

Minireview Article

Profitability of Sugarcane Production and its Contribution to Farm Income of Farmers in Kaduna State, Nigeria

ABSTRACT

Aims: Aims of the study were to determine how profitable is sugarcane production and its contribution to farm income of farmers in Kaduna state.

Study Design: Primary data were collected for this study from sugarcane farmers through the use of well structured questionnaires.

Place and Duration of Study: This study was carried out in Maigana Agricultural Zone of Kaduna state, Nigeria between September and December 2014 cropping season.

Methodology: Multistage-stage sampling technique was employed for data collection.

Results: A total of 330 respondents were randomly selected and interviewed. The net farm income of sugarcane farmers in the study area per hectare was realized to be ₦78,036.05k. The results also revealed that the average return on investment was ₦1.83k; meaning that for every ₦1 invested in sugarcane production in the study area, a profit of ₦1.83k was realized by the farmers. Also, sugarcane production in the study area contributed averagely to about 19.55% of the farmers' annual farm income.

Conclusion: , it is concluded that sugarcane production in the study area was profitable; that none of the farmers solely depended on sugarcane farming as his only source of income; rather majority of them (i.e. about 80%) earned most of their income from other sources annually.

Keywords: Profit; net farm income; sugarcane; farmers

INTRODUCTION

Sugarcane (*Saccharum officinarum*) is one of the most important crops 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 the remaining 40% came from sugar beet [1]. It is a tropical crop that usually takes between 8 and 12 months to reach its maturity. Matured cane may be green, yellow, purplish or reddish considered ripe when sugar content is at its maximum [2].

In Nigeria, sugarcane is one of the industrial crops that, before 1982, contributed to elevating the nation's GDP in the agricultural sector. However, little attention was paid to its production after 1982 and this accounted for the collapse of some sugar factories and the consequent increase in unemployment in the country [3]. Nigeria has vast human and natural resources, in terms of land and water, to produce enough sugarcane, not only to satisfy the country's requirement for sugar and bio-fuel, but also for export [4].

World production of sugarcane stood at 1.5 billion tonnes as of 2008 [5]. Brazil, China, Cuba, Mexico, Pakistan, Thailand, USA, Colombia, Australia and Indonesia are the leading countries in sugarcane production. Brazil, India and Cuba are the leading countries in sugarcane production, producing over half of the total world sugarcane production. Africa in the same reporting period has 1.2 million hectares with 72.1 million metric tons, respectively [2]. The important sugar-producing countries in the tropical Africa are Mauritius, Kenya, Sudan, Zimbabwe, Madagascar, Cote d'Ivoire, Ethiopia, Malawi, Zambia, Tanzania, Nigeria, Cameroon and Zaire. Nigeria is one of the most important producers of the crop with a land potential of over 500,000 hectares of suitable cane field capable of producing over 3.0 million metric tons of sugarcane. If processed, it will yield about 3.0 million metric tons of sugar [4].

Nigeria is the largest consumer of sugar in West Africa and has a large area of cultivable land suitable for the growing of industrial sugarcane [6] and [7]. Nigeria is noted to be abundantly blessed with human, water and environmental potentials for the production of sugarcane. Areas with high

potentials for commercial sugarcane /sugar production have been identified through studies sponsored by the Federal Ministry of Industry and conducted by Dutch consultants HVA in the early eighties. It should be pointed out that most of the areas in the Northern States where water for irrigation is available; sugarcane cultivation in large quantities is feasible. The crop can be rotated or even inter-planted with other crops where land with adequate sources of water abounds like in the various River Basin Development Authority Areas [8].

According to [9], sugarcane is produced and sold in many local government areas of the state, including Makarfi, Giwa and Kudan. About 20 thousand households in the state grew sugarcane in 2013.

1.1 Profitability Measurement Using Net Farm Income

Net farm income is the difference between gross income (revenue) and total cost of production. It is used to show the levels of costs, return and net profit that accrue to farmers involved in production [10]. The technique emphasizes the costs (fixed and variable cost) and returns of any production enterprise. [11] have examined two major categories of costs involved in crop production. These are fixed and variable cost. Fixed cost (FC) refers to those costs that do not vary with the level of production or output while variable costs (VC) refer to those costs that vary with output. The total cost (TC) is the sum of total fixed cost (TFC) and total variable cost (TVC).

