MARKETING EFFICIENCY OF ORANGE-FLESHED SWEET POTATO (OFSP) (Ipomoea batata (L) Lam) IN NASARAWA STATE, NIGERIA

ABSTRACT

The study assessed the marketing efficiency of orange fleshed sweet potato in Nasarawa State, Nigeria. The study covered six (6) Local Government Areas out of the thirteen (13). Two (2) LGAs each out of the three (3) Agricultural zones were selected. A random sampling technique was adopted and a sample size of (90) respondents was used. Primary data were collected through structured questionnaire and analyzed using descriptive statistics, and multiple linear regression model was used as tools of analysis. Results of the study showed that 38.9% of the respondents were still young and within the active age of 21-30. Also, majority 77.8% of the OFSP marketers, were married. The regression result of the determinants of OFSP market pricing efficiency shows a coefficient of multiple determination adjusted (R^{-2}) of 0.595 which indicates that 59.5% variation in marketing efficiency of OFSP is explained by the independent variables. The independent variable marital status was positively significant at 1% level of probability which implies that an increase in marital status will increase the marketing of OFSP at 1% level of probability while input level though significant but was inversely significant at 5% level of probability and this implies that an increase in input level will have a decrease in the input level at 5% level of probability. Age of Respondent, gender, years of experience, quantity marketed and educational level was not significant. The study recommended that young, active and educated youths in the study area should take up OFSP marketing as a profitable venture that is capable of generating employment and self-reliance, instead of relying on government jobs.

Key words: Marketing, efficiency, sweet potato, determinants

1. INTRODUCTION

Sweet potato offers a particularly significant potential for increasing food production and income there by reducing poverty and improving food security level in Nigeria. Sweet potatoes are consumed without much processing in most parts of the tropics. Sweet potatoes present diverse industrial uses, some of which are potentially highly profitable, such as sweet potato snacks (Adewumi, *et al.,* 2008). Sweet potatoes are extremely adaptable to adverse environmental conditions; they can help increase food security in times of drought and famine, particularly in post-conflict areas for displaced persons (Andrade *et al.*, 2009). Sweet potatoes produce carbohydrates much faster and require less labor than other crops. Sweet potatoes are used to restore access to food for resetting populations and alleviate future agro-climatic or political shocks. The challenge with using sweet potatoes in emergency response situations is the crop's low multiplication rate. Vine material needs to be ready to go into mechanisms in place to distribute vine materials to needy farmers (Andrade *et al.*, 2009).

The objectives of this research are as follows;

To determine the socio-economic characteristics of sweet potato marketers in the study area.

To Identify the determinants of OFSP marketing efficiency in the study area

2. Literature review

Nigeria is the third largest producer of sweet potatoes in the world in terms of quantity, after China and Uganda (FAO,2002). According to FAO, (2008) and Adekoya*et al.,* (2010), Nigeria is the largest producer of sweet potato in Africa. In 2010, Nigeria produced 2.5% of the world's production of sweet potatoes, about (130) million tons of sweet potato are produced per year with China supplying about 80-85% of the world's production, Nigeria share in sweet potato is

3.7% from 1961 to 2016. However, sweet potatoes are still considered a minor crop in the country. Orange-Fleshed Sweet potato (OFSP) is an improved breed of sweet potato (*Ipomeabatatas*[L.] *Lam.*) cultivated in tropical and semi-tropical regions of the world for food and source of income especially among the rural dwellers (Padmaja, 2009; Mitra, 2012; Adebisi, *et al.,* 2015). It belongs to the morning-glory family known as *convolulaceae* and is originated from Latin America (Low *et al.*, 2009).It can be grown in wide range of agro-ecologies and soil types. Orange flesh sweet potato is easy to cultivate, it is a crop with immense ability to grow in marginal fields (Afuape, 2014). It can be vegetatively propagated, and has fairly drought resistant ability once established. It has short maturity period compared to other root and tuber crops. Improving the efficiency with which farmers use the available resources is very crucial to increasing production, productivity, and household income.

