estimate of the State, which is 4,235,595, based on the 3.2% national growth rate, occupies a land mass of 19,794km^2. The research design is quantitative in nature, relying on survey procedure and primary data, sourced directly from cassava tuber processors. Cassava processing is a major component of the cassava value chain in the study area. Major processing methods employed in the study area is the traditional method, which is labour intensive.

Sampling Techniques

Multi-stage sampling procedure was used in the selection of the respondents. In the first stage, all the agricultural zones (i.e., Edo South, Edo Central and Edo North) in the state were purposively selected to give the study a state-wide focus. Snowball technique was used in the sampling of cassava processors. This technique entails the identification of an individual having the characteristics of interest, in this case, a processor. This individual is requested to identify other persons with similar characteristic who are then interviewed (Adekoya *et al.,* 2014). It is a recommended sampling methodology when information on the population of interest is non-available. This technique was employed in sampling cassava processors from the 16 Local Government Areas sampled for the study. Overall, a total of 87, 40 and 42 processors were sampled from Edo central, Edo south and Edo north respectively. This gave a total of 169 respondent sampled for the study.

Information was retrieved from the respondents with the aid of a questionnaire. The reliability of the instrument was determined by collecting data from a sample of 20 processors from areas not included in the final sample. The data were collected at two time periods and the correlation coefficient determined to be 0.796, which was an acceptable result against the benchmark of 0.70 (Omoregie and Onemolease, 2020).

Data obtained from the respondents were analysed using descriptive statistics, including inferential statistics such as multiple regression, Cochran and Friedman tests.

Friedman rank test of difference was used to determine significant differences among the expected roles of the agricultural extension service in the cassava processing value chain. The Cochran Q test is used to determine if there are differences in a dichotomous dependent variable between three or more related groups (Omoregie, Onemolease and Orhibo, 2020). It was used to analyse the present roles of the agricultural extension service in cassava tuber processors in the study area.

Multiple regression was used to determine the relationship between the socioeconomic characteristics of the processors and their extension needs. The mathematical representation of the regression model is specified as:

$$Y = a+b_1X_1+b_2X_2+ \text{-----}+bnXn + e \quad \ldots\ldots. (2)$$

Where:
Y=the dependent variable
a=the coefficient on the constant term
b= the coefficient on the independent variable(s)
X= the independent variable(s)
e=error term

Dependent Variable:
Y= Extension needs of cassava processors (*proportion of total score on needs*)

Explanatory variables:
X_1 = Age (*measured in years*)
X_2 = Education (*years of formal school education*)
X_3 = Family size (*number of persons living together under same roof*)
X_4 = Farming experience (*measured in years)*
X_5 = Farm size (*hectare*)
X_6 = Income (*annual income from cassava enterprise in ₦*)
X_7 = Contact with extension agent (*dummy variable: Yes = 1; No = 0*)

Measurement of variables

Respondents were asked to indicate the present roles played by the agricultural extension service in their cassava processing enterprise. Their responses were scored as either 'Yes' or 'No'. The respondents were also asked to indicate areas in which the extension service can assist or support them in their enterprise. Their responses were measured on a four-point Likert-type scale of '*very important'* scored as (4), *important* (3), *little important* (2) and '*not important'* (1). Based on their responses, any score below the weighted mean of 2.50 indicate prospective role of or the processors expectations of the extension service, while a score of 2.50 and above indicate otherwise.

Processing constraints was measured by rating respondents on four-point Likert type scales of '*very severe'* scored (4), '*severe'* (3), '*little severe'* (2) and *'not severe'* (1). Based on their responses, any constraint score below the weighted mean cut-off (i.e., 2.50) is considered not serious while a score of ≥2.50 indicate otherwise. The mean cut off was obtained as follows: *(4+3+2+1) / 2 = 2.50.*

Results and Discussion

Socioeconomic Characteristics of cassava processors

The highest proportion of processors (37.72%) belonged to the 41-50 years age category while the average age was 41 years. This implies that many of the cassava processors were of average age, fairly young and have the energy to engage in the rigours associated with cassava processing. Similar finding has been reported by Nwosu and Ogbonnaya , who found the average age of cassava processors in Abia State to be about 41 years. Table 1 shows the highest proportion of the cassava processors (53.89%) were male while 46.11% were female. This indicates a higher proportion of female participation in processing. This differs from other findings

which reported low female participation in processing activities in Delta State (Ngbakor, Uzendu and Ogbumiuo, 2013).

