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Economic Analysis of Marketing Red Skinned Sweet Potato (*Ipomoea batatas*) in Selected Markets of Kano State, Nigeria

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Abstract

The study focused on the analysis of marketing Red Skinned Sweet Potato in selected markets of Kano State. Multistage sampling techniques was used for the study and data was collected using a structured questionnaire supplemented with key informant interview. A total of one hundred and seventeen 117 red sweet potato marketers were sampled. The analytical tool employed included simple descriptive statistics, net marketing margin, Gini Coefficient, marketing efficiency and multiple regression of the respondents in the study area. The result of the socio-economic characteristics showed that 33% of the red sweet potato marketers were adult belonging to the age group of 30-39 years, 60% of marketers had household size of 1-10 members, 41% had 1-10 years of marketing experience, 91% were married with 91% males, the result of educational background study area shows that 46.8% had informal education. The result of the profitability analysis revealed that red sweet potato marketing was profitable with ₦574.52 and the total revenue realized for the marketing were ₦3250. The result further revealed Gross Margin (GR) of 0.85 traded in the study area while return per naira invested was found to be 1.18 accrued from every 1.00 invested. The result also revealed that marketing of red sweet potato was efficient with 305.56%. The study further revealed variables such as: marketing experience, labour costs, transportation costs, loading and off-loading were found to be statistically significant. Results also indicate that the major determinant of net marketing income in the study area included labour cost, experience and transportation cost. The study recommended that since white sweet potato marketing determined to be a profitable enterprise more should and enhance income generations in the study area.

Keywords: Red Sweet Potato, Marketing

1. Introduction

Sweet potato (*Ipomoea batatas*) is an important tropical crop which belongs to the morning-glory family known as convolulaceae that originated from Latin America, it ranks second after cassava among the tropical root crops International Potato Center (IPC, 2011) [10]. The crop can be considered in promoting nutritional security particularly in agriculturally backward areas, beside carbohydrates it is a rich source of protein, lipids, calcium and carotene (Low *et. al.*, 2009) [14]. It has been used in Africa to combat a widespread of vitamin A deficiency which causes blindness and even death in 25,000 – 500,000 children per year (Low *et al* 2009) [14]. Despite the demographic pressure on land, there has been noticeable increase in the production of sweet potato in Nigeria (Low *et. al.*, 2009) [14]. Sweet potato (*Ipomoea batatas L.)* is an important traditional crop that is grown customarily by small-scale farmers mainly for household consumption. It ranks as the seventh most important food crop in the world after wheat, rice, maize, potato, barley, and cassava with a global annual production of over 133 million tons (Ali *et. al.*2017) [2]. It is an important root crop that provides food to a large segment of the world population, especially in the tropics and subtropics where bulk of these crops are cultivated and consumed. Asia is the largest sweet potato producing region with 125 million tons of annual production (Abegunde and Arogundade, 2012). Sweet potato production rose from 2.516 million metric tons in 2006 to 3.4 million metric tons in 2007 and China accounts for about 90% of worldwide sweet potato production with an annual production of 117 million tons (Srinivas, 2006 [21] and Akoroda, 2009. The surveys conducted revealed that there is an increase of sweet potato production by 2.65% from 2008 – 2009 in Zone III which comprised 17 Local Governments (KNARDA, 2010) [12]. These increases were attributed to improved technological inputs, international and national research efforts. FAO, (2013) [6] asserted that an increased sweet potato production that is not matched by adequate promotion and marketing to absorb surpluses from increased field has been detrimental to the

sustainability of sweet potato production in the study area. According to International Potato Center IPC, (2011) [10], 7 million tons are produced in Africa annually, mostly for human consumption. However, African yields are quite low about a one third of Asian yields indicating huge potential for future growth (Mmasa *et al.*, 2011) [15]. In East Africa, sweet potato is the main food crop in many rural areas. It forms 50% of rural household incomes in the region. The most common varieties grown are: white, red, purple and the yellow-fleshed sweet potato. Preparation of sweet potato food is commonly done by boiling, baking, frying or roasting the unprocessed tubers; however, vines are fed to livestock particularly in areas like central Kenya where small-scale dairying in zero grazing management systems is well developed (Mmasa *et. al.*, 2011) [15]. According to Mukras, (2013) [16] sweet potato is an under-exploited food crop in East Africa. The limited range of ways and availability of adapting processing technologies in which sweet potato is utilized in the region seriously undermine its potential benefits to farmers, consumers and other chain actors (Mmasa *et,al.*, 2011) [15].