In Nigeria, OFSP like other varieties of sweet potato is grown in all parts of the country.However, commercial cultivation appears to be concentrated in Northern, semi-arid agro ecological zone of the country covering Benue, Nasarawa, Plateau, Kogi, Kwara, and Niger states (Amienyo and Ataga, 2007; Sweet potato Support Platform for West Africa, SSP-WA, 2012 in Anderson and Gugerty, 2012). Sweet potato vines, leaves and roots are used for animal feed for sheep, goats, and rabbits (Tewe, et al., 2003). Sweet potato can also be exploited for ethanol and biofuel production. Sweet potato can be processed to yield about 137 liters of ethanol per metric ton of sweet potato tubers (Akoroda, 2009). Like other varieties of sweet potato, OFSP can be grown under different production systems. While some farmers prefer sole cropping system, others intercrop sweet potato with pigeon pea to ensure better environmental resource utilization, better yield stability, reduction in pests and diseases and diversification of rural income.In view of the nutritional quality of sweet potato, the crop constitutes a significant part of the diets of large number of people in the areas of production. Although sweet potato is a crop that is consumed in all parts of the country, its level of production still remains low. The world sweet potatoes sector is however undergoing major changes. Worldwide, sweet potato's production and consumption is huge. All over the world people eat and use this super food. OFSP is an important root crop in Nasarawa State Nigeria, for income and livelihoods of the producers. It has huge potential for improving the profitability of the investors in the marketing system, but this has not been adequately appreciated or fully exploited.Therefore, this study aims at determining the marketing efficiency of OFSP in Nasarawa State. Determining the marketing efficiency will provide practical steps for decision makers to apply marketing policies needed to improve OFSP marketing thereby improving the profitability, attraction of more investors, and the improvement of the nutritional value on health matters especially in young children and pregnant women. In view of this, the study seek to address the following questions;

What are the socio-economic characteristics of sweet potato producers in the study area?
What are the determinants of OFSP market pricing efficiency in the study area?

3. **METHODOLOGY**
  Study Area
The study was conducted in Nasarawa State, Nigeria. The state has three Agricultural Zones; namely; Central, Southern and Western zone. The state consists of thirteen (13) Local Government Areas namely; Akwanga, Awe, Doma, Karu, Keana, Keffi, Kokona, Lafia, Nasarawa, Nasarawa-Eggon, Obi, Toto and Wamba. The State has a total population of 1,869,377 with a projected population of 2,532,918 for 2017 applying the projected growth rate of 2.8% per annum NPC (2006). While the combined population of the sampled areas (LGAs) is 988,783 inhabitants and projected population of 1,339,754 for 2017 as estimated using 2.8% growth rate provided by NPC (2006).The State, lies between latitude 7° and 9° North and longitude 7° and 10° East. The State shares common boundary with Plateau State and Taraba

State in the East, Benue State in the South, Kaduna State in the North, Kogi State and FCT in the West (NSMI, 2007). The crops grown in the study area are mainly maize, rice, groundnut, yam, sorghum, sweet potato, cassava, pumpkin, pigeon pea among others.
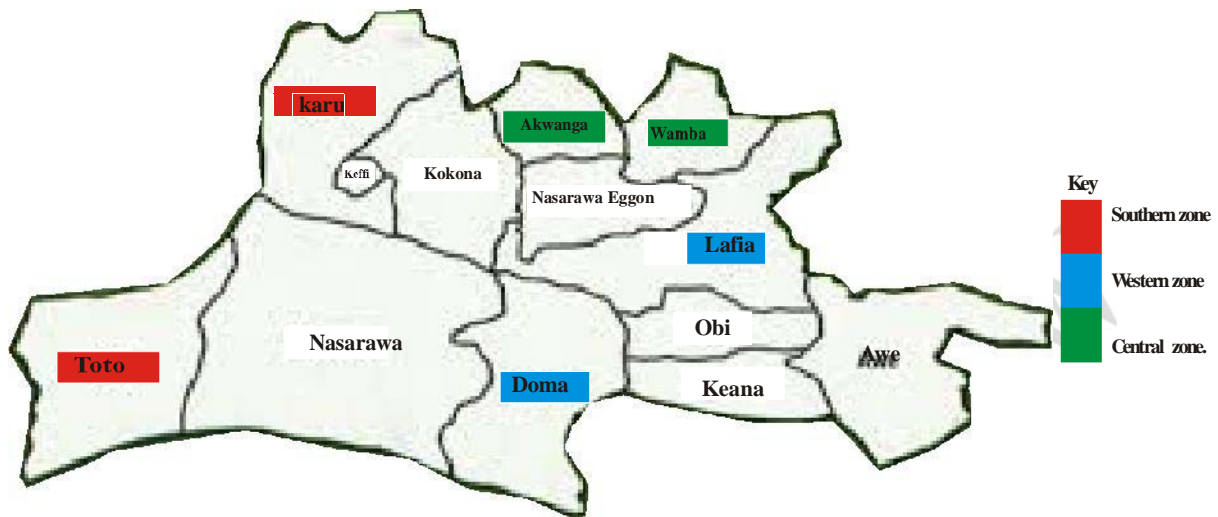
Figure 1: Map of Nasarawa State showing the three Agricultural Zones.

