



**AN EXPLORATORY STUDY OF VALUE ADDITION INITIATIVES USED BY SWEET  
POTATO PROCESSORS IN KWARA STATE, NIGERIA**

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**ABSTRACT**

The study assessed the value addition initiatives used by sweet potato processors. A structured interview schedule was used in data collection. A multi-stage sampling technique was used to select 130 respondents. Data were analyzed using descriptive statistics and Pearson's Product Moment Correlation. Results reveal that age, years of processing experience, household size and annual income were 30.38 years, 5.8 years, 4 persons and ₦118,876.94. Radio and family & friends were the most important source of information to processors while 52.3% and 56.9%. 90.8% of respondents had low knowledge on improved value addition initiatives. Furthermore, there was positive and significant correlation between knowledge level of sweet potato processors and their source of information ( $r = 0.341$ ,  $P < 0.001$ ). The major constraints were perishability of sweet potato, farmers' low knowledge in sweet potato value chain, high cost of processing equipment, inadequate storage facilities and inadequate extension services. The study concluded that source of information, knowledge level and constraints influenced the processors practice of value addition to sweet potato. The study recommended the need for an aggressive promotion of value addition to sweet potato through trainings and workshops, organizing processors in groups association and linking them to reliable markets, provide more robust extension and agricultural support services to build the capacity of smallholder processors.

**Keywords:** Correlation, Initiative, Knowledge, Processing and Sweet potato,

**INTRODUCTION**

Sweet Potato, *Ipomea batatas* L. is one of the world's most important food crops in terms of human consumption, particularly in Sub-Saharan Africa, parts of Asia, and the Pacific Islands. It was first domesticated more than 5,000 years ago in Latin America; it is grown in more developing countries than any other root crops and can be grown nearly in all parts of Nigeria. Many parts of the plant are edible, including leaves, roots and vines and varieties exist with a wide range of skin and flesh colour, from white to yellow, orange and deep purple. International Potato Center explains (CIP, 2017). Okorie and Onyeneke (2012) posited that sweet potato is an important food security and a short-term crop that can be consumed by boiling and mashing or frying. It is the fifth most important food crop in developing countries. Nigeria is the fourth largest producer of sweet potato in the world (Food and Agriculture Organization Statistics, 2017) producing 4,013,786 tons in 2017.

The crop is generally considered as a minor crop in Nigeria in terms of total production and consumption due to the fact that it is usually grown by independent small holders on small plots. However, it is gaining importance in the Nigerian diet due to the relative ease of cultivation, early maturity (compared to other root and tuber staples) and enormous industrial and economic potential (Fawole, 2007). It is increasingly being recognized as having an important role to play in improving household and national food security, health and livelihoods of poor farming households. Oke and Workneh (2013) noted that sweet potato roots are bulky and perishable unless

cured. Hence, it is both desirable and necessary to process sweet potato into storable products forms to add value to the crop in order to contribute significantly to food security, nutrition, income generation and enhanced livelihood for the farmers (Ndunguru, 2009). The limited range of ways and availability of adapted processing technologies in which sweet potato is utilized in Nigeria seriously undermine the potential benefits of the crops to farmers, consumers and other chain actors. Westby *et al.* (2003) noted that unprocessed sweet potato has short shelf life leading to storage losses and reduced food security thus processing, freezing or drying may extend shelf life thereby benefiting producers and processors through increased market feasibility.

Value addition to agricultural produce is the process of increasing the economic value and consumer appeal of an agricultural commodity. The reason for value addition to agricultural produce is for farmers, small entrepreneurs, food processors and other chain actors to upgrade the value of agricultural food products. Value addition to agricultural products is therefore a means of attaining commercialization, increase in farm income and consequently reduction of rural poverty and food insecurity. While sweet potato presents diverse industrial uses, which are potentially highly profitable, majority of farmers are yet to embrace and utilize high end value addition initiatives. Some sweet potato value added products with longer shelf life include refined starch, ethanol, baked chips, noodles, food fortifiers, food colourings, and local dried chips. Some of the value addition initiatives introduced includes; processing of shelf-stable intermediate products such as chips, flour, grits, noodles, starch, *sparri*, *crisps*, e.t.c while value added products for consumption e.g. for confectionaries i.e. Baked Bread, *chin chin*, crackies and also for juice, for salad (Wayua *et al.*, 2019). Starch to make noodles, alcohol, e.t.c. The crop can also be utilized in the production of chin-chin, buns, doughnut, bread, queen cake, livestock feed, syrup, fortification of *fufu*, pounded yam and baby food.