The marital status of the respondents showed that most of the processors (67.07%) were married, 19.76% were single, and 4.19% were divorced while 8.98% were widowed. This suggests the major motivation for their engagement in this value chain activity is to cater for their families, thereby suggesting a sense of responsibility. This finding is supported by (Temidayo, 2019), who noted that most participants in cassava value chain activities were married people, who participated to improve their status. Also, Nwosu and Ogbonaya *(*2014) reported 88% of cassava product processors in their study as married.

Majority of the processors maintain a household size of 5-8 persons (48.5%) followed by a size of 1-4 persons (29.94%). The average size was 7, which implies that they cater for many persons. This result aligns with that of Nwosu and Ogbonaya *(*2014), who reported a household size of 4-6 persons (59.0%) for cassava product processors. The modal educational attainment of the respondents was tertiary education (40.12%) with 16.77% having no formal education. This suggests a high level of formal education among cassava processors, which may facilitate their adoption of improved processing technologies since education encourages people to make use of farm innovations (Unaeze and Umeh, 2020).

Table 1: Socioeconomic Characteristics of processors

Characteristics	Options	(n=167)	
		Freq	%
Age range (years)	21-30	17	10.18
	31-40	55	32.93
	41-50	63	37.72
	51-60	31	18.56
	61-70	1	0.6
Sex	Female	77	46.11
	Male	90	53.89
Marital status	Single	33	19.76
	Married	112	67.07
	Divorced	7	4.19
	Widowed	15	8.98
Household size	1-4	50	29.94
	5-8	81	48.5
	9-12	27	16.17
	13-16	9	5.39
Educational level	No formal education	28	16.77
	Primary education	37	22.16
	Secondary education	35	20.96
	Tertiary education	67	40.12
Farm experience	≤10	60	35.93
years)	11-20	73	43.72
	> 20	34	20.36
Income range (₦)	100,000 & below	60	35.93
	100,001 - 200,000	76	45.51
	200,001-300,000	18	10.78
	>300,000	13	7.78

The result for processing experience shows that the highest proportion of respondents (35.93%) had 5-10 years experience with the average being 14, implying they were quite experienced in this value chain. This will afford them better opportunity to have first-hand knowledge of the needs and challenges associated with cassava processing, in line with the assertions of Okwokenye and Onemolease (2011). Majority of the respondents (29.34%) earned ₦100,001 – ₦200, 000 per annum, 35.93% below ₦100,000 while the mean income was ₦140,269.85. This value is low, suggesting the respondents were small scale entre-preneur.

Cassava products processed by respondents

Figure 1 shows majority of the processors were involved in the processing of '*gari'* (95.8%) and fufu (69.5%), followed by starch (47.3%) and tapioca (46.1%). Abdoulaye *et al.* (2014) found that gari (52%) and fufu (30%) were the major cassava products processed by cassava processors. Stella *et al.* (2013) study equally reported a high percentage for gari (90.6%) and fufu (63.8%) as major products processed.