2. Material and method

The study was carried out in Kano State, Nigeria.

2.1 Sampling Techniques

A multistage sampling technique was used for data collection in the study area. The first stage involves purposive selection of one local government area from each zone based on relative abundance and high intensity of sweet potato marketing. On that basis Kibiya Local Government was chosen from zone I, Rimin Gado Local Government was chosen from zone II and Wudil Local Government was chosen from zone III. The second stage, involves purposive selection of one market from each of the selected local governments based on the size, location and high involvement in white sweet potato marketing. On that basis, Kibiya market was selected from zone I, Rimin Gado markets was selected from zone II and Darki market was selected from zone III. The third stage, involves random selection of respondents from the three selected markets. A pre-survey was conducted and a total of 389 marketers were identified from all the markets out of which 30% was considered from each of the selected markets, due to financial and time constraint. In the last stage, a total of 117 red sweet potato marketers were randomly selected for the study.

2.2 Analytical Tool

The tools of analysis used for this study are: Descriptive statistics, Marketing margin analysis and Marketing efficiency.

Marketing Margin Analysis: The model is specified as follows:

$$\text{Net Marketing Margin (NM)} = TR - TMC \quad (1)$$

Where:		
NMM =	Net Marketing Margin	
TMC = (C_1+C_2+C_3+C_4+C_5)	Total Marketing	Cost

Where: C_1 = Cost of Transportation ₦, C_2 = Cost of Labor ₦, C_3= Marketing Charges ₦, C_4 = Storage ₦, and C_5 = Commission Fee ₦,

Gross Ratio: It is a ratio that measures the overall financial success of a business. A less than 1 ratio is desirable for any business, the lower the ratio the higher the profit (Olukosi and Erhabor, 2008). It is stated as:

$$GR = \frac{TMC}{TR} \quad (2)$$

Where,
GR = Gross Ratio
TMC = Total Marketing Cost
TR = Total Revenue

Operating Ratio: It measures the solvency of a business. A ratio less than 1 is desirable because it indicates that the business is making profit. A ratio of 1 implies break-even and a ratio greater than 1 implies a loss (Olukosi and Erhabor, 2008). According to Musa *et. al.*, (2006), the lower the ratio (<1) the higher the profitability of the business. It is given as:

$$OR = \frac{TVC}{TR} \quad (3)$$

Where,
OR = Operating Ratio, TMC = Total Variable Cost and TR = Total Revenue

Return on Capital Invested: return on capital invested is defined as total income or revenue divided by total marketing cost (Olukosi *et. al.*, 2005) [18]. It is given as:

$$RNI = \frac{TR}{TMC} \quad (4)$$

Where,
RNI = Return on Capital Invested
TR = Total Revenue
TMC = Total Marketing Cost

Marketing Efficiency: The formula is specified as:

$$M.E = \frac{\text{Value added by marketing}}{\text{Cost of marketing services}} X\ 100 \quad (5)$$

Thus:
Value Added by marketing (VA) = Sp – Pp Where:
Sp = Selling price of the commodity (₦)
Pp = Purchase price of the commodity (₦)

2.3 Multiple Regression Model

Multiple regression was employed to achieve objective iii (socio-economic factors influencing the profitability of sweet potato marketing in study area). The profit margin was the dependent variable and the independent variables were identified and specified in the general model as it was used by (Shua'ib *et. al.*, 2011).
The implicit *model* is;

$$Y = f\ (X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_{8.....xn}) + e \quad (6)$$

Where,

Y = Profit/150kg sold (₦)

X_1 = Age of Potatoes Marketers (years)

X_2 = House hold size of Potatoes Marketers (number of persons)

X_3 = Educational Status of Potatoes Marketers (1-tertiary inst., 2-sec., 3-pri., 4-others)

X_4 = Gender of Potatoes Marketers (1-male, 2-female)

X_5= Transportation cost (₦)

X_6 = Tax (₦)

X_7 = Loading and off-loading (₦) X_8= Time spent in the Market (Hours) X_9 = Type 1. White, 2. Red, 3. Purple. U = error term α = constant f= functional notation

