



Full Length Research Paper

Economics analysis of sugarcane (*saccharum officinarum*) production in Moro Local Government Area of Kwara State, Nigeria

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Abstract

The study examined the profitability and factors influencing Sugarcane Production among the farmers in Moro Local Government Area of Kwara State. A total of 80 sugarcane farmers were randomly selected. The questionnaires were administered to collect data between 2010 and 2011. The data were analyzed using descriptive statistics, farm budget and multiple regression functions. The results revealed that majority of the farmers were male (65%). The dominant age group of the respondents was 31 – 40 years (70%) and 75% of the farmers had more than 10 years of farming experience. The sugarcane production in the study area was profitable as the farmers realized an average net farm income of ₦27,100.21/ha with a return of ₦1.88 per every naira invested. The most important determinants of sugarcane production in the study area were farm size and sugarcane sett, which were significant ($P < 0.05$ and $P < 0.01$) respectively. It is recommended that credit facilities should be provided to the farmers for increase productivity through an effective system where farmers will be linked with service providers such as financial institutions, insurance companies, as well as other private community money lenders.

Keywords: Economics, Sugarcane, Production, Nigeria.

INTRODUCTION

Sugarcane (*Saccharum officinarum*) is one of the most important crop in the world because of its strategic position and immense uses in the daily life of any nation as well as for industrial uses aimed at nutritional and economic sustenance. Sugarcane contributes about 60% of the total world sugar requirement while 40% came from sugar beet (Onwueme, 2005). It is a tropical crop that usually takes between 8 – 12 months to reach its maturity. Matured cane may be green, yellow, purplish or reddish and considered ripe when sugar content is at its maximum (Onwueme and Sinha, 2003).

The current estimated sugarcane production of the nation as at 2008 was put over 1.4m tones. This figure represents the combined production of both industrial and domestic consumption. Sugarcane for domestic consumption is produced more than that produced for

industrial use. Thus, chewing cane accounts for between 55 – 65% of the total cane production. The bulk of these are consumed raw for its sweetness of the juice but some of it is processed into a variety of products such as sugar, molasses, baggasse, sweets and left-over leaves/stalks (Busar and Misari, 2007).

Although there are vast potential for the commercial production of this crop, its processing industry did not come into existence in Nigeria until the early 1960s (Abdullahi, 2000). Commercial cultivation of sugarcane did not start until 1950 while industrial production of refined sugar started in the early 1960s with the establishment of the Nigeria Sugar Company (NISUCO), at Bacita, Kwara State in 1964. Since then another mill, the Savannah Sugar Company (SSCL) has taken off at Numan, Adamawa State in 1980 and smaller one in

Lafiagi in 1983. Similarly, National Sugar Development Council, Abuja, is installing a medium-size 250 tonne-cane-day Mini sugar plant at Sunti, Niger State. The combined installed capacities of these mills are about 120,000 metric tonnes of processed granulated white sugar per annum. However, total domestic production has fluctuated between 16,000 and 50,000 tonnes annually, which are able to satisfy only about 5% of the total national demand for sugar (Busari and Misari, 2007).

Sugarcane has three main products namely: Sugar, Bagasse and Molasses and the sugar industry is responsible for the manufacture of raw or refined granulated brown or cubed sugar from sugarcane which is consumed as a basic food item. In addition it serves as a raw material for a variety of products for brewing beer, soft drinks, confectionaries, pharmaceuticals etc (Nasir, 2001). Sugarcane plant is the most efficient converter of solar energy, carbon dioxide and water into energy giving food and the first food sweetening material of our ancestors (Kochhar, 1996).

The area where sugarcane is cultivated includes the tidal water areas, naturally flooded areas such as the Fadama of Northern Nigeria. These areas have a total minimum of 1500mm of rainfall during the growing season. However, in some area like the Bacita Sugar Company in Kwara state and Savannah Sugar Company at Numan in Adamawa state, water is supplemented through irrigation to enhance production. 40% of the sugar, which is consumed in Nigeria, is from these establishments (Girel, 2006).