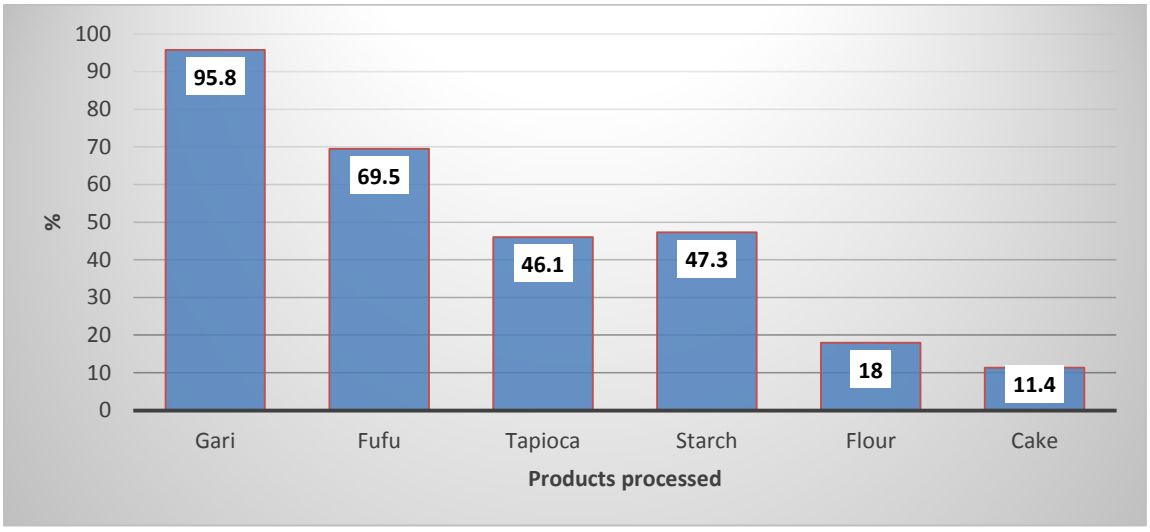
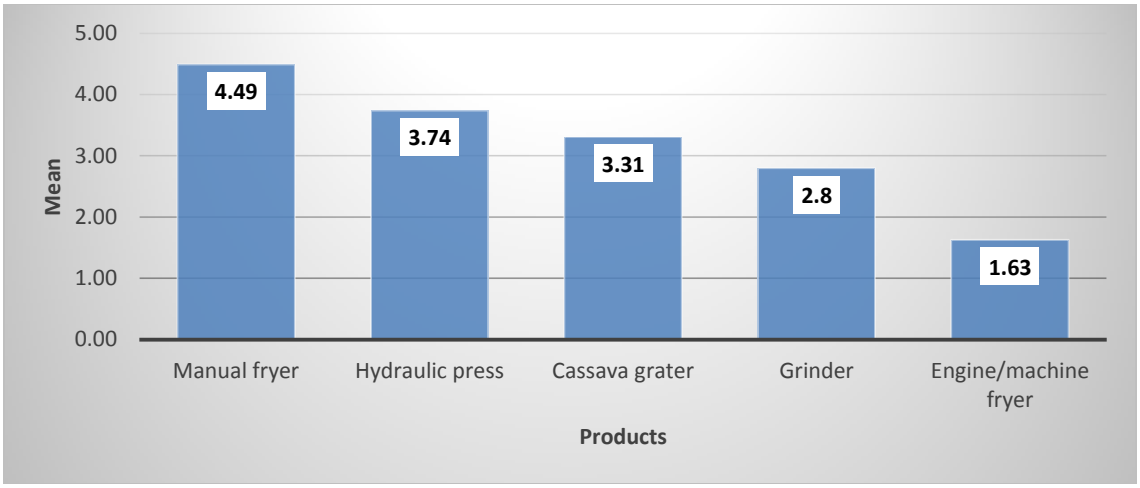


Figure 1: Cassava products processed by respondents

Processing Technologies Adopted

Table 2 shows the major processing technologies regularly used by the processors were manual fryer (mean = 4.49), hydraulic press (mean=3.74) and cassava grater (mean=3.1). Other studies have equally reported the high use of manual fryers and hydraulic press among cassava processors (Unaeze and Umeh, 2020).



**Frequently used (mean ≥ 3.00)*

Figure 2: Processing technologies adopted by processors

Extension Contact with Cassava Processors

Figure 3 shows most of the processors had contact with extension services in the last six months, with a contact rate of 93.41%. This high contact imply that the respondents are likely to be exposed to information that could help them improve on their processing activities by increasing their awareness or knowledge of improved processing technologies and market linkages. These will contribute to increasing their income and bettering their livelihood.

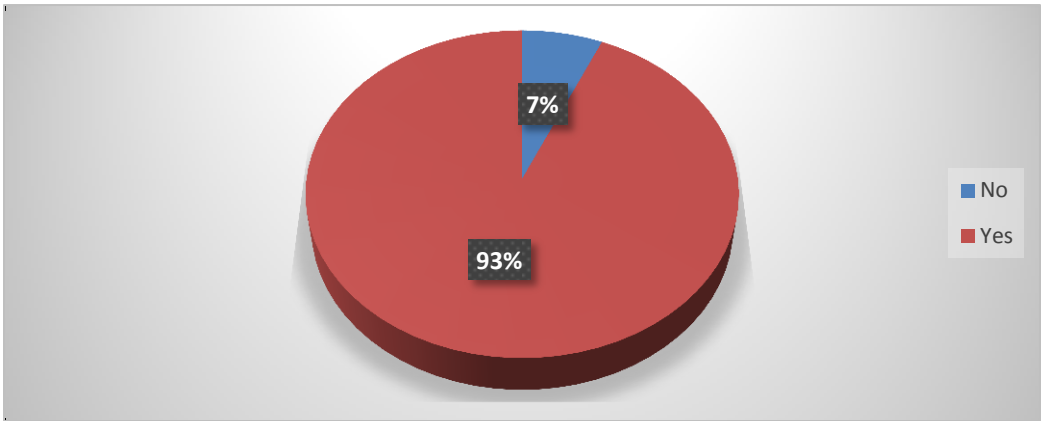


Figure 3: Extension contact with cassava processors

Present roles of the extension service in cassava processing

Table 2 shows the various services/support the extension service had provided to cassava tuber processors, i.e., services the processors have accessed or benefitted from the extension service. The major areas the processors had received extension services were linkage to improved cassava tuber producers (79.0%), information on processing technologies