3. Results and discussion

3.1 Socio Economic Characteristic of Respondents

The distributions of respondents according to age as presented in Table 1 revealed that 33% of the sweet potato marketers were within the age range of 30-39 years with a mean of 37 years, implying that the marketers were strong, agile and active and can participate adequately in marketing activities. Age is expected to have negative influence on the respondent's participation in improved sweet potato marketing. This agrees with the findings of Okwuokenye and Onemolease (2011) that age can influence the adoption of improved agricultural practices. The findings are also consistent with those of Mbanaso *et. al.*, (2012). Funke, Raphel and Kabir (2012), Tiri, Ekpa and Akinyemi (2015) and Gichangi, (2010) reported that the most active marketers' age group engaged in agricultural production was within 31- 50 years. Table 1 further indicates that sweet potato market is male dominant with a proportion of 98.25%. The results of the marital status of sweet potato marketers showed that majority of the marketers (76.92%) were married while (21.37%) of the marketers were single. Ikechi, (2005) argues that marriage has a direct relationship with family stability; therefore, the high percentage of married respondents suggested that the sweet potato marketers were stable and able to make good business decisions. The result in Table 1 below shows that 46.8% of sweet potato marketers had no formal education, about 41.3% of the respondent had only primary education, and 3.2% had secondary education while 1.6% had tertiary education. This indicates that the marketers' educational level is high. This high literacy proportion of sweet potato marketers in the study area implied that the marketers would be better exposed to more reliable information sources and good decision making in their marketing activities. This finding is in line with Esiobu and Onubuogu (2014) which found that education has a positive and significant impact on marketers' efficiency. Thus, literacy level will greatly influence the decision making and adoption of innovation by marketers, which may bring about increase in productivity.

Table 1: Socio Economic Characteristics of Red Sweet Potato Marketers

Variables	Frequency	Percentage
Age 20-29	1	0.8
30-39	42	33.3
40-49	1	0.8
50-59	38	30.2
60-69	35	27.8
Total	**117**	**100**
Gender Distribution Male	115	98.29
Female	2	1.71
Total	117	100
31-40	1	0.8
Total	**117**	**100**
Marketing Experience 0-13	51	40.5
11-20	41	32.5
21-30	24	19.0
31-40	1	0.8
Total	117	100

Source: Field survey, 2018

3.2 Profitability of Marketing Red Sweet Potato

Net marketing returns of red sweet potato marketers were presented in Table 2. The result of net marketing returns of red sweet potato sold per week in kg showed that the red sweet potato enterprise was viable. It was observed that the mean weight of 1 bag of red sweet potato weighed 150kg. The average selling price for a kg of red sweet potato was ₦3,829.06 while the average purchasing price was ₦2,808.55. The mean marketing returns made by the red sweet potato marketers per week were ₦574.52.

Table 2: Computation of Gini Coefficient per 150kg bag of Red Sweet Potato

Quantity of S/P Sold/bag	No. of S/P Sellers	Proportion of S/P Sellers (X)	Cumulative Proportion of S/P sellers	Total Value of Sales	Proportion of total Sale	Cumulative Total Volume of Sale (Y)	ΣXY
1-5	15	0.128	0.128	6,150	0.189	0.189	0.0242
6-10	63	0.538	0.668	20,850	0.642	0.831	0.3453
11-15	15	0.128	0.796	5,500	0.169	1.000	0.0216
16-20	0	0.000	0.796	0.000	0.000		0.000
21-25	24	0.205	1.000	0.000	0.000		0.000
26-30	0	0.000		0.000	0.000		0.000
Total	117			32,500			0.3911
GC	0.6089						

Source: Field Survey (2018) Gini Coefficient 1-0.3911= 0.6089

The result in Table 3 also revealed that red sweet potato purchase price cost accounted for 86.3% of the total cost while cost of transportation accounted for 8.4% of the total cost. The Table also showed that the cost of labour gulped 3.2% of the total cost while marketing charges accounted for 2.1% of the total cost. The low marketing charges among the marketers may be due to the fact that most of them sell in open spaces, along the road where stalls are allocated to other food stuff sellers or pay for a section of another person's shop. The Table also revealed that an average marketer incurred a total variable cost of ₦3250 per week but earned average revenue of 2304.17 per week. This indicates that average marketer earned ₦449.85 as gross margin per week suggesting that red sweet potato marketing is a profitable venture in the study area. The average rate of return on investment (return per naira invested) was N1.18,

indicating that for every N1 invested in red sweet potato in the study area a profit of 18 kobo was made. Thus, it could be concluded that red sweet potato market in the study area is profitable. This finding is consistent to the findings of Elizabeth (2013) who observed that sweet potato marketing is profitable by returning ₦0.40 to every ₦1.00 spent.

