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Original Research Article

Factors Influencing the Level of Acceptance of Cocoyam Value Added Technologies among Households in Delta State, Nigeria

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Abstract

The study examined the extent of utilization of cocoyam value added technologies among rural households in Delta State, Nigeria. A multi-stage random sampling procedure was used to select 120 respondents for the study. Data were collected from primary sources using structured questionnaires. Descriptive and inferential statistics were used to analyze the data. The results show that the majority (75.6%) of the respondents were females. However, greater proportions (69.7%) of the respondents were married, while 30.3% were single, respectively. The majority (33.6%) and 28.6% of the respondents also attained secondary and primary levels of education. The average mean age was 43 years, while the average mean household size and farming experience of the respondents were 3 persons and 11 years, respectively. The result also shows that the average farm size of the respondents was 1.2 ha. This implies that the respondents are still small-scale farmers. In terms of access to credit, 62.2% of the respondents had no access to a credit loan, while 37.8% had access to a credit loan. More so, the majority (68.9%) of the respondents did not belong to any social organization, while 31.1% of them belonged to a social organization. Results also indicated that cocoyam leaves for soup (3.53) were the only value-added technology above the mean benchmark of 3.0. This was followed by use of cocoyam preserved root for soup with a mean score of 3.48, use of cocoyam thickener (3.41), and processing corn into flour, respectively. The major factors influencing utilization of cocoyam value-added technologies include farm size, household size, income, educational level, access to credit, and age. In the light of the above, this paper therefore calls for land reform and credit policies targeted at allocating more land and provision of credit at little or no interest rate to cocoyam farmers who are interested in the business. Farmers should be encouraged to form cooperatives for ease of access to technological innovations to enhance utilization of value-added cocoyam technologies.

Keywords: Acceptance, Cocoyam value added, and Food Sustainability.

Introduction

In many parts of the world, roots and tubers like cassava, sweet potato, yam, and cocoyam are important staple crops, they are commonly cultivated by smallholder farmers and used as food security and income especially in Africa (FAOSTAT (2021). Food production has increased significantly as a result of adoption of agricultural innovations (improved crop varieties) and other relevant technologies, such as value-added technologies (Thomas*et al.*,2017).

Nigeria is the largest cocoyam producer in the world with annual output of about 3,450,000 metric tons (Igbozulike,2015; Udemezue et al.,2024). Production of Cocoyam in Nigeria has two edible aroid species called *Colocasia esculenta* (L.) Schott (Taro) and *Xanthosomamafaffa* (Tania). They are perennial plants grown as annual crops. *Colocasia esculenta* is one of the oldest cultivated plants in the world. *Colocasia esculenta* originated in South East Asia while *Xanthosoma*is believed to have originated in the American tropics. It was introduced into West Africa

around 1840(Otekunrin, *et al.*, 2021). In Nigeria, C. esculenta first became established as a staple in the South East followed much later by *Xanthosama*while *Xanthosoma*is the main cocoyam grown in the South West. They are popular and rich carbohydrate food crop (Enibe*et al.*, 2019; Otekunrin*et al.*, 2021; Udemezue*et a.l*,2024).

Despite the economic and nutritional values associated with the crop, the production of cocoyam had stagnated for few years now due to several production constraints, among which are neglect on the crops, climatic factor, low input, scarcity of planting materials, and various pre- and post-harvest biotic challenges, including the Cocoyam Root Rot Blight Complex (CRRBC), and Taro leaf blight (TLB) (Amadi, *et al.*, 2015 in Udemezue*et al.*, 2024).

In Nigeria, cocoyam is grated, mixed with condiments and wrapped in leaves and steamed for about 30minutes to prepare a delicacy popularly known as *ekpankwukwo (ikokore*). Cocoyam flakes is another end product of cocoyam which is cooked, cut into chips and dried under the sun. The resulting flakes are later soaked in water and cooked with vegetable and pigeon pea (*Cajanuscajan*) during famine or planting season when food is scarce (Onwuka, 2012 in Osahon and Odoemelam,2019). Other uses of cocoyam include maintaining healthy urinary function, reducing ageing and heart diseases, management of cholesterol and diabetes (Osahon and Odoemelam,2019).

Cocoyam is a crop with lots of potentials and a large number of households in Nigeria grows cocoyam as cash crop, selling at least half of their yearly Production to make money (Osahonand Odoemelam,2019).Despite this, there is limited available literatures as regards to the level of utilization of cocoyam value added technologies among households .In view of this, the work investigates the factors influencing the level of utilization of cocoyam value added technologies in Delta State, Nigeria. The specific objectives were to; examine the extent of utilization of cocoyam value added technologies in the study area, ascertain the determinants of utilization of cocoyam value added technologies among the households and estimate the constraints working against the adoption of the value added technologies in the study area.