Sugarcane is grown for chewing, drinking juice, raw sugar and centrifugal sugar. Thick noble canes, which are relatively soft with a high sugar and juice content and low fiber, are best for chewing. By boiling the juice over an open fire until it is almost dry, a form of sugar is prepared (Onwueme and Sinha, 2003). With further improvement, all insoluble materials and all impurities are separated from the juice and the resulting product is a fine-grained, pale yellow sugar which is further refined to produce white sugar which has become an important item of human diet. The dark brown viscous liquid separated from the crystalline sugar in the last stage of juice processing is called molasses containing 35% sucrose and 15% reducing sugars. It is an important industrial raw material in producing rum, gin, vodka, ethyl alcohol, acetone and butanol, also bakers and brewer's yeast are produced from it. It is widely used as a stock feed and preparing silage as additives and used in constructing roads (Davies, 2009).

Bagasse is another by product of sugarcane used as fuel in sugar factories, in paper manufacturing, cardboard, fiber board, wall board and plastic, cattle feed and in producing furfural (Gibbon and Pain, 1995). NSDC (2002) also observed that bagasse is the fibrous remain after squeezing out the juice from sugarcane. The modern sugar estates use this by-product as fuel for power generation; it has great potentials as fodder crop.

Objectives of the study

The broad objective of the study is to examine the economics of sugarcane production in Bacita, Moro Local Government Area of Kwara state. The specific objectives are:

- (1) To examine the socio-economic characteristics of sugarcane farmers
- (2) To determine the cost and benefits associated with sugarcane
- (3) To determine the factors influencing sugarcane production in the study area

METHODOLOGY

Area of study

The study was carried out in Moro Local Government Area of Kwara state. The climate is that of Guinea Savannah region with plenty of untapped agricultural resources. They include abundant luxuriant grasses for feeding of livestock, good and favourable soil made up of alluvial and vertisol soils for the production of crops, a zone partially free from pest and diseases and tsetse flies that would hinder livestock production. Temperature is fairly high and almost uniform throughout the year. The temperature ranges from 25^oC to 30^oC annually. The relative humidity is between 50 – 60%. It has a tropical climate, which is clearly marked by dry and rainy seasons. The rain season starts from April and ends by October.

Sampling Techniques

The target population for this study was the sugarcane farmers in Moro Local Government Area (LGA) of Kwara State. Two stage random sampling techniques were used in selecting the respondents. Four communities were purposively selected from the LGA that were noted for large sugarcane production. 20 farmers were selected from each community, making a total of 80 farmers.

Method of Data Collection

Questionnaire was the main instrument of data collection for this research, which was administered to sugarcane farmers.

Method of Data Analysis

Descriptive statistics such as frequency distribution and percentage were used to analyze data collected. Farm budget was also used to determine the cost and benefit

associated with sugarcane production and Cob-Douglas production function was employed to determine the factors influencing sugarcane production. Other production functions such as Quadratic, Linear and Semi-log were used to select the one that will give a best fit.

Model Specification

Farm Budget Model

According to Olukosi and Erhabor (1991), Farm Budget is a detailed physical and financial plan needed for the operation of the farm over a given period of time. This tool has been widely used by scientists in determining the profitability of farm enterprise (Baba, 1999; Hamidu, 2005). Mathematically, farm budget can be expressed as follows:

$$\text{NFI} = \text{TR} - \text{TC} \dots\dots\dots (1)$$

$$\text{TC} = \text{TVC} + \text{TFC} \dots\dots\dots (2)$$

Therefore,

$$\text{NFI} = \text{TR} - (\text{TVC} + \text{TFC}) \dots\dots\dots (3)$$

Where,

NFI = Net Farm Income

TR = Total Revenue

TVC = Total Variable Cost

TFC = Total Fixed Cost

The estimated Net Farm Income (NFI) gives an indication of the profitability or otherwise of the sugarcane production.