Table 3: Costs and Return of Red Sweet Potato/150kg

Variables	Price (N)	Percentage (%)
Average Selling Price(N)	3250	
Variable Cost (N)		
Sweet Potato Purchase Price	2304.167	83.78
Transportation	274.530	9.98
Labour	102.607	3.73
Marketing Charges	68.846	2.51
Total Marketing Cost	2750.15	100
Marketing Margin	449.85	
Gross Ration	0.85	
Operating Ratio	0.14	
Return on Capital Invested	1.18	

Source: Field Survey (2018)

3.3 Marketing efficiency per 150kg of red sweet potato

The results in Table 3 shows the marketing efficiencies of red sweet potato was found to be 230.86%, 305.56% and 217.25% for Kibiya, R/Gado and Darki markets respectively. The results revealed that all the markets were efficient in red sweet potato marketing with R/Gado market having the higher marketing efficiency. The higher the ratio the higher the marketing efficiency and vice versa (Olukosi, *et. al*., 2007) [19].

3.4 Factors Affecting Profitability of Red Sweet Potato

The results of regression analysis presented in Table 4 shows a significant of R= 0.879. This implies that multiple regression coefficients between the predictors and the criterion was 88%, A summary of the model presented in Table 4 shows the adjusted coefficient of determination of R^2 value of 0.773. This indicates that 77% of the variation in the profitability of red sweet potato is explained by the independent variables. Furthermore, it indicates that 22.7% of the variations in the profitability of redsweet potato are determined by other factors not considered. The factors not considered can include climatic conditions of the area; distance to various possible markets; requirements in possible available markets' and the amount of time marketers spend in the market. The F-value of a model which determines the overall significance of the entire model was 40.56 and was significant at 1% level of significance. This implies that all variables included in the model were collectively important and responsible for the variation in the dependent variable of the model.

Table 4: Marketing efficiency per 150kg of red sweet potatoes

Market	Total market cost (₦)	Total revenue (₦)	Market efficiency (%)
Kibiya	415.83	960.00	230.86
R/Gado	495.00	1,512.50	305.56
Darki	521.67	1,133.33	217.25

Source: field survey, 2018.

Table 5: Regression Results of Factors Affecting Red Sweet Potato Profitability

Variables	Beta	T	Sig	Expected Sign
Age	-2.119	16.030	0.000	+
Household Size	0.063	0.397	0.692	-
Education	0.021	0.329	0.743	+
Experience	0.546	2.727	0.007	+
Transportation	0.200	2.676	0.009	-
Labour	5.121	9.744	0.000	-
Loading	-3.626	-8.048	0.000	-
Off-loading	-1.087	-4.262	0.000	-
Tax	0.069	0.832	0.407	-
R	0.879			
R^2	0.773			
Adjusted R^2	0.754			
F	40.56			

Source: Computed from survey data (2018)

Predictors: (Constant), Experience, Labour, Education, Age, Tax, Transport, Uploading, Loading, H Size

Dependent Variable: Red Sweet Potato Profitability

4. Conclusion

Sweet potato marketing is a profitable business with attractive net return on investment in all the markets in the study area. The research on the economic analysis of marketing Red skinned sweet potato in selected markets of Kano state showed that the sweet potato marketing in the area is competitive with relatively high level of income inequality among the marketers. The study was also able to show that considerable number of factors militates against an effectual marketing structure of the crop.

5. Recommendations

Based on the findings of this study, it is recommended that:

1. Sweet potato marketers should form a cooperative group in order to obtain loan from the financial institutions to increase their capital base: loan will be easily acquired from these cooperatives without bureaucratic bottlenecks.
2. Also, government should provide an enabling environment through the provision of needed infrastructural facilities especially good roads.
3. Since the coefficient of labour and experience were positive and significant, it implies that through labour and experience, some marketers may learn more about the prevailing market conditions. This learning by experience should be enhanced through training of the marketers by the non-governmental and government agencies, on the existing and potential sweet potato market opportunities such as sourcing and marketing of highly competitive sweet potato varieties and storage management techniques.

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