Methodology

The study was carried out in Delta State, Nigeria. A multi-stage sampling design that involves random and purposive procedure was used for the study. Data was collected through structured questionnaires. In the first stage, 3 local governments out of 25 LGAs in the State were used for the research. In the second stage, two communities per LGAs wereused due to their involvement in cocoyam production. In the last stage, 20 households were randomly selected from each community and this gave a total sample size of 120 respondents. Data collected was analyzed using descriptive statistics and regression model.

Model Specification

To ascertain the extent of use of cocoyam value added technologies,a 5-point likert rating scale was used:very high (5), high (4), moderate (3) low (2) and very low (1). Respondents with mean score of 3.00 and above indicatedhigh extent in the use of cocoyam value added technologies, while respondents with mean score of less than 3.0 were low. To determine the mean likert level, Xs = ΣX. Xs of each item was computed by multiplying the frequency of each response pattern with its appropriate nominal value and dividing the sum with the number of respondents to the items. This can be summarized with the equation thus: $X = \Sigma n/N$ (1)

Where, Xs =mean score

Σ = summation

f= frequency

n = likert nominal value

N= number of respondents

= 5+4+3+2+15/5= 15/5=3.0

To estimate the determinants of level of utilization of cocoyam value added technologies in the study area. Ordinary Least Square Regression Model was used. The model is specified as thus: Y = f (X1, X2, X3, X4, X5, X6, X9, X10, X11, X12) + e (2)

Where,

Y1 = cocoyam value addition technologies used

X1 = Sex (male = 1; female = 0)

X2 = Age (years)

X3 = Marital Status (married = 1, others 0)

X4 = Level of Education (years)

X5 = Occupational status (full-time farmer = 1; part-time = 0)

X6 = Farming experience (years)

X7 = Farm size (ha)

X8 = Household size (actual number of persons living in a household)

X9 = Monthly income (naira)

X10 = Membership of Social Organization (yes = 1; otherwise = 0)

X11 = Access to credit (access = 1; otherwise = 0)
X12 = Extension contact (Number extension contacts in a year)

Result and discussions

Socio-economic characteristics of the coco yam farmers

Data in Table 1 show that the majority (75.6%) of the respondents were females. This indicates females dominate cocoyam production activities in the area. There is a misconception in some localities in this study area that, apart from yam, every other root and tuber crop is a woman's crop. The result is in line with the findings of Osahon and Odoemelam (2019), who noted that there are more female farmers dominated in cocoyam activities than their male counterpart, but this contrasts the findings of Otitoju and Arene (2010) in Osahon and Odoemelam (2019), that Nigerian agriculture is dominated by males. The result also shows that 45.4% of the respondents were between the ages of 26 and 35 years. This is followed by those with an age range of 46-55 years (26.8%). The average mean age was 43 years. This implies that young people of active age dominated the activities. Youth has been classified as people within the age bracket of 15–35 (NBS, 2016). The result, therefore, showed that the youths are yet to tap into the various opportunities in cocoyam production (Chukwu, 2015). The majority (69.7%) of the respondents were married, while 30.3% were single, respectively. The finding implies that cocoyam farmers in the study area are largely married and are actively engaged in their businesses in order to adequately care for their family members (Onumadu*et al.*, 2014; Ekwe*et al.*, 2016; Osahon and Odoemelam, 2019).

A greater proportion (33.6% and 28.6%) of the respondents attained secondary and primary levels of education, respectively. The result showed that the level of literacy of the respondents in the study area was relatively high when compared to other states in the country. Education enhances farmers' ability to make accurate and meaningful management decisions. It also indicated that farmers' educational level positively influenced their adoption of improved technologies. Engagement in full-time or part-time agricultural production activities is most likely to affect attitude toward agro-technology adoption (Osahon and Odoemelam, 2019). The average mean household size and farming experience of the respondents were 3 persons and 11 years, respectively. The result also shows that the average farm size of the respondents was 1.2 ha.

In terms of credit access, 62.2% of the respondents had no access to a credit loan, while 37.8% had access to a credit loan. Access to credit needs to be addressed to encourage food production, especially among the rural farmers, who would remain subsistent in their food production, except there is an intervention that will empower them to produce more. Low access to credit could be because of poor information on credit facilities, unfavorable government policy on agriculture, and a lack of collateral, including limited access to land, bureaucratic bottlenecks, and credit policies, among others (Ekwe*et al.*, 2016).

Findings also show that the majority (68.9%) of the respondents did not belong to any social organization, while 31.1% of them belonged to a social organization. Membership in a social organization provides a platform for information sharing on modern production techniques, purchasing inputs in bulk, and labor exchange. This has been stated by Ekwe*et al.* (2016) as being a major factor influencing the output of farmers. Membership in a cooperative society can assist farmers in raising their production output and minimizing cost since the group would be able to take advantage of economies of scale, overcome barriers to assets, and better manage available resources. The majority (62.2%) of the respondents had no contact with extension, while others (37.8%) had contact with extension agent. The result further shows that although the level of extension contact in the zone was relatively high, it may vary across the different states in Nigeria.