[12] examined resource-use efficiency and profitability of fluted pumpkin and found that the net farm income to be ₦116, 891.39 per hectare.

[13] assessed the profitability of Egusi Melon under sole and intercropping system in Okeni Local Government area of Kogi State of Nigeria and found out that the average net farm income per hectare for sole melon and two, three and four crop mixtures were ₦1,328.68, ₦915.77, ₦887.27 and ₦414.57 respectively; the total gross return per hectare for melon (pooled data) averaged ₦12,638.61 while the total cost of production was ₦8,838.74 on average and the total net farm income per hectare for both sole and mixed (pooled data) melon was ₦3,799.00 on the average, implying that Egusi melon production was profitability in the study area.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Kaduna state. The State is located in the north central to middle belt of Nigeria. The state lies between latitudes 9°10' East and 11°30' North and longitudes 6° East and 9°10' North, respectively. It shares borders with Kastina and Kano states to the north, Plateau state to the north-east, Nasarawa state to the south and Niger and Zangfara states to the west. To the south-west, the state shares border with the Federal Capital Territory (FCT). The state has a total land area of about 4.5 million hectares, with an estimated total arable land of about 2.02 million hectares comprising 1.94 million hectares upland and 0.8 million hectares lowland. It has an estimated population of approximately 6,113,503 people with an annual growth rate of 3.2% making it the third most populous state in Nigeria [14].

There are two distinct seasons in the state namely: wet and dry. Wet season generally spans April – October, while dry season falls between October and March. The average rainfall is about 1,482 mm, while temperature ranges from 35°C to 36°C during the humid period to as low as 10°C – 23°C during the winter periods of November – February. The state falls within the Southern and Northern Savannah Ecological Zones characterized by woodlands with grasses of different species. The soil is developed from undifferentiated complex igneous and metamorphic rocks. The fine top soil coupled with reasonable organic matter in it, enhances the fertility status of especially the Southern part of the state. The physical properties of the soil are moderately good and allow for continuous cropping for a wide variety of crops [9].

About 80 percent of the State's population is engaged in peasant farming producing both food and cash crops. The crops produced in the state include cotton, groundnut, tobacco, maize, beans, guinea corn, millet, rice, ginger, cassava, sugarcane, yam and potatoes. During the dry season, a considerable number of people in the state are engaged in irrigation farming along some major rivers and dams. Low lying fertile land with a lot of alluvial deposit known as the "Fadama" is particularly important for irrigation farming in Kaduna State. The total "Fadama" area in Kaduna state is estimated

to be 80,000 ha out of this only 11,000 ha have been put under cultivation. The crops cultivated are mainly vegetables and among the cash crops, there is sugarcane [9].

The state produces over 40,000 MT of sugarcane every year. Makarfi LGA accounts for about 39% (15,500MT), Giwa LGA produces 15% (6,200MT) while Kudan LGA 13% (5,200MT) of the total annual state production. Another important aspect of agriculture engaged by the people is the rearing of cattle, sheep, goats, pigs and poultry farming. Kaduna State occupies a very strategic position in terms of its historical role, contemporary political development and economic activities. Kaduna state has 23 local government councils [9].

2.2 Sampling Procedure and Sampling Size

For this study, a multi-stage sampling technique was employed. In the first stage, Makarfi, Giwa and Kudan local government areas were purposively selected out of 23 LGAs that make up the state. This was because, they were the most prominent sugarcane producing areas in the state [9]. In the second stage, nine villages were purposively selected out of villages that were prominent in sugarcane production (three from each of the selected LGA). In the third stage, only 25% of the total number of sugarcane farmers in each of the nine villages was randomly selected for this study. This represented a sample size of 330 respondents.

