UNDER PEER REVIEW

SDI Paper Template Version 1.6 Date 11.10.2012

Determinants of sugarcane price and revenue in Sokoto metropolis, Sokoto state, Nigeria

*[1]Maikasuwa, M., A., [1]N.A. Jatto.,[1]Maryam M.,[1]Abbas A. Y., [1]Abdullahi Y.T and
[1]Department of Agricultural Economics, Faculty of Agriculture, Usmanu Danfodiyo University, Sokot, Sokoto State, Nigeria.

ABSTRACT:

Aims: The study was carried out to determine the price and revenue of sugarcane in Sokoto metropolis.
Study design: Purposive sampling technique was used to select *Ramin Kura* market because of the high concentration of sugarcane seller in the market followed by systematic sampling of 50 respondents.
Place and Duration of Study: Sample for the study was obtained at *Ramin Kura* market in Sokotometropolis between February 2012 and December 2012
Methodology: From the list of the sugarcane sellers (comprising 252 registered members) collected from the association of sugarcane sellers at *Ramin Kura* market, systemic sampling was used to select one respondent out of every five interval giving a total of 50 sugarcane marketers that were used for the study. Data collection was done using a structured questionnaire. Data analysis was done using Multiple regression.
Results: The study revealed that while the coefficient of quantity demanded (0.456) had significant positive on the price of sugarcane, distance from source (-1.182) and handling cost (-0.570) had significant negative effects on the price of sugarcane. However, length of stem, tax and storage cost did not have any significant effect on the price of sugarcane at the *Ramin Kura* market. The study also showed that quantity sold (0.719), transportation cost (1.11) and storage cost (0.138) had significant effect on the total revenue obtained by the sugarcane sellers.
Conclusion: Based on the results, it was concluded that quantity demanded, distance from source and handling cost were the main determinanats of sugarcane price in Sokoto metropolis. Also, quantity sold, transportation cost and storage cost were the main determinant of sugarcane revenue in the metropolis.

+2347037919141
Mkzuru2002@yahoo.co.uk
Keywords: Determinants, Price, Revenue, sugarcane, Sokoto Metropolis

UNDER PEER REVIEW

INTRODUCTION

Sugarcane (*Saccharum officinarum*) originated from tropical South Africa and South East Asia. World production of sugarcane stood at 1.5 billion tonnes as of 2008. Currently Brazil is the largest sugarcane producing country. Nigeria has a suitable land area (800,000ha) for the cultivation of sugarcane and about 30million metric tonnes can be cultivated annually [1]. In Sokoto state, sugarcane provides a means of livelihood to many farmers especially those residing in the rural areas [2].The major producing local government areas in the state are Wamakko, DangeShuni, Goronyo, Wurno, Gwadabawa, Tangaza, Gudu, Kware, Bodinga, and Gada where about 8,000 ha and 7,300 ha of land were utilised for sugarcane production in 2002 and 2005, respectively [2]

Sokoto state like many other places in Nigeria, price of agricultural products are rarely stable especially perishable produce like sugarcane.

The fluctuation in prices of commodities affects the fortunes of individuals in the economy. Prices give signal to the producers regarding the commodities to be produced in the economy and how to earn money and sustain the process of production. The most common feature observed in agricultural prices is clearly marked by seasonal pattern of change. Price fluctuation can be caused by the divergence between planned output and realised output. There is also the seasonality in production and marketing which also causes price fluctuation. This is so because most products are characterised by some seasonality

UNDER PEER REVIEW

behaviour in their production and marketing pattern. According to [3] there are two types of price variation, the seasonal and the cyclical price variation. The seasonal price variations are regular patterns of price fluctuation

UNDER PEER REVIEW

that occur within a year. The cyclical price variation is a pattern that repeats itself regularly with the passage of time. A study conducted by Wayas [4] showed that the price of sugarcane was influenced by the distance between the production site and the point of sale, non-motorable roads linking the production sites to the market areas and unavailability of markets around the production site. These factors make it difficult for local farmers to transport sugarcane to far distance places where they can sell at higher prices. The only alternative left for them is to dispose the crops at any price available within their reach. In an open market, the price of sugarcane is largely determined by haggling and visual appraisal of stalk and physical characteristics rather than by measures, such as stalk weight.