Table 1: socio-economic characteristics of cocoyam farmers in Delta State, Nigeria (n=119)

Variables	Frequency	Percentage	Mean
Sex			
Male	29	24.4	
Female	90	75.6	
Age			
18-25	9	7.6	
26-35	54	45.4	43 years
36-45	9	7.6	
46-55	32	26.8	
56-65	15	12.6	
Marital status			
Married	83	69.7	
Single	36	30.3	
House hold size			

1-2	63	53.0	
3-4	41	34.4	5 persons
5-6	15	12.6	
Farming experience			
1-5	13	11.o	
6-10	45	37.8	11 years
11-14	21	17.6	
15-19	26	21.8	
20-24	14	11.8	
Level of education			
Non formal education	23	19.3	
Primary school	34	28.6	
Secondary school	40	33.6	
OND/NCE	12	10.1	
First degree/HND	10	8.4	
Farm size			
0.5-0.9 ha	44	37.1	
1.1-2 ha	39	32.7	1.2 ha
2.2-3 ha	36	30.2	
Access to credit			
Yes	45	37.8	
No	74	62.2	
Membership of cooperative			
Yes	37	31.1	
No	82	68.9	

Source: field survey, 2024.

Extent of Utilization of Cocoyam Value Added Technologies in the state

Findings in Table 2 indicated that cocoyam leaves for soup (3.53) were the only value-added technology above the mean benchmark of 3.0. This was followed by the use of cocoyam preserved root for soup with a mean score of 3.48, the use of cocoyam thickener (3.41), and processing corn into flour. These findings are in line with Ijioma *et al.* (2014), who observed high utilization of cocoyam soup thickener among others in their study in Abia State also. The result also showed low extent of use of most of the value-added technologies in the study area. The result is an indication of the poor awareness of the respondents on these technologies, which, if not addressed, would continuously hinder the utilization of these technologies. The essence of value addition is to increase economic gains from agricultural production. It is, therefore, not enough to produce more without commensurate efforts to increase market share of what is being produced through value addition.

Table 3: Distribution of respondents according to the level of utilization of cocoyam value added technologies in the study area

Utilization technologies	Mean	Remarks
Use of cocoyam leaves for soup	3.53	High
Use of cocoyam preserved root for soup	3.49	High
Use of cocoyam soup thickener	3.41	High
Processing corn into flour	3.10	High
Converting cocoyam flour into bread	2.30	Low
Converting cocoyam flour into chinchin	2.10	Low
Making of cocoyam flakes	1.35	Low
Making of cocoyam cakes	1.30	Low

Source: field work, 2024. Mean scores of 3.00 and above were seen as high while below 3 is regarded as low.

Multiple regressions Analysis Showing Factors Influencing Utilization of Cocoyam Value Added Technologies in Delta State

Four functional forms of multiple regressions were estimated, but linear regression was selected based on the magnitude of the R2 value, number of significant variables, and F value. The results of regression analysis of the independent variables (sex, age, marital status, educational level, occupational status, farming experience, farm size, household size, income of the farmers, farmers' organizations, access to credit, and access to extension contact) on determinants of the factors influencing utilization of Cocoyam value-added technologies show that a strong correction (R = 0.897) exists between the dependent variable and independent variables. These variables were able to explain 90% of the variation in

determinants of yam production among farmers (R2 =0.864). The adjusted R^2 also supported the claim with a value of 0.861, or 86.1%. This implies that the independent variables explain the behaviors of the dependent variable at 97 level of confidence.

Out of the 12 variables investigated as regards the factors influencing utilization of cocoyam value-added technologies in Delta State, only seven (6) variables were found to be statistically related to the factors influencing utilization of cocoyam value-added technologies in the study area. Those variables were farm size, household size, income, educational level, access to credit, and age.

Age was significant and negatively related to the level of utilization of cocoyam value-added technologies in the study area. This could mean that an increase in age will lead to a decrease in the utilization of cocoyam value-added technologies. This implies that the ability of a farmer to break risk and be innovative decreases with age (Osahon and Odoemelam, 2019).

Farm size was statistically significant and directly related to the utilization of cocoyam value-added technologies in the study area. This implies that a 1% increase in farm size will bring about a significant increase in utilization of cocoyam value-added technologies among the farmers in the study area. Farm size affects adoption costs, risk perceptions, human capital, credit constraints, labor requirements, tenure arrangements, and more. With small farms, it has been argued that large fixed costs become a constraint to technology adoption, especially if the technology is costly (Abara and Singh, 1993 in Osahon and Odoemelam, 2019).