Sampling Procedure and Data collection method

The study covered six (6) Local Government Areas out of the thirteen (13). The state has three Agricultural zones which include; Central, Southern and Western zones. The LGAs in all the three (3) Agricultural zones include Lafia, Obi, Awe, Doma, Toto, Kokona, Karu, Keffi, Nasarawa Eggon, Keana, Kokona, Akwanga and Wamba. Two (2) LGAs each out of the three (3) Agricultural zones were selected. The LGAs for the study include for Southern zone, Lafia and Doma, for Western zone, Toto and Karu, and for Central zone Wamba and Akwanga respectively. Fifteen (15) marketers were randomly selected from each of the markets to give total number of (90) respondents which formed the sample size of the study.

Method of Data Analysis

Data obtained were analyzed using descriptive statistics and multiple linear regression model. Descriptive statistics were used to describe the socio-economic characteristics of the OFSP marketers while multiple linear regression model was utilized in achieving the determinants of marketing efficiency of OFSP marketers.

Descriptive Statistics

The descriptive statistics involves the use of simple percentages, means, frequency, distributions, tables and standard deviation and they are presented as follows;

Arithmetic mean was computed as follows;

$$\bar{X} = \sum \frac{x_i}{N} = \frac{X_1 + X_2 + X_3 \cdots\cdots\cdots\cdots X_N}{N} \quad \cdots\cdots\cdots (1)$$

Where

$\bar{X}$ - Mean

$\sum X_i$ = summation of the sample

N = Total number of observations

Σ = Summation

X_i = Individual observation

Percentage would be mathematically expressed

as: $Percentage\ (\%) = \frac{X}{N} \times 100 \quad \cdots\cdots\cdots\cdots (2)$

Where:

% = Percentage

X = Individual observation

N= Total observation

Multiple linear regression

The multiple linear regression model is expressed implicitly as:

$Y_i = \alpha + \beta x_i + u_i$.......................2

Where:

Y_i = Marketing efficiency (₦).

$$M.E = \frac{marketing\ output}{marketing\ input} \times 100\%$$

β = Regression coefficient

X_i = Vector of selected independent variables

X_1 = Gender (dummy: 1 = male and 0 = female)

X_2 = Age (years)

X_3 = Marital status of marketer

X_4 = marketing experience (years)

X_5 = Quantity marketed (Kg)

X_6 = Educational level (years)

X_7 = Level of inputs, measured by the amount (₦) spent on all variable inputs α = constant term

U = randomly distributed error term

4. *RESULTS AND DISCUSSION*
Socio-Economic characteristics of respondents

Age: Results of the study showed that 38.9% of the respondents were between the ages of 21-30 years, 33.3% were within the age bracket of 31-40 years, 20.0% were within the age bracket of 41-50 years, while only 3.3% of the marketers were between the ages of 51-50 years. The mean age was approximately 36.0 years. This result implies that most of the OFSP marketers were within their middle, active and productive ages (Nwaliejiet al, 2014) and suggests that OFSP marketing business requires a lot of energy and is labour intensive, moving from one place to another to assemble the products for marketing and hawking. The result is in consonance with earlier studies by Umeh and Ataborh (2007); Afolabi (2009); Shabu and Gyuse (2011); Akarue and Ofoegbu (2012).

Marital status: Findings from the study revealed that majority 77.8% of the OFSP marketers were married, under only 16.0% were still single. The result depicts that respondents involved in OFSP marketing see it as an enterprise for family sustainability. Also married individuals are seen to be more responsible according to societal standards. This supports the findings of Oguntadeet al. (2010), who observed that OFSP marketing is a profitable venture, which can serve as a reliable source of livelihood for the family.