Production Function Model

To examine the resources use efficiency, Cobb-Douglas production function was used. This model can be expressed in its implicit form as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, U) \dots\dots\dots (4)$$

Where,

Y = Yield of sugarcane (tonnes)

X₁ = Land (ha)

X₂ = Sett (tonnes)

X₃ = Labour (manday)

X₄ = Fertilizer (Kg)

X₅ = Water (m³)

U = Random error term

This model has been widely used in the analysis of various productivity studies (Ofejekwu, 1992; Adeniyi, 1998; Baba, 1999). This function can further be expressed below:

$$Y = a + X_1b_1 + X_2b_2 + X_3b_3 + X_4b_4 + X_5b_5 + U \dots\dots\dots (5)$$

This function can further be expressed in a logarithm form as:

$$\text{Log } Y = \text{Log } a + b_1\text{Log}X_1 + b_2\text{Log}X_2 + b_3\text{Log}X_3 + b_4\text{Log}X_4 + b_5\text{Log}X_5 + \text{Log}U \dots\dots\dots (6)$$

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Farmers

According to Wegner (1997), socio-economic studies of any society are very vital in the understanding of the type and nature of other livelihood as well as their social life.

Table 1, reveals that majority (70%) of the respondents fell within the age group of 31 – 40 years. This could be considered as productive age bracket (Haruna and Kushwaha, 2003). This followed by those in the age group of 41 – 50 years which constituted 25%. The young farmers are more active in the adoption of new farming techniques and always willing to change for better than the older ones who are somehow conservative. Asumugha et al., (2000) also stressed that the relatively young farmers assume greater risk in anticipation of high profit than the older ones. Majority (65%) of the respondents were male who engaged in sugarcane production in the study area while 35% were found to be female. This could be attributed to the fact that sugarcane production is strenuous and labour intensive. This is in line with Haruna (2002) that majority of farmers in the wetland or fadama areas of Bauchi state are male.

Analysis of educational level of respondents revealed that majority (53.75%) had secondary education followed by primary education (35%). 6.25% of the sugarcane farmers had no formal education. It could be deduced that most of the sugarcane farmers in the study area were literate. Majority (52.5%) has a family size between 6 – 10 persons, followed by those with the family size of 1 – 5 persons constituting 32.5%, and 11 – 15 persons constituting only 1.5% of the respondents. Most of the respondents used family labour in the study area; hence majority had family size of 6 – 10 persons. Most of the respondents may not have labour problem as much of it could be supplied within the family. This agrees with the findings of Welsh (2001) who stressed that a farmer incurs less production cost if family labour is being fully utilized for farm production.

The results show that 47.5% of the respondents had farming experience of between 16 – 20 years, followed by those with 11 – 15 years, constituting 27.5%. Only 7.5% had farming experience between 1 – 5 years, while the remaining 17.5% of the respondents had farming experience between 6 – 10 years. These percentages will increase over time as more mobilization, sensitization and incentives are provided. Majority (76.25%) of the respondents engaged in sugarcane production had average farm size of between 1 – 2 hectares, followed by 3 – 4 hectares (17.5%). Also those with 5 – 6 constituted 3.75% with only 2.5% of them had between 7 – 8 hectares. This result conforms to the assertion of Okigbo (1998) that the largest proportions of total farm holdings in Nigeria are small scale holdings below 5 ha. Majority

Table 1. Socio-Economic Characteristics of Farmers

Variables	No of Respondents	Percentage (%)
Age (years)		
21 – 30	4	5
31 – 40	56	70
41 – 50	20	25
Gender		
Male	52	65
Female	28	35
Level of Education		
No Formal Education	5	6.25
Primary Education	28	35
Secondary Education	43	53.75
Tertiary Education	4	5
Family Size (Person)		
1 – 5	26	32.5
6 – 10	42	52.5
11 – 15	12	15
Farming Experience		
1 – 5	6	7.5
6 – 10	14	17.5
11 – 15	22	27.5
16 – 20	38	47.5
Land Holding (ha)		
1 – 2	61	76.25
3 – 4	14	17.5
5 – 6	3	3.75
7 – 8	2	2.5
Marital Status		
Married	72	90
Divorced	6	7.5
Widowed	2	2.5