2.3 Data Collection

The data for this study was collected from primary source only. The data was obtained using the interview method with well structured questionnaires administered among the respondents. The information collected from the respondents of sugarcane producers included: age, sex, number of years in farming, educational qualification, household size, number of extension contacts, farm size, inputs availability and prices, farming technique, output etc.

2.4 Model Specification

[15] described budgeting as the detailed quantitative statement of a farm plan and a forecast of its financial result. Olukosi and Erhabor (1988) defined a farm budget as a detailed physical and financial plan for the operation of the farm for a certain period of time. Farm budgeting was used in this study to determine the levels of costs, returns and net revenue that accrue to sugarcane production based on the inputs used. The budgeting tool that was used in the study is the Net Farm Income (NFI). It is measured as the difference between the Total Gross Margin (TGM) and the Total Fixed Cost (TFC). The Gross Margin by definition is the difference between the Gross Farm Income (GFI) and the Total Variable Cost (TVC); while the Gross Farm Income (GFI) also known as Total Value of Production (TVP), is the Total Physical Product (TPP) multiplied by unit market price of the product [11].

The Model is expressed as follows:

$$\begin{aligned} \text{NFI} &= \text{GM} - \text{TFC} \\ \text{GM} &= \text{GFI} - \text{TVC} \\ \text{GFI} &= \text{TVP} = \text{TPP} \cdot P_x \end{aligned} \quad (2a)$$

Where:

NFI = Net Farm Income (Naira/ha)
GM = Gross Margin (Naira/ha)
TFC = Total Fixed Cost (Naira/ha)
GFI = Gross Farm Income (Naira/ha)

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Where:

NFI = Net Farm Income (Naira/ha)
GM = Gross Margin (Naira/ha)
TFC = Total Fixed Cost (Naira/ha)
GFI = Gross Farm Income (Naira/ha)
TVC = Total Variable Cost (Naira/ha)

152 TVP = Total Value of Production (Naira/ha)
 153 TPP = Total Physical Product (Kg/ha) and
 154 P_x = Unit market price of the product (Naira/ha)
 155

156 3. RESULTS AND DISCUSSION

157 3.1 Profitability Analysis in Sugarcane Production

158 This is simply the difference between the total revenue and total costs of production. Thus, on
 159 average basis, the estimated total revenue in the study area was ₦171,510.95k per hectare. This was
 160 obtained by multiplying the average sugarcane output by the unit price. The average sugarcane
 161 output (20,589.55kg) was determined as total quantity of sugarcane output (6,794,550kg) divided by
 162 total number of sugarcane farmers (330) in the study area. The unit price was the price at which a
 163 kilogram of sugarcane output was sold. This was estimated as follows: on average basis a tie (*dami*)
 164 of sugarcane was sold at ₦250 and it contains 15 stalks; a stalk of sugarcane then cost ₦16.67k (i.e.
 165 250/15); a stalk weighs 2kg averagely, thus a kilogram of sugarcane was sold at ₦8.33 (i.e. 16.67/2).
 166 Total variable cost per hectare was ₦65,254.90k; this was the sum of cutting, fertilizer, labour and
 167 agrochemical costs. Averagely the cost of 100kg bag of cutting (*sett*) was ₦1000 (i.e. 1kg = 1000/100
 168 = ₦10), fertilizer was ₦5000 per 50kg bag (i.e. 1kg = 5000/50 = ₦100), labour was ₦700 per man-day
 169 (i.e. ₦500 payment for the 5 hours farm work carried out in the morning and ₦200 for 2 hours of the
 170 evening time) and agrochemical was ₦1000 per liter. The average quantity of sugarcane cutting,
 171 fertilizer, labour and agrochemical used per hectare in the study area were 3014.09kg, 161.04kg, 25
 172 man-day and 1.51liter respectively. Hence, these variable inputs costs were estimated to be
 173 ₦30,140.90 (10 x 3014.09) for cutting, ₦16,104 (100 x 161.04) for fertilizer, ₦17,500 (700 x 25) and
 174 ₦1,510 (1000 x 1.51), respectively. The total fixed cost was ₦28,220 per hectare; it comprises the
 175 land renting and depreciation cost of the farming tools. Averagely, a hectare of land for sugarcane
 176 production was rented at ₦25,720; a hoe costs ₦500 and spends 5 years averagely functional, thus
 177 its annual depreciation value is ₦100. About 25 number of hoes were used per hectare in the
 178 sugarcane production. Hence, the total depreciation cost of the farming tools was estimated to be
 179 ₦2500 (100 x 25). By subtracting total variable cost and total fixed cost (i.e. total costs) from the total
 180 revenue respectively, the net farm income of sugarcane farmers in the study area per hectare was
 181 realized to be ₦78,036.05k as presented in Table 3.1.