Gender: The result of the analysis of sex distribution of respondents showed that there were more male OFSP marketers 54.4% in the study area than females 45.6%. This is due to the rigorous nature of work associated with OFSP marketing and farming which makes females to avoid the enterprise in favour of less rigorous aspects of the OFSP value chain. The result indicates that gender influences technical efficiency. This result is in consonance with earlier study by Umeh and Ataborh (2007) and Afolabi (2009).

Household size: Results of the study showed that majority 80.0% of the respondents had household size within the range of 1and10 persons, 16.7% had household size ranging from 11-20 persons, while 3.3% of the respondents had household size of between 21 and 30 persons respectively. The mean household size was approximately 16 persons. The result indicates a

large household size which can be a source of cheap labour both for the farm operations and the marketing services. This agrees with the findings of Umeh and Ataborh (2007) and Nwaliejiet al. (2014). Lawal and Adigun (2012) opined that large household size ensures availability of labour for marketing activities. This finding also supports the result of Anozieet al. (2014) who reported that large household size compliment labour to enhance productionand productivity thereby leading to increase in income.

Educational status: Respondents' level of education is considered as an important factor in improving the understanding, adoption and comprehension of new technology that will help in the development of one's business**.** It was also revealed from the findings that majority, even though not much 38.9% of the marketers in the study area had no formal education. However, 25.6.0%, 22.2%, and 13.3% had secondary education, primary education, and tertiary education respectively. Overall, its shows that majority of the respondents had one form of education or the other and this accounted for 61.1%.It can be deducted from this study that higher percentage 61.1% of the marketers had attended formal education. This implies that they were literate marketers and can read and write. Education is an advantage for training and marketing skill enhancement planning and implementation for marketers by extension service providers since it is easier to train marketers who are literate. Furthermore, education is considered to have positive influence on the business acumen of entrepreneurs (Afolabi, 2009). This study is in agreement with the findings of Akpokodjeet al. (2001); Akarue and Ofoegbu (2012),Umeh and Ataborh (2007) who stated that most rice marketers can read and write and had positive impact in the various marketing enterprise value chain in their respective study areas.

Membership of cooperative: Findings of the study also showed that majority 76.7% of the OFSP marketers in the study area do not belong to any cooperative association, while 23.3% belong to one cooperative group or the other. The higher percentage of respondents who do not belongs to any form of cooperative or the other might possibly be due to low level of education as well as absence of cooperative groups in their environment. Similarly, it could be attributed to lack of knowledge about the importance of belonging to a group as well as inadequate mobilization and sensitization by change agents or their complete absence in the study areas. Cooperative groups help members to negotiate for prices of commodities and also provide some level of marketing information and market protection to avoid excess exploitation from various marketing agents. Results from the finding imply that most of the marketers might be exploited by tax agents in the market. Waziriet al. (2014) suggests that marketers belonging to a cooperative association will likely be protected from exploitation, hence encouraging efficient marketing system.

Years of marketing experience: Results on the farming experience of the respondents revealed that half 50.0% of the respondents involved in OFSP marketing had marketing experience of between 1 and 5 years, while 32.2.0% had marketing experience ranging from 6-10 years. Also, 11.1%, 3.3% and just1.1% had marketing experience within the ranges of 11-15 years, 16-20 years and 21-30 years respectively. The mean marketing experience was estimated at 16 years. Experience plays a very important role in the performance of any enterprise. The higher the experience in an enterprise, the more informed and skilled, entrepreneurs become. This suggests that the efficiency of OFSP marketers in the study area would be high. The result is in consonance with Umeh and Ataborh (2007).

Access to credit: Result on the level of access to credit institution by marketers also revealed that almost all the orange marketers in the study area (98.9%) had no access to credit institutions, while a marginal proportion (1.1%) had access to credit institutions. This indicates poor access to credit institutions by OFSP marketers in the study area. Credit is essential as it could influence marketers' ability to actively participate in the marketing system and will

greatly influence the expansion, modernization, adoption and value chain addition in reshaping the performance of their business and thereby helping in creating higher form of acceptability by consumers through their various efforts at modernization of the marketing process. This study is related to findings of (Girei*et al*, 2016) who found out that the probability of farmers to access agricultural credit is generally high for farmers with high income than farmers with less income, this is due to limited resources by the low income farmers, hence less demand for credit than at higher levels of income. Also, this is in consonance with (Onuk*et al.,* 2010) who found out that larger proportion of respondents were not members of any association, which implies that only a few farmers would have access to credit facilities, since lending agencies will prefer to give credit to cooperatives rather than individuals.