available (67.7%) and training on processing methods (61.7%). Others include improved storage methods (54.5%), linkage to credit providers (51.5%) and market (49.1%). The table shows that extension services had provided a lot of services to the cassava product processors in the study area.

Cochran test was used to test for the significance of the difference among the present roles or services respondents have benefitted from the agricultural extension service in the study area. The test result (χ^2 = *221.57; df=10; P<0.01*) was significant, implying that significant differences existed in the services received benefitted from extension workers by cassava processors. The post-hoc test revealed there was no significant difference among services benefitted by the processors in the following areas: linkage to improved cassava tuber producers (0.790), linkage to cassava tuber producers (0.695), getting information on available cassava processing technologies (0.677), trainings in processing methods (0.617), knowledge of storage methods of products (0.545) and linkage to credit providers (0.515). However, these roles were the most significant services the respondents claimed to have benefitted from the extension service, compared to other support/services. The least significant roles of the extension service in cassava processing were packaging of products (0.365), training on management of processing equipment (0.341), and excursions to processing industries (0.305). Since the result was significant, the null hypothesis was rejected while the alternative hypothesis was accepted.

Table 2: Present roles of the extension service in cassava processing

Current roles/ services accessed	Freq	%	Response Proportion*
Linkage to improved cassava tuber producers	132	79	0.79[a]
Linkage to cassava tuber producers	116	69.5	0.695[a]
Given information on cassava processing technologies available	113	67.7	0.677[a]
Training on processing technologies/methods.	103	61.7	0.617[a]
Storage methods of products	91	54.5	0.545[a]
Linkage to credit providers	86	51.5	0.515[a]
Linkage to markets for products i.e., where to sell	82	49.1	0.491[b]
Linkage to manufacturers or fabricators of processing machine	62	37.1	0.371[b]
Packaging/branding of products	61	36.5	0.365[c]
Management of processing machines/equipment	57	34.1	0.341[c]
Tour/excursions to processing industries	51	30.5	0.305 [d]

χ^2 *= 221.57; df = 10; p < 0.01*

Extension needs of cassava processors

Table 3 shows the processors expectations regarding the roles of the agricultural extension service. Based on the mean benchmark of 3.00, the major areas of needs include information on credit sources (mean= 4.81), organizing visits/excursions to processing industries or more experienced processors (mean = 4.77), training on use of processing machines (mean = 4.76) and information on cassava processing technologies available (mean = 4.71). These findings confirm the studies of Unaeze and Umeh (2020), who reported cassava processors indicating the following as their areas of need: credit information on sources, processing technologies, training on use of processing technologies and excursions to processing industries.

Friedman test was used to test if

significant differences existed among the extension needs of cassava processors. The Friedman test result ($\chi^2 = 122.21$; $df = 10$, $P < 0.05$) was significant, implying that significant differences existed among the listed extension needs. The post-hoc test showed that information on potential sources of credit (mean rank = 6.82), information on cassava processing technologies (6.67) were among the most significant expectations of the respondents, while the least significant expectations were training on the maintenance of processing equipment (mean rank = 5.51), packaging of processed products (5.27) and linking processors to potential markets (4.87).

Table 3: Agricultural extension needs of cassava processors

Expectations	Mean*	SD	Mean rank**
Provide information on credit sources	4.81	0.39	6.82[a]
Organize excursions to processing industries or more experienced processors	4.77	0.42	6.61[ab]
Provide training on use of processing machines	4.76	0.43	6.56[abc]
Provide information on processing technologies available	4.71	0.75	6.67[a]
Link processors to fabricators of processing machine	4.68	0.54	6.18[abcd]
Provide information on better storage methods of products	4.65	0.48	5.96[abcde]
Provide price information for various cassava products	4.62	0.64	6.00[abcd]
Training on maintenance of processing equipment	4.56	0.51	5.51[cde]
Link processors to cassava tuber producers	4.56	0.58	5.54[bcde]
Provide training on packaging/branding of processed products	4.52	0.51	5.26[de]
Link processors to potential markets	4.41	0.63	4.86[e]

