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An economic investigation of sugarcane production, processing and marketing: A case study of Fulbaria Upazila at Mymensingh district

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Abstract

Fulbaria is an Upazila (with 402.41 km² land area) at Mymensingh District. Here agriculture is the main source of income. It is famous for sugarcane production and processing. Here many farmers produce sugarcane and process it to make red sugar, which is unique in Bangladesh. Sugarcane is an important crop worldwide due to its many nutritional and economic uses. The aim of our study is to examine the profitability of sugarcane cultivation in Fulbaria Upazila at Mymensingh District of Bangladesh. Main objectives of the study were to explore profitability of sugarcane cultivation in study area, production and processing of sugarcane, factors affecting sugarcane cultivation and constraints of sugarcane cultivation in this area. Data were randomly collected from 90 farmers. A well-structured questionnaire was used for collecting data. We have used both descriptive and functional analyses in this study. Per hectare cost of sugarcane cultivation in this area was Tk. 245970. Net return was Tk. 174030 in the study area. Average BCR was 1.70. So sugarcane cultivation is a significant farm business in our study area. Human labor, irrigation, insecticides cost, transportation, and seed cost were positively significant but fertilizer was negatively significant on gross return in the study area. But farmers face various problems like lack of capital, processing industry or factory or mill, storage of sugar, marketing, natural calamities etc. This study will try to analyse economic significance of sugarcane production and solutions for specific problems. And will provide recommendations for improving the condition of sugarcane production and processing by using modern technology.

Keywords: Agriculture, red sugar, cobb-douglas production function, cost of production, return, profitability, sugarcane cultivation

Introduction

Sugarcane (Akh) is one of the most important cash crops of Bangladesh. Because of available raw materials, it is grown in almost all areas in Bangladesh. In Bangladesh sugarcane is grown in about 0.38 million acres of land. Out of this cultivated area about 50% is located in the sugar mills zones and the remaining 50% is grown in the non-mills zones. The annual production of cane is about 5.5 million metric tons. Although sugarcane is produced in almost all the district of the country, the principal growing areas are Chittagong, Comilla, Sylhet, Bogra, Pubna, Kushtia, Rangpur, Dinajpur, Rajshahi, Faridpur, Barisal, Dhaka, and Mymensingh. There are 15 sugar mills in Bangladesh. These mills use about 60% of the cane produced, rest are supplied to the molasses producers. The by-products obtained from sugarcane include rum, alcohol, fuel, bagasse, livestock feed and from the stalk residue, paper and wallboard. Sugarcane growing is a profitable farm business. It can play a vital role for the development of the sugar industry as well as overall economy by increasing cash income of farmers.

Objectives of the study

The main objectives of the project are:

- To find out economic significance of sugarcane production in the study area.
- To analyse the product processing and marketing channel of sugarcane.
- To find out various problems faced by sugarcane farmers and provide solutions for the same.

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Specific objective

To find out profitability of sugarcane production by comparing returns and cost of production.

Justification of the Study

Fulbaria Upazila of Mymensingh District is unique in Bangladesh for producing red sugar from sugarcane. But this unique activity is not well recognised. So this study will try to focus this sector among mass people and will find out economic significance of this sector for the study area.

Literature review

- Mohona Hassan, M. Harun-Ar Rashid, Maimuna Begum and Md. Rashid Ahmed studied on “A comparative economic analysis of sugarcane cultivation with and without intercropping in selected areas of Pabna District in Bangladesh.” And they found that sugarcane cultivation is profitable but sugarcane cultivation under with intercropping farm is more profitable than without intercropping farm.
- Islam, M.S., Khatun, S., Kamruzzaman, M. Kaysar, M.J. and Islam S. studied on “ Economics of sugarcane cultivation in some selected char lands of Bangladesh” and they found that sugarcane cultivation shows the right path to the char farmers to uproot the poverty from char areas of Bangladesh.
- Md. Selim Reza, Mahmud Hossain Riazi and Dr. M. Moazzem Hossain Khan studied on “productivity and profitability of sugarcane production in Northern Bangladesh.” And they found that multiple cropping is more profitable than mono-cropping. Anwar Hossain and Naeen-ur-Rehman Kattak, studied on “Economic Analysis of sugarcane Crop in District Charsadda” and they found that in the study area, capital and labour employment, marketing, credit and financing and sources of income are related with sugarcane crop cultivation.
- Rana, M.S, Hossain, F. and Roy, S.S. studied on “Attaining sufficient yield of sugarcane in Bangladesh: An empirical approach” and they found that sugarcane production is profitable and a huge amount of money could be earned from this sector through the by-production of molasses, alcohol and chobra.
- Md. Shariful Islam and M. Obaidul Islam studied on productivity and economic efficiency of sugarcane cultivation under intercropping system with potato and mungbean. And they found that sugarcane cultivation intercropping with potato and mungbean brings higher net return and profit for farmers of Bangladesh.

Methodology

The study was carried out at Fulbaria Upazila of Mymensingh district in Bangladesh. Five villages namely, Bakta, Kaldaha, Enayetpur, Kushmail, and Radhakanai villages of Fulbaria Upazila were selected randomly for the study from the Upazila. A total of 90 farmers we have taken 43 small farms, 37 medium, and 10 large farms. These farms were selected following stratified random sampling technique. Based on cropping pattern, cultivation of sugarcane is divided into two seasons-Kharif and Rabi. The Kharif season covers from May to September and Rabi season covers from October to April. It is generally planted within October to December and harvested after 12-18 months of planting. For this study, 2020-21 was chosen as

plantation year. The study mainly based on primary data. The data were collected from the farmers through a face to face interview using a well-structured questionnaire. The required data were collected from July to September 2021. Here we have used both descriptive and statistical techniques to analyze the collected data. We have used SPSS programs and MS Excel to get a meaningful result in this study. To calculate the sum, average, and percentage of costs, gross return, net return and profitability of sugarcane we have used descriptive technique. Here we have used Cobb-douglas production function to determine the effects of the most important variables to the gross return of sugarcane.

Profitability analysis

Net return analysis technique was used to determine the Profitability of sugarcane cultivation in the study area.

Net return

We have calculated net return by deducting total cost from gross return. We have used the following equation to determine the net return of sugarcane cultivation:

$$\Pi = \Sigma Py.Qy + \Sigma Pb.Qb -\Sigma (Pxi \times Xi) -TFC \tag{1}$$

Where,

- Π = Net return
- Py = Price of main product per unit,
- Qy = Total quantity of main product,
- Pb = Price of by- product
- Qb = Quantity of by-product
- Pxi = Price of ith input per unit used for sugarcane production,
- Xi = Quantity of the ith input used for sugarcane production
- TFC = Total Fixed Cost
- Σ = Sum i= 1, 2, 3.....n (number of inputs)

Benefit cost ratio (BCR)

To calculate benefit cost ratio we have used following formula:

$$\text{Benefit-Cost Ratio} = \text{Gross Benefit} / \text{Gross Cost}$$

Cobb-Douglas production function

We have used the following Cobb-Douglas production function to determine the major factors influencing gross returns of sugarcane cultivation:

$$Y = a X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6} X_7^{b7} e^{U_i} \tag{2}$$

Cobb Douglas Production Function was further transformed into the following logarithm form:

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + U_i \tag{3}$$

Where,

- Y = Gross return from sugarcane production (Tk