

Research paper

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

ABSTRACT

The study was carried out to evaluate the determinants of sugarcane price and revenue in Sokoto metropolis, Sokoto state, Nigeria. Purposive sampling technique was used to select *Ramin Kura* market because of the high concentration of sugarcane seller in the market. Data were collected with the aid of questionnaire administered to 50 respondents that were randomly selected from the list of registered members of sugarcane sellers association. Data collected were analysed using Multiple Regression. The study revealed that the coefficient of quantity demanded (0.456), distance from source (-1.182), and handling cost (-0.570), had significant effects on the price of sugarcane while length of stem, tax and storage cost had no significant effect on the price of sugarcane. 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 of sugarcane sellers while experience, handling cost and tax had no significant effect on the total revenue of sugarcane sellers. Based on the results, it was concluded that quantity demanded, distance from source and handling cost were the main factors determining sugarcane price in Sokoto metropolis. Also, quantity sold, transportation cost and storage cost were the main factors determining sugarcane revenue in the metropolis. It is recommended that sugarcane sellers ought to increase the quality supplied in the market to offset changes in price due to increase in the market demand. This may prevent and/or reduce price fluctuation. The increase in quality supplied shall also bring about increase in revenue generation via economies of scale.

Key Words: Determinants, Price, Revenue, Sokoto Metropolis

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 [Wikipedia, 2009]. Nigeria has a suitable land area (800,000ha) for the cultivation of sugarcane and about 30million metric tonnes can be cultivated annually [Imolehin *et al.*, 2008b]. In Sokoto state sugarcane provides a means of livelihood to many farmers especially those residing in the rural areas [SMANR, 2007]. The major producing local governments areas in the state are

34 Wamakko, DangeShuni, Goronyo, Wurno, Gwadabawa, Tangaza, Gudu,
35 Kware, Bodinga, and Gada where about 8,000 ha and 7,300 ha of land were
36 utilised for sugarcane production in 2002 and 2005, respectively [SMANR,
37 2007].

38 In Sokoto state like in many other places in Nigeria, price of agricultural
39 products are rarely stable especially those that are perishable such as sugarcane.
40 Snodgrass *et al.*, [1970] observed that, most agricultural commodities are
41 affected by price variation arising from seasonal fluctuations in demand, supply
42 and marketing. Similarly, Subba *et al.* (2008) added that agricultural prices are
43 volatile in the sense that they are subject to changes over time and space. The
44 fluctuation in prices of commodities affects the fortunes of individuals in the
45 economy. Prices give signal to the producers regarding the commodities to be
46 produced in the economy and how to earn money and sustain the process of
47 production. The most common feature observed in agricultural prices is clearly
48 marked by seasonal pattern of change. Price fluctuation can be caused by the
49 divergence between planned output and realised output. There is also the
50 seasonality in production and marketing which also causes price fluctuation.
51 This is so because most products are characterised by some seasonality
52 behaviour in their production and marketing pattern. According to Olukosi *et al.*
53 (2007) there are two types of price variation, the seasonal and the cyclical price
54 variation. The seasonal price variations are regular patterns of price fluctuation

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 (2008) showed that the price of sugarcane is 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 from sales, the Federal Ministry of Agriculture (FMA) (2008) 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 very affected by price and revenue fluctuations [Subby *et al.*, 2008]. This study is therefore, designed to determine the factors affecting price of and revenue generated from sugarcane.

Methodology

76 The study was carried out in Sokoto metropolis, Sokoto state. The states
 77 consist of 23 local governments. It is located in the North –Western part of
 78 Nigeria and falls within the Sudan Sahel vegetation zone with longitude 11°30’-
 79 1350 and latitude 4°64’(SOSG Diary, 2007). The metropolis consists of part of
 80 Wamakko, Dange, Kware, Sokoto South and Sokoto North L.G.As (NPC,
 81 1991). *Ramin Kura* market was purposively selected to meet the targeted
 82 sugarcane sellers because of the high concentration of sugarcane seller in the
 83 market. A list of the sugarcane sellers (comprising 252 registered members)
 84 was collected from the market association of sugarcane sellers comprising out
 85 of which 50 respondents were randomly selected and used for the study. Data
 86 collected from the respondents covered information on demography; factors
 87 affecting pricing such as distance, handling cost. Data collected also covered
 88 information pertaining to factors affecting revenue such as transportation cost,
 89 handling cost and years of experience. Data analyses were done using multiple
 90 regression. The functional forms of the production function that were used
 91 include linear and quadratic, double log and semi-log equations.