Owing to the complexity of pricing, and hence revenue generated form sales, the Federal Ministry of Agricultureand rural development [5] asserts that one of the cardinal objectives of agricultural pricing policy of Nigeria is the stabilisation of prices and revenues to farmers. This may not be unconnected with the profound effect price and revenue fluctuations may have on the growth, equity and stability of the economy. For instance, incomes and living standards of the farmers, labourers and consumers are highly affected by price and revenue fluctuations [6]. This study is therefore, designed to determine the variable influencing the price and revenue generated from sugarcane.

METHODOLOGY

The study was carried out in Sokoto metropolis, Sokoto state. The state

UNDER PEER REVIEW

consist of 23 Local Government Areas. It is located in the North –Western part of Nigeria and falls within the Sudan Sahel vegetation zone with longitude $11^{0}30'$ 1350 and latitude $4^{o}64'$(LGAs) [7]. The metropolis consists of part of Wamakko, Dange, Kware, Sokoto South and Sokoto North LGAs [8].

Ramin Kura market was purposively selected because of the high concentration of sugarcane sellers in the market. From the list of the sugarcane sellers (comprising 252 registered members) collected from the association of sugarcane sellers, a systemic sampling was used to select one out of every five interval giving a total of 50 respondents used for the study.

Data collected from the respondents covered information on demography, parameters affecting pricing such as distance, handling cost, it also include parameters affecting revenue such as transportation cost, handling cost and years of experience. Data analyses were done using multiple regression. The functional forms of the production function that were used include linear and quadratic, double log and semi-log equations.

Model specification

The general form of the multiple regression model is specified as follows:

$$Y=F(X_1, X_2, X_3, X_4, X_5, X_6) \quad \text{.....equation 1}$$

Where: For factors affecting pricing;

Y= Price of sugarcane/kg, F=Functional notation, X_1=Quantity demanded (kg) X_2=Distance from source of sugarcane (km), X_3=Length of stem

UNDER PEER REVIEW

(cm), X_4=Handling cost (₦) X_5=Tax ₦ and X_6=Storage cost ₦)

For factors affecting revenue;

Y= Total Revenue (GI-TC) (₦), X_1= Quantity sold (₦,) X_2=Transportation cost (₦), X_3=Years of Experience, X_4= Handling cost (₦), X_5= sale Tax (₦) and X_6= Storage cost (₦)

Different functional forms of the model such as linear, Cobb-Douglas and Quadratic functional forms were tried to select the equation with the best fit. Equation selection was done on the basis of R^2-value, P-value, f-Value, sign and size of the regression coefficients. From the results Obtained, the quadratic functional form appeared to be the best fit in the analysis of factors affecting price while the linear functional form was the best fit in the analysis of factors affecting revenue.

In the case of factors affecting price, the quadratic functional form was therefore, specified as follows

$$Y=a + B_1X_1+ B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 - B_7X_1 - B_8X_2 - B_9X_3 - B_{10}X_4 - B_{11}X_5 - B_{12}X_6 + B_{13}X_1X_2 +U \quad \text{.....equation 2.}$$

In the case of factors affecting revenue linear functional form was specified as

$$Y= a + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + \quad \text{.....equation 3}$$

Where: U = error term, a=intercept, and B_1-B_6 are regression coefficients.

Results and discussion

The Ordinary Least Square (OLS) was the econometric technique used in the estimation of coefficients of the variables for both factors determining price and

UNDER PEER REVIEW

revenue for the sugarcane enterprise. Unlike other methods of estimations such as the Maximum Likelihood Estimate (MLE), OLS estimates are unbiased and have minimum variance [9] . Result in Table 1 shows the determinants of sugarcane price in the study area. The Table reveals that an R^2 value of 0.789 was obtained. This means that 78.9% of the variation in the price of sugarcane in Sokoto metropolis is associated with or explained by the variation in the variables included in the quadratic regression equation specified and only 21.1% is accounted for by other factors not captured in the equation.