182
 183 The results also revealed that the average return on investment was ₦1.83k; meaning that for every
 184 ₦1 invested in sugarcane production in the study area, a profit of ₦1.83k was realized by the farmers.
 185 Hence, it is vivid to say that sugarcane production in the study area was profitable. Therefore, the null
 186 hypothesis of the study stating that, sugarcane production in the study area is not profitable was
 187 rejected while the alternative accepted.
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Table 3.1: Average Cost and Return Per Hectare for Sugarcane Production

A. Return:		Value (₦/ha)
i- Average Output (kg/ha)		20,589.55
ii- Average Price (₦/kg)		8.33
Total Revenue (TR) = (i*ii)		171,510.95
B. Cost:		
1. Variables Costs		
a- Cutting (kg)		30,140.90
b- Fertilizer (kg)		16,104.00
c- Labour (Man-day)		17,500.00
d- Agrochemicals (Litre)		1510.00
Total Variable Cost (TVC) = (a + b + c + d)		65,254.90
2. Fixed Costs		
e- Land Renting		25,720.00

f- Depreciation	2,500.00
Total Fixed Cost (TFC) = (e + f)	28,220.00
Total Costs (TC) = (TVC + TFC)	93,474.90
Gross Margin (GM) = (TR - TVC)	106,256.05
Net Farm Income (NFI) = (TR - TC)	78,036.05
Net Farm Income on ₦1 Invested = (TR/TC)	1.83

Source: Computed From Field Survey Data (2014)

3.2 Contribution of Sugarcane Farming to the Farmers' Annual Income

The farmers in the study area were found to have had other sources of farm income other than sugarcane farming, such as other crop(s) farming, animal rearing, poultry, etc. The average annual farm income of the sugarcane farmers was estimated to be ₦299,556.36k (98,853,600/330); the average income (profit) earned from sugarcane production by the farmers was estimated to be ₦58,556.36k (19,323,600/330). Hence, sugarcane production in the study area contributed averagely to about 19.55% (58,556.36/299,556.36 x 100) of the farmers' annual farm income. The maximum contribution made was 81.87% while minimum was 0.12%. These imply that none of the farmers solely depended on sugarcane farming as his only source of income; rather majority of them (i.e. about 80%) earned most of their income from other sources annually, as judged by the mean contribution. This was because sugarcane production takes longer period of between 10 and 12 months from planting to harvesting unlike other crops such as tomato, chili paper, cabbage, carrot, maize etc that take shorter period of between 3 and 6 months from planting to harvesting. Thus, they generate income annually more often than the sugarcane. About 13% (i.e.42) of the farmers incurred loss due to low demand for the crop in this production season while the remaining 87% realized profits at different levels.

It can be deduced from this finding that sugarcane production served as one of the sources of farm income of the farmers. In other words, the income of the sugarcane farmers has increased, thereby reducing poverty level among its producers.

4. CONCLUSION

It was found in this study that sugarcane production in the study area was profitable and that none of the farmers solely depended on sugarcane farming as his only source of income, rather majority of them (i.e. about 80%) earned most of their income from other sources annually.

5. RECOMMENDATIONS

An enabling environment should be created for sugar industries in the country by the stakeholders to boost demand for the crop. Both agricultural and micro-finance banks should financially support the small and medium scale sugarcane farmers. Low interest rate on loan should be charged and unnecessary stringent conditions removed.

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