**Needed (mean ≥ 3.00); **Friedman test: $\chi^2 = 122.21$; $df = 10$, $p < 0.05$*

Table 4: Constraints facing cassava processors

Constraints	Mean*	SD
Difficulties in obtaining credits facilities to purchase processing equipment	3.80	.45
High cost of diesel	3.80	.45
Irregular supply power	3.80	.52
Lack of or inadequate finance	3.77	.66
High maintenance cost of equipment	3.75	.58
Inadequate labour supply/or workers	3.71	.53
Lack of processing equipment/facilities	3.69	.66
Inability to operate modern processing equipment	3.62	.59
Lack of information about modern processing machines	3.56	.76
Poor packaging/branding material	3.56	.65
High transport cost	3.56	.73
Insufficient water for processing	3.54	.58
Inadequate market information	3.02	1.12

**Serious (mean ≥ 2.50)*

Constraints facing cassava processors

Table 4 shows processors are faced with several constraints. Major ones included difficulties in obtaining credit facilities to purchase equipment, high cost of diesel and irregular power with mean scores of 3.80 each, inadequate finance (mean = 3.77), high maintenance cost of equipment (mean = 3.75)

and inadequate labour supply (mean = 3.71). The difficulties in obtaining credit facilities to purchase processing equipment may be due to the processors inability to access formal credit (Temidayo, 2019). Other researchers have mentioned lack of finance, lack of processing facilities, sources of labour and transportation problems as problems facing processors (Temidayo, 2019).

Relationship between the socio-economic characteristics of cassava value chain actors and their extension needs.

Table 5 shows the multiple regression results for the test of relationship between the socio-economic characteristics of the cassava processors and their extension needs. The regression model was significant (*F = 8.14; p<0.050*), implying that the combined influence of the independent variables on the dependent variable (extension needs) is significant. Based on the adjusted coefficient of determination (R^2= 0.23), the independent variables explained or accounted for 23% of the observation on the dependent variable (agricultural extension needs).

The t- value shows that income (b = 0.68; p<0.050) and education (b = -0.69; p<0.050) were significant variables. The positive value for income suggests processors with higher income had expressed greater need for agricultural extension services than those with less income, probably because they have the financial capability to access such services. The negative result for education indicates that processors with lower formal education had greater need for agricultural extension services compared with those with more formal education. The coefficient for contact with extension agents was negative though not significant. This means respondents with less contact with extension agents had higher extension needs than those with higher contact. This can be explained by the fact that those with more contacts are already benefiting from the services of the extension service hence their lower need for extension. Studies by Ogunsumi (2016), Scerri and Agarwal (2018) have shown that farmers in contact with extension workers generally benefit from information and training on improved practices.

Table 5: Relationship between the socioeconomic characteristics of cassava processors and their extension needs

Independent variables	Coefficient (b)	t	Prob. Level
Constant	51.07	34.61	0.00
Age	0.00	0.13	0.89
Sex	-0.25	-0.58	0.56
Household size	-0.06	-0.88	0.38
Education	-0.69*	-4.03	0.00
Experience	0.03	1.02	0.31
Income	0.68*	5.83	0.00
Contact with Extension agents	-0.29	-0.33	0.74

F- value: 8.14; p< 0.050; Adjusted R^2: 0.23

Conclusion and Recommendations

The study reveals that the agricultural extension service has been playing important roles in the processing component of the cassava value chain in the study area. Processors reported accessing several services from the extension agency. However, based on the extension needs indicated, they expect the agency to continue in the advisory services it is currently providing to them, and also expand such services to capture providing linkages to cassava tuber farmers and new markets, as

well as provide training on packaging/branding of processed products.

Based on the findings of the study, the following recommendations are made: Cassava processors should be linked to credit providers such as microfinance bank to access fund to enable them to finance their processing activities and especially modern machinery. There is the important need for the processors to be linked to fabricators, capable of manufacturing modern processing equipment. Machine fabricators can be trained to construct modern processing equipment to improve availability of these equipment; The government should improve conditions of existing road, as their bad condition was said to be responsible for the high transport cost. The agricultural extension service should focus efforts on reaching out to the less educated processors and those with higher income as these were found to be in most need of the services.

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