92 **Model specification**

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

$$94 \quad Y = F(X_1, X_2, X_3, X_4, X_5, X_6) \dots \dots \dots \text{equation 1}$$

95 Where:

96 For factors affecting pricing:

97 Y= Price of sugarcane/kg, F=Functional notation, X_1 =Quantity demanded
 98 (kg) X_2 =Distance from source of sugarcane (km), X_3 =Length of stem
 99 (cm), X_4 =Handling cost (N), X_5 =Tax (N), and X_6 =Storage cost (N)

100 For factors affecting revenue:

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

104 Different functional forms of the model such as linear, Cobb-Douglas and
 105 quadratic functional forms were tried to select the equation with the best
 106 fit. Equation selection was done on the basis of R^2 -value, T-value, f-
 107 value, sign and size of the regression coefficients. From the results
 108 obtained the quadratic functional form appeared to be the best fit in the
 109 analysis of factors affecting price while the linear functional form was the
 110 best fit in the analysis of factors affecting net revenue.

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

113
$$Y = a + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 - B_7X_1 - B_8X_2 - B_9X_3 -$$

 114
$$B_{10}X_4 - B_{11}X_5 - B_{12}X_6 + B_{13}X_1X_2 + U \dots \dots \dots \text{equation 2.}$$

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

117
$$Y = a + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + \dots \dots \dots \text{equation 3}$$

118 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 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 (Olayemi, 1998 and Thomas, 2007). Table 1 shows results obtained for the determinants of sugarcane price in the Sokoto metropolis. 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 factors 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 (Olukosi and Abraham 1998; Michael and Emmanuel 2002) that an increase in the quantity demanded of a commodity should 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

transported from a far distance place to the location of sale deterioration may occur, which may bring about reduction in the price. This finding conforms to Onwueme (1991), 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 Nura (2005) 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: Result of multiple regression of factors affecting sugarcane price

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

Source: Field survey, 2009

Note: ***= significant at $P < 0.01$; **= significant at $P < 0.05$; ***=

153 significant at $P < 0.10$; ns= not significant

154 Table 2 shows results obtained for the determinants of revenue from sugarcane
155 in Sokoto metropolis. The Table reveals an R^2 value of 0.840 which means that
156 84% of the variation in the revenue obtained from sugarcane sale in Sokoto
157 metropolis is associated with or explained by the variation in the factors
158 included in the linear regression equation specified and only 16% is
159 accounted for by other factors not included in the equation.

160 Quantity sold (X_1) has a significant positive coefficient ($P < 0.1$). This
161 implies that increase in the quantity of sugarcane sold leads to a corresponding
162 increase in total revenue generated from the crop. This agrees with the *apriori*
163 expectation that there is a direct relationship between the quantity a seller is
164 able to sell at the market and the amount of revenue he is likely to generate from
165 the sale. This suggests that sugarcane sellers could increase the amount of total
166 revenue obtainable through economies of scale, all things being equal. While
167 Yisa (2004) observed a 23.3% increase in annual revenue from sugarcane due to
168 economies of scale, Sluyters (2006) did not realise any significant increase in
169 the revenue of sugarcane associated to the economies of scale.

170 The coefficient of transportation cost (X_2) is positive and significant ($P < 0.01$).
171 This implies that there is also a direct relationship between the amount of
172 money spent on transporting the commodity to the point of sale and the total
173 revenue generated. The reason may not be farfetched because sugarcane sellers

174 normally increase the price of the commodity whenever there is an increase in
 175 the cost of transportation probably due to increase in the price of petrol.
 176 However, the rate of commodity price increase by the sellers is usually much
 177 more than what is required to cover the extra cost due to petroleum increase.
 178 Hence, they tend to gain more revenue from the price fluctuations. The
 179 coefficient of cost of storage (X_6) is also positive and statistically significant
 180 ($P<0.05$) meaning that the more the amount of money spent on storage the more
 181 will be the total revenue. This may not be unconnected with the fact that,
 182 spending more on storage translate into adding more value to the commodity
 183 which in turn manifest into more revenue due to more value addition. Joseph
 184 (2010) reported similar significant positive correlation ($P<0.01$) between cost of
 185 storage and total revenue realised from sale of agricultural produce. However,
 186 the coefficient of years of experience (X_3), tax (X_5) and handling cost (X_4) do
 187 not have statistical significance.

188 **Conclusion**

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

ought to 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.

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202 **Table 2: Result for the linear regression analysis of factors affecting total 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	-0.900ns
Handling cost (X_4)	0.337	0.791ns
Tax (X_5)	0.105	1.096ns
Storage cost (X_6)	0.138	1.888**
R^2	0.840	

203 **Source:** Field survey, 2009.

204 Note: Note: ***= significant at $P < 0.01$; **= significant at $P < 0.05$;

205 ***= significant at $P < 0.10$; ns= not significant

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