The table also shows that the coefficient of quantity demanded (X_1) (1.584) is positive and significant (P = 0.05) meaning that increase in the quantity demanded will bring about increase in the price of sugarcane. This conforms to observation made by [10] that an increase in the quantity demanded of a commodity would bring about a corresponding increase in its price. Distance from the source of sugarcane (X_2) also has a negative coefficient (-1.182) and is statistically significant (P=0.05). This implies that the closer the source of the sugarcane the higher its price will become. This may be because as sugarcane is

UNDER PEER REVIEW

transported from a far distance to the location of sale deterioration may occur, which may bring about reduction in the price. This finding conforms to [11] who observed that deterioration in sugarcane occurs after 48 hours and poor quality due to deterioration attracts low price.

Table 1 further shows that handling cost (X_4) has a negative coefficient(-1.527) and is significant (P =0.1). This is in agreement with the finding of [12] that price of sugarcane in Nigeria is negatively affected by the marketing charges such as transportation and retailing charges. However, Tax (X_5), storage cost (X_6) and length of stem (X_3) do not have any significant effect on the price of sugarcane in Sokoto metropolis.

Table 1: Multiple regression showing determinants of sugarcane price

Variables	coefficient	P value
Quantity demanded (X_1)	0.456**	1.584
Distance from source (X_2)	-1.182**	-1.899
Length of stem (X_3)	0.111^{ns}	0.896
Handling cost (X_4)	-0.570*	-1.527
Tax (X_5)	0.106^{ns}	0.536
Storage cost (X_6)	0.525^{ns}	1.249
R^2	0.789	

Source: Field survey, 2009

Note: **= significant at P = 0.05; *= significant at P = 0.10; ns= not significant

UNDER PEER REVIEW

Result in Table 2 shows results obtained for the determinants of revenue from sugarcane in the study area. The Table reveals an R^2 value of 0.840 which means that 84% of the variation in the revenue obtained from sugarcane sale in Sokoto metropolis is associated with or explained by the variation in the factors included in the linear regression equation specified and only 16% is accounted for by other factors not included in the equation.

Quantity sold (X_1) has a significant positive coefficient (P=.1). This implies that increase in the quantity of sugarcane sold leads to a corresponding increase in total revenue generated from the crop. This agrees with the *apriori* expectation that there is a direct relationship between the quantity a seller is able to sell at the market and the amount of revenue he is likely to generate from the sale. This suggests that sugarcane sellers could increase the amount of total revenue obtainable through economies of scale, all things being equal. While [13] observed a 23.3% increase in annual revenue from sugarcane due to economies of scale, Sluyters [14] did not realised any significant increase in the revenue of sugarcane associated to the economies of scale.

The coefficient of transportation cost (X_2) is positive and significant (P=.01). This implies that there is also a direct relationship between the amount of money spent on transporting the commodity to the market and the total revenue generated. The reason may not be farfetched because sugarcane sellers

UNDER PEER REVIEW

normally increase the price of the commodity whenever there is an increase in the cost of transportation probably due to increase in the price of petrol. However, the rate of commodity price increase by the sellers is usually much more than what is required to cover the extra cost due to petroleum increase. Hence, they tend to gain more revenue from the price fluctuations. The coefficient of cost of storage (X_6) is also positive and statistically significant (P=.05) meaning that the more the amount of money spent on storage the more will be the total revenue. This may not be unconnected with the fact that, spending more on storage translate into adding more value to the commodity which in turn manifest into more revenue due to more value addition. [15] reported similar significant positive correlation (P=.01) between cost of storage and total revenue realised from sale of agricultural produce.