Household size was also significant and directly related to the level of utilization of cocoyam value-added technologies in the study area. This suggests that a 1% increase in household size will lead to a greater amount of increase in level of utilization of cocoyam value-added technologies. The increase in household size also implies that more family labor would be readily available since relatively large household size is an obvious advantage in terms of labor supply, where the wage rate is relatively costly (Osahon and Odoemelam, 2019).

The coefficient of income was significant and directly related to the level of utilization of cocoyam value-added technologies. This implies that a 1% increase in income will lead to a significant increase in the level of utilization of cocoyam value-added technologies. This may be because an increase in income will enable the farmers to adopt new production strategies. Programs that produce significant gains can motivate people to participate more fully in them.

Access to credit was significant and directly related to the utilization of cocoyam value-added technologies. This result implies that a unit increase in access to credit among farmers will lead to a.092% increase in utilization of cocoyam value-added technologies.

The coefficient for the educational level was positive, and this implies that individuals with higher educational attainment are usually heavily involved in the utilization of cocoyam value-added technologies, while those with lower education tend to participate lower in the same business. It is expected that educational attainment will contribute significantly to decision-making about the utilization of cocoyam value-added technologies. This finding is in line with Chukwu (2015) and Esiobu and Onubuogu (2015), who said that education is one of the factors that influence participation in agribusiness.

However, an increase in the level of education of the farmers can result in an increased level of commercialization of the farm enterprise. This is in line with *a priori* expectations, as educated farmers are flexible and can adopt good changes and new improved technologies that can enhance their level of commercialization. Therefore, the level of education of a farmer does not only increase his productivity but also enhance his ability to understand, evaluate, and adopt new production techniques (Iheke, Onu, and Egem, 2021).

Table 3: Multiple regression Analysis Showing Determinants of Yam production in Delta State

Model	Unstandardized Coefficients		Standardized Coefficients	
	B	Std. Error	Beta	T
Constant	5.7619	3.3890		5.225
House hold size	9003.617	3500.451	.094	2.748
Farming experience	8335.673	717.258	.236	8.976

Income	.624	.013	1.056	50.094
Educational Level	21837.365	4239.041	.179	7.567
Access to credit	30701.049	10060.673	.092	3.052
Farm size	50256.340	14438.166	.184	3.481
Age	-4211.352	535.816	-.307	-7.860

Source: Field work, 2024.R^2= 0.864, Adjusted$_R{}^2$=0.861

Constraints to Cocoyam Production Technologies in Delta State

Table 4 shows the distribution of respondents according to constraints in cocoyam production technologies in Delta State, Nigeria. Percentage and rank order were used. Findings showed that rot and decay, poor storage facilities, little access to credit loans, pests and diseases, inadequate funds to invest in cocoyam businesses, inadequate extension contacts, and poor road networks, among others, were ranked (1st, 2nd, 3rd, 4th, 5th, 6th, 7th). The study also showed that other constraints had percentages ranging from 42.0% to 24.4%, which were equally significant among the variables constraining cocoyam production in the study area.

Distribution of Cocoyam Farmers according to Constraints to Cocoyam production Technologies in the Study Area

Constraints	Frequency	Percentage	Ranking
Rot and decay during storage	109	91.6	1st
Poor storage facilities	103	86.6	2nd
Lack of credit	101	84.9	3rd
Pest and disease	99	83.2	4th
Lack of fund to invest on cocoyam production	92	77.3	5th
Lack of extension contact	89	74.8	6th
Poor road network	85	71.4	7th
High cost of planting material	51	42.9	8th
High cost of labour	50	42.0	9th
Poor knowledge of cocoyam technologies	43	36.1	10th
Lack of extension contact	40	33.6	11th
Low price of product	38	31.9	12th
High cost of processing	29	24.4	13th

Source: field work, 2024

Conclusion

The study analyzed the factors influencing the utilization of cocoyam value-added technologies among rural households in Delta State, Nigeria. Results show high and low levels of utilization of some of these technologies in the study area. The major factors influencing utilization of the technologies include age, farm size, household size, monthly income, educational level, and access to credit. Findings also show that rot and decay, poor storage facilities, little access to credit loans, pests and diseases, inadequate funds to invest in cocoyam businesses, inadequate extension contacts, and poor road networks, among others, were ranked (1st, 2nd, 3rd, 4th, 5th, 6th, 7th). In the light of these, this research therefore calls for land reform and credit policies targeted at allocating more land and provision of credit at little or no interest rate to cocoyam farmers who are interested in the business. Farmers should be encouraged to form cooperatives for ease of access to technological innovations to enhance utilization of value-added cocoyam technologies.

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10. Further research should be on the impacts of cocoyam value added technologies on the various householdsin the state.

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