Despite the importance of sweet potato and documented evidence in support of the need for value addition in Nigeria, the crop has received little attention due to paucity of information on the value addition methods on sweet potato as used among the farmers and processors. Therefore, the fact that processing and improved utilization of sweet potato has the potential to enhance the production of the crop and contribute to food and nutrition security necessitated this investigation whose objectives are to assess value addition initiatives used by sweet potato processors; identify various forms of value-added sweet potato products available; examine knowledge level of these processors; identify sources of information on Sweet potato value addition; and identify the constraints to sweet potato value addition initiatives in the study area. The study is guided by the hypothesis that there exists no significant relationship between the knowledge level of processors and sources of information.

## **MATERIALS AND METHODS**

### **The study Area**

The study was conducted in Kwara State located in the North-Central part of Nigeria. The state has a land mass of 36,825 square kilometres and has a population of 3.49 million (Projected from 2006 census figure). Kwara State is divided into four zones by the Kwara State Agricultural Development Project (KWADP) in line with environmental features, social practices and for organizational ease. These are Zone A: Baruten and Kaiama Local Government Areas; Zone B: Edu and Patigi Local Government Areas; Zone C: Asa, Ilorin East, Ilorin South, Ilorin West and Moro Local Government Areas; and Zone D: Ekiti, Ifelodun, Offa, Oyun, Isin, Irepodun and Oke-ero Local Government Areas. Agricultural extension in the state is largely public and administered by the state ministry of agriculture. The state has an estimated 524,837 farm families, the majority

of which live in the rural areas (International Fund for Agricultural Development (IFAD), 2012). The population for the study comprised all sweet potato processors in Kwara State, Nigeria. A four-stage sampling procedure was used to collect primary data for the study. The first stage was a purposive sampling of Zones C and D because they are the major sweet potato producing and processing areas in Kwara State. The second stage was a random selection of 50% of ADP blocks from each zone. Thirdly, a random selection of 50% of ADP cells in each of the blocks was carried out. Fourthly, two sweet potato processors were randomly selected from each cell so as to make a total sample size of 146 respondents. However, 130 questionnaires were considered valid and therefore used in analysis of data components.

### **Method of Data Analysis**

Data for this study was obtained with the aid of a questionnaire and a structured interview schedule. Trained enumerators and extension agents were engaged with the help of local leaders to obtain information from respondents. The instrument was validated by experts in the field of agricultural extension and rural development to ensure both face and content validity. The test-retest method was used to ensure the reliability of the instrument for data collection. The reliability of the instrument was considered satisfactory with a Cronbach's alpha coefficient of 0.79. Descriptive statistics such as frequency distribution, percentages, mean scores, standard deviation, charts and Likert-type scales was used to present the findings for the objectives of the study. The hypothesis was tested using Pearson Product Moment Correlation (PPMC) denoted as:

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

Where:

$x_i$  and  $y_i$  are data points

$\bar{x}$  is the mean of the x-values and  $\bar{y}$  is the mean of the y-values

$\sum$  is the summation sign

## **RESULTS AND DISCUSSION**

### **Socio-economic characteristics of respondents**

As shown in Table 1, the mean age was 30.38. Majority of the respondents are within the productive and active and energetic age range, hence their ability to engage in income generating ventures such as value addition initiatives to sweet potatoes (Seriki and Oluade, 2013). This finding is similar to that of Helen Keller International ([HKI], 2012) that the distribution of sweet potato processors or producers in Nasarawa State is skewed toward age specific groups in the range of 30-39 years. Majority (78.5%) of the sweet potato processors were female while 21.5% were male processor in the study area. This suggests that sweet potato processing in the study area is largely female-dominated. Studies have indicated that sweet potato is considered a woman's crop (Nungo *et al.*, 2007) which may explain high female participation in value addition. Also, Bafana (2012) is of the opinion that men participate actively in the production of food and women in the processing, packaging and marketing of agricultural produce. The mean household size is 4 people while mean processing experience is 6 years.

The mean annual income was ₦118,877. These suggests that sweet potato processing may not be the major source of income but sometimes used as a means of supplementing household income. Most of the respondents (75.4%) were married while 12.3% were single, 3.1% and 3.1% were separated and divorce respectively and 6.2% were widowed. This finding corroborates the

earlier findings by Daudu (2016) that rural communities in Kwara State are dominated by married people and that married folks tend to be more involved in agricultural activities because married people have responsibility for the provision of household needs of their families' hence greater

**Table 1: Socio-economic characteristics of the respondents**

Variable (n=130)	Frequency	Percentage	Mean
<b>Sex</b>			
Male	28	21.5	
Female	102	78.5	
<b>Marital Status</b>			
Single	16	12.3	
Married	98	75.3	
Separated	4	3.1	
Divorce	4	3.1	
Widowed	8	6.2	
<b>Education level</b>			
No Formal Education	74	56.9	
Primary Education	14	10.8	
Secondary Education	28	21.5	
Tertiary Education	12	9.2	
Others education Type	2	1.6	
<b>Age</b>			30.38
≤ 20	18	13.8	
21 – 29	40	30.7	
30 – 38	43	33.1	
39 – 47	21	16.2	
48+	8	6.2	
<b>Household Size</b>			3.86
1-3	60	46.2	
4-6	40	30.8	
7-9	18	13.8	
>9	12	9.2	
<b>Processing experience</b>			5.85
1-4	46	35.2	
5-8	53	40.8	
>8	31	23.8	
<b>Annual Income (Naira)</b>			118876.94
<50,000	14	10.8	
50,000 – 300,000	108	83.1	
>300,000	8	6.1	

**Source:** Field Survey (2019).

involvement in agricultural activities for sustainable livelihood. Most of the respondent 56.9% had no formal education while 10.8 had primary education, 21.5% had secondary education while 9.2% had tertiary education and just 1.3% had other kinds of education. The level of education is expected to influence farmers' adoption of agricultural innovation and decisions on various aspects of farming. They maintained that education is highly important for sustainable agricultural growth and development.

Furthermore, Table 2 shows that membership of agricultural cooperative, membership of non-agricultural cooperative accounted for 69.2% against 30.8% who belongs to an agricultural cooperative. Membership of agricultural cooperative society helps members to interact effectively and aids the flow of valuable agricultural information. The interactions have the potential of resulting in greater involvement of members in agricultural activities since ideas can spread fast among members of an organization or society. This corroborates the view of Ekong (2003) who opined that members of cooperative societies have advantage of access to micro-credit, input subsidies and can share and cross-breed ideas with like minds.

About 43.1% of the respondents obtain their capital through their personal saving, 18.5% obtain their capital from cooperative, 33.8 obtain capital from family and friends while 4.6% obtain their capital from the bank. Majority of the processors had no contact with extension agents while 38.5% responded that they have contact with extension agent, 13.8% had one extension agents' visit in a year, 10.8% had two extension agents' visit in a year, 7.7% had three visits in a year, 6.2% had four visit in a year and 21.5% have quarterly contact with extension agents'. Since the majority of the respondents had little contact with extension agents, they had little access to timely information, improved processing technologies and current market price. This is not unconnected to the unimproved initiatives that are employed by the processors. Also, the result reveals that majority (65.4 %) of the respondents in this study area do not have sweet potato processing equipment.

**Table 2: Socio-economic characteristics of the respondents Cont'd**

<b>Variable (n=130)</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Membership of cooperative</b>		
Agricultural	40	30.8
Non-agricultural	90	69.2
<b>Source of Capital</b>		
Personal Savings	56	43.1
Cooperative	24	18.5
Family/Relations	44	33.8
Bank	6	4.6
<b>Contact with extension agents</b>		
No	80	61.5
Yes	50	38.5
<b>Possessing equipment</b>		
No	85	65.4
Yes	45	34.6

**Source:** Field Survey (2019)



This could be attributed to poor access to credit which will enable them to purchase the equipment. This result agrees with the submission of Orinda *et al.* (2017) that availability of credit helps farmers and processors to finance the acquisition of value addition equipment that could enhance adoption and continuous use of the value addition technology.

#### **Available value-added sweet potato products**

Table 3 shows that, the sweet potato is processed into fermented flour, roasted flour, local fried potato chips, Porridge, amala (swallow), livestock feed (fodder), Kunu-Zaki, and boiled compared to noodle, fortifiers, candy, food colouring, additives and juices, etc. This could be as a result of low input and technical support requirements. Shelf-stable sweet potato intermediate products such as Baked Chips (Crisp), flour, additives and Juices Candy, Starch, and ethanol are generally unavailable. These represent more advanced initiatives that require more inputs thereby limiting their wider adoption by the processors and farmers. Others in the study area mix sweet potato with yam for preparation of pounded yam in the ratio of 1% sweet potato to 10% yam for consumption.

**Table 3: Available value-added sweet potato products**

<b>Value added product from sweet potato</b>	<b>n</b>	<b>(%)</b>
Fermented flour	126	96.9
Roasted form	126	96.9
Local fried potato chips	130	100.0
Baked chips (Crisps)	10	7.7
Porridge	122	93.8
Amala (swallow)	128	98.5
Ethanol/Alcohol	14	10.8
Livestock Feed (fodder)	124	95.4
Noodles	6	4.6
Sweeteners	2	1.5
Sweet potato starch	6	4.6
Baked bread	4	3.1
Sweet potato Vegetable	8	6.2
<i>KunuZaki</i> (millet beverage fortified with sweet potato)	110	84.6
Food Fortifiers	2	1.5
Sparri (Sweet potato Garri)	64	49.2
Food colourings	2	1.5
Boiled	128	98.5
Additives and juices	2	1.5
Others	14	10.8

**Source:** Field Survey (2019)

#### **Knowledge level of processors in sweet potato value addition**

Results in Table 4 as show that the greater proportion of respondents were in the low knowledge category followed by the medium category and the high knowledge level category. It can be concluded that the knowledge level of the respondent in this study is low on improved value addition activities. Studies have shown that inadequate knowledge among farmers is strongly linked to inappropriate use as well as dis-adoption of improved methods. Low knowledge of sweet potato value addition is expected to influence adoption and use of available initiatives. This

scenario presents an opportunity for agricultural extension agents and Research Institutes to deploy resources needed to generate an increase in knowledge.

**Table 4: Knowledge levels of the respondents.**

<b>Knowledge level of the respondents</b>	<b>Frequency(N=130)</b>	<b>(%)</b>
Low	118	90.8
Medium	10	7.7
High	2	1.5

Source: Field Survey, 2019.

### **Sources of information on sweet potato value addition in the study area**

The result reveals that respondents obtain information on Sweet potato value addition initiatives through radio and their family/friends as presented in Table 5. From the findings, family and friends (56.9%) appears to be the most effective means of informing farmers and processors about activities and it is also the basic unit of all societies and the most important universal social institution. Ekong (2003) affirmed that the family has a great influence on the adoption of innovation. Also, information dissemination through radio (52.3%) is the second most effective means of informing processors about agricultural activities since most processors can afford transistor radio and as such information through radio can reach them quickly in their respective localities. The implication is that the appropriate agricultural skills, knowledge and information on the best global practices on sweet potato value addition that will no doubt enhance the productivity of their enterprise may be disseminated through these channels.

**Table 5 Sources of information on sweet potato value addition in the study area**

<b>Source of information</b>	<b>Frequency</b>	<b>(%)</b>
Television	4	3.1
Radio	68	52.3
Internet	4	3.1
Newsletter and journals	2	1.5
Family and friends	74	56.9
Extension Agents	14	10.8
Agric shows	6	4.6
Cooperative meeting	12	9.2
Others	2	1.5

Source: Field Survey, 2019. **Key: No= 0→0.49 Yes= 0.5→1**

### **Correlation between knowledge level of processors and source of information**

Table 6 shows the result of correlation between the knowledge level of processor and source of information. The null hypothesis that there is no significant association between the knowledge level of processors and sources of information is rejected ( $r = .341$ ) and a conclusion is reached that there exists a significant association between processors knowledge level and their source of information. The implication is that the knowledge levels of processors are greatly influenced by the amount of information available to them. Inability to access information would translate to low knowledge of available sweet potato value addition initiatives while increased access to information would likely translate to high knowledge and awareness of sweet potato value addition initiatives.

**Table 6: Correlation between knowledge level of processors and source of information**

Variables	N	Mean	Standard deviation	R	P-value
Knowledge level	130	42.6087	7.54815	0.341***	0.000
Source of information	130	0.1431	0.08799		

Source: Field Survey (2019)

\*\*\*Correlation is significant at the 0.001 level (2-tailed)

### Constraints to sweet potato value addition initiatives

As shown in Table 7, the major constraints were high perishability of sweet potato (MS=2.91), farmers' low knowledge on sweet potato value chain (MS=2.80), high cost of processing equipment (MS=2.77), inadequate extension service (MS=2.62) and inadequate storage facilities (MS=2.61) while the least constraints were climatic limitations (MS=1.11). This result is similar to the findings of Philip *et al.* (2009) that high cost of processing equipment, high perishability, and inadequate storage facilities are impediments to agricultural productivity in Nigeria. Fakoya *et al.* (2010) also reported that inadequate extension service was a constraint to sweet potato production in Nigeria. Inadequate extension service impedes processors ability to access innovation as they may see such innovation as an intruder designed to disrupt their farming system and may be a reason for farmers' refusal to adopt improvements. However, with the help of a functional extension service, farmers could be persuaded to become more dynamic in decision to adopt innovations.

**Table 7: Distribution of respondents according to constraints to Sweet Potato Value Addition**

Constraints	Very serious	Serious	Not serious	Mean score
Inadequate finance for Sweet potato/ No access to credit	72(55.4)	54(41.5)	4(3.1)	2.52
High cost of sweet potato processing equipment	102 (78.5)	26(20.0)	2(1.5)	2.77
Inadequate storage facility	91(70)	27(20.8)	12(9.2)	2.61
Transportation problem/ Lack of good roads	34(26.2)	58(44.6)	38(29.2)	1.97
High perishability of sweet potato	120(92.3)	8(6.2)	2(1.5)	2.91
High cost of farm labour	8(6.2)	20(15.4)	102 (78.5)	1.28
Pest/disease infestation	4(3.1)	48(36.9)	78(60)	1.43
Absence of market for processed sweet potato products	56(43.1)	44(33.8)	30(23.1)	2.20
Inadequate extension service	86(66.2)	38(29.2)	6(4.6)	2.62
Farmers' low knowledge on Sweet potato value chain	106(81.5)	22(16.9)	2(1.5)	2.80
Non availability of planting materials	8(6.2)	50(38.5)	72(55.4)	1.51
Too much attention on other crops	10(7.7)	88(67.7)	32(24.6)	1.83
Climatic limitations	2(1.5)	10(7.7)	118(90.8)	1.11
Land tenure system problems	4(3.1)	12(9.2)	114(87.7)	1.15

Source: Field Survey, 2019

\* values in parenthesis are percentages

**Key: Not serious---1→1.49    Serious----1.5→2.49    very serious-----2.5→3**





## CONCLUSION AND RECOMMENDATIONS

There is narrow utilization of sweet potato among processors in the study area. Majority of respondents obtain information on sweet potato value addition initiatives through family/friends and radio. Knowledge of sweet potato value addition initiatives especially on high end initiatives such as baked chips (crisp), sweeteners, additives and juices, ethanol, sweet potato doughnuts, noodles among others which are more shelf stable products is abysmally low while knowledge of traditional initiatives is high. The major constraints were high perishability of sweet potato and farmers' low knowledge on sweet potato value chain. The government and private sector should help in the design and fabrication of storage structures, building of processing plant so sweet potato can be processed into a variety of products and hence reduce wastage and loss. There is also the need for an aggressive promotion of value addition initiatives to sweet potato through trainings and workshops by organizations and research institutes such as National Roots Crops Research Institutes (NRCRI), National Stored Products Research Institutes (NSPRI), and Federal Institutes for Industrial Research Oshodi (FIIRO). Finally, a more robust extension and agricultural support service to build the capacity of smallholder farmers and processors is imperative and expedient.

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