UNDER PEER REVIEW

Table2: Linear regression analysis of determinants of revenue

Variables	Coefficient	T-ratio
Quantity sold (X_1)	0.719*	1.628
Transportation cost (X_2)	1.117***	0.660
Experience (X_3)	-0.067^{ns}	-0.900
Handling cost (X_4)	0.337^{ns}	0.791
Tax (X_5)	0.105^{ns}	1.096
Storage cost (X_6)	0.138**	1.888
R^2	0.840	

Source: Field survey, 2009.
Note: Note: ***= significant at P = .01; **= significant at P = .05; ***= significant at P = .10; ns= not significant

Conclusion

In conclusion, it was observed that quantity demanded, distance from source, handling cost and storage cost were the main determinants having significant influence on the price of sugarcane in the study area. Similarly, quantity sold, transportation cost and storage cost were the major determinants affecting the total revenue of the sugarcane sellers in the study area. Based on the results, it is recommended that sugarcane sellers

UNDER PEER REVIEW

should increase the quality supplied in the market to offset changes in the market demand so as to prevent and/or reduce price fluctuation. The increase in quality supplied shall also bring about increase in revenue generation via economies of scale. The association of sugarcane sellers should make an effort to source loan for their members so as to improve on the marketing activity.

UNDER PEER REVIEW

REFERENCES

[1]Imolehin, E .D. and A. C. Wada Advances in sugarcane and sugar research in Nigeria.*Training Manual on Sugarcane Production and processing.*A.C. Wada and I. O. Fatoba (edt.) Badeggi NCRI, Niger, Nigeria. 2008. 1.

[2]SokotoState Ministry of Agriculture and Natural Resources (SMANR) .*Annual Report*. 2007: 8-11.

[3]Olukosi, J. O. Isitor, S. U. and O. O. Moses (2007,) *Introduction to Agricultural Marketing and Prices Principle and Applications*. Agitab Publication, Zaria, 37-42 and 107-115.

[4]Wayas, J. V. . Sugarcane markets outlets. Training Manual on sugarcane production and processing. In: A. C. Wada and I. O. Fatoba (eds). Badeggi, NCRI, Niger, Nigeria. 2008. 94.
Nigeria. 2008. 1.

[5](FMARD) Federal Ministry of Agricultureand Rural development *Agricultural Policy for Nigeria.*Lagos.2008. 64.

[6]Subba, S. R., Ragbu, P. R., Sastry,T. V. and I. D. Bhavani . *Agricultural Economics*.Oxford and IBH Publishing Co Put.Ltd. New Delhi, India. 2007. 535-536.

[7]SOSG: Sokoto State, Home Affairs Department. Diary *Yearly Publication*. 2007. 1-3

[8](NPC) National Population Commission .*Population of Nigeria by sex*, Report. 2006

[9]Olayemi., J.K.. Element of applied econometrics. Elshaddai Venturess Ltd., No. 15, Ago Ilorin st. Mokola, Ibadan, Nigeria. 1998

[10]Emmanuel, O.E and Micheal S.I. Agricultural economies: an Introduction to basic concept and principles. Best print Bussiness press. Uyo, Akwa Ibom, Nigeria. 2002

UNDER PEER REVIEW

[11]Onwueme, I. C. and T. D. Sinha *Field Crop Production in Tropical Africa.*CTA, Wageningen, Netherlands, City publication. 1991. 412.

[12]Nura, A. B.. Evaluation of sugarcane marketing in Bunza Local Government Area of Kebbi State, unpublished B.Sc. Project Department of Agricultural Economics and Extension, UsmanuDanfodiyo, Sokoto, Nigeria. 2005. 34

[13]Yisa, E. N. Sugarcane production and marketing in Nigeria. A case study of Niger state,unpublished BSc. ProjectDepartment of Agricultural Economics, Usmanu Danfodiyo Univerity, Sokoto, Nigeria. 2004

[14]Sluyter, J. A. Some information about sugarcane produced in part of the Bida Diuisia of Northern Nigeria. Northern Zone Agricultural Science 2006. 2(4). Pp. 290-203

[15]Joseph T. Determinant of revenue from sales of some selected Agricultural produce in Louis, Toronto. *Journal of international Agricultural Research* 2010. 4(6).