Table 1: Socio-economic characteristics of respondents

Characteristics	Frequency	Percentage	Mean $\bar{X}$
Age (years)			
11-20	4	4.4	
21-30	35	38.9	
31-40	30	33.3	36.0
41-50	18	20.0	
51-60	3	3.3	
Total	90	100	
Marital Status			
Single	16	17.8	
Married	70	77.8	
Divorced	3	3.3	
Widow(er)	1	1.1	
Total	90	100	
Gender			
Female	49	54.4	
Male	41	45.6	
Total	90	100	
Household Size (number)			
1-10	72	80.0	
11-20	15	16.7	
21-30	3	3.3	16.0
Total	90	100	
Educational Status			
None	35	38.9	
Primary	20	22.2	
Secondary	23	25.6	
Tertiary	12	13.3	
Total	90	100	
Membership of Association			
No	69	76.7	
Yes	21	23.3	
Total	90	100	
Years of marketing experience			
1-5	45	50.0	
6-10	29	32.2	

11-15	10	11.1	16.0
16-20	3	3.3	
21-25	2	2.2	
26-30	1	1.1	
Total	90	100	
Access to credit			
No	89	98.9	
Yes	1	1.1	
Total	90	100	

Source: Field survey, 2018

Regression result

The regression result of the determinants of OFSP marketing efficiency is presented in table 2, the result shows a coefficient of multiple determination adjusted (R^{-2}) of 0.595 which indicates that 59.5% variation in demand of OFSP is explained by the independent variables. The independent variable marital status was positively significant at 1% level of probability which implies that an increase in marital status will increase the marketing of OFSP at 1% level of probability while input level though significant but was inversely significant at 5% level of probability and this implies that an increase in input level will have a decrease in the input level at 5% level of probability. Age of Respondent, gender, years of experience, quantity marketed and educational level was not significant.

Table 2: Regression of the Determinants of OFSP Marketers

Variables	Coefficient	Standard error	t-value
(Constant)	1.532	.539	2.842***
Age of respondent	.118	.267	.441[NS]
Input level	-.011	.005	-2.200**
Gender of respondents	.226	.199	1.137[NS]
Marital status	.883	.185	4.768***
Years of experience in Marketing	.088	.089	.988[NS]
Quantity marketed	-.004	.016	-.250[NS]
Educational level	-.114	.074	-1.541[NS]
Df = 7,			
F-value = 4.695,			
R^2 = 0.629,			
Adjusted R^2 = 0.595			

Y = Dependent variable (marketing efficiency was measured in percentage (%))
**Significant at 5%; ***Significant at 1%; NS=Not Significant
Source: Field survey, 2018,

Conclusion

Results of the study showed that 38.9% of the respondents were between the ages of 21and 30 years. The mean age was approximately 36.0 years. Findings from the study, further revealed that majority 77.8% of the OFSP marketers were married. Furthermore, Results of the study showed that majority 80.0% of the respondents had household size within the range of 1-10 persons with a mean household size of about 16 persons. It was also revealed from the findings that 38.9% of the marketers in the study area had no formal education but 61.1% of the marketers had attended formal education. Findings of the study also showed that majority 76.7% of the OFSP marketers in the study area do not belong to any cooperative association.

Results on the farming experience of the respondents revealed that majority 50.0% of the respondents involved in OFSP marketing had marketing experience within 1-5 years. The mean marketing experience was approximately 16 years. Furthermore, Results on the level of access to credit institution by respondents as revealed that majority 98.9% had no access to credit institutions. Additionally, majority of the marketers were male.

Disclaimer:

This paper is based on preliminary dataset. Readers are requested to consider this paper as preliminary research article, as authors wanted to publish the initial data as early as possible. Authors are aware that bigger sample size is required to get a scientifically established conclusion. Readers are requested to use the conclusion of this paper judiciously as authors have worked with a small sample size. Authors also recommend working with bigger sample size for similar future studies.

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