Source: Field Survey, 2012

Table 2. Cost and Returns Analysis for Sugarcane Production

Inputs (₦)	Costs (₦/ha)	Percentage (%)
Variable Cost (VC)		
Setts	1,800	5.82
Fertilizer	5,560	17.97
Irrigation water	3,200	10.34
Hired Labour	4,000	12.93
Family Labour	12,000	38.79
Total Variable Cost (TVC)	26,560	85.85
Fixed Cost (FC)		
Land	1,200	3.88
Cost of Capital	3,178	10.27
Total Fixed Cost (TFC)	4,378	14.15
Total Cost (TC) of Production	30,938	100
Returns (₦/ha)		
Gross Farm Income (GFI)	58,038.21	
Net Farm Income (NFI)	27,100.21	
Rate of Returns on Invested (RRI)	1.88	

Source: Field Survey, 2012

(90%) of the sugarcane farmers were married. The high proportion of married individual indicates that more family labour is available for sugarcane production activities. This confirms with the findings of Haruna et al., (2002)

which reported that this high proportion of marriage indicates greater responsibilities for catering to their families needs.

From table 2, it was observed that the total variable

Table 3. Regression Coefficient and t-values from the Cob-Douglas Production Function

Variable	Regression Coefficient	T-Ratio
Constant term (a)	1.4288	4.51**
Land (X ₁)	0.5612	1.87*
Sett (X ₂)	0.5931	5.11**
Labour (X ₃)	-0.0833	-0.63
Fertilizer (X ₄)	0.07264	0.84
Water (X ₅)	0.00106	0.04
F-ratio	58.22**	
R ²	76.4%	

Source: Computed from field survey, 2012

** Significant at 1%

*Significant at 5%

cost (TVC) accounted for 85.85% of total cost (TC). 14.15% was the contribution of the fixed cost. The analysis further revealed that out of the total variable cost, labour accounted for a substantial part of the cost of production and this constituted 51.72%. Therefore, from this analysis it was clear that labour constituted substantial part of inputs required in the production of sugarcane, and it is generally noted that sugarcane production is both labour and capital intensive (NSDC, 2002). The fixed cost constituted 14.15% of the total production cost. It was observed that very few of the respondents were able to obtain loans from any source and that could be a major constrain to their expansion of their cane field and subsequently low yield. Net farm income was ₦27,100.21/ha and sugarcane production was profitable in the study area given that ₦1.88 was derived from every naira invested.

Production Analysis

The Cob-Douglas production was selected because it agree with the *a priori* expectation, that land, sett, labour, fertilizer and water will have positive influence on sugarcane production. It was also found that labour has a negative of -0.0833 which implies that any increase in labour supply by man a day will lead to decrease in sugarcane output by -0.0833. A percent increase in sugarcane sett increases the yield of sugarcane by 59.31% and 5% increase in land increases the yield of sugarcane by 56.12%. The coefficient of determinant R² was found to be high at 76.4%.

CONCLUSION

The bulk of the respondents were small scale sugarcane farmers with small farm holdings ranging from 1 to 2 hectares. The use of family labour on the farm was very rampant because of large family size of the respondents and inadequate funds to hire farm labour. The sugarcane production in the study area is profitable with a return of

₦1.88 for every naira invested. Sugarcane sett and land are significant at 1% and 5% respectively.

RECOMMENDATION

Based on the study, the following recommendations were made:

In an attempt to develop the sugar industries, attention should be given on the primary production sector; to facilitate reduction in foreign exchange expenditure in importing sugar, there should be timely provision of inputs and mechanical services to the farmers as well as sufficient irrigation water so as to enhance farmer's farm operation, which could lead to higher yield. An effective system should be put in place where farmers should be linked with service providers such as financial institutions, insurance companies as well as other private community money lenders. To meet the demand of the company in terms of high quality cane supply and to generate sufficient funds for the farmers, the issue of low cane yield should be addressed through provision of high yielding, disease resistant, productive and pest/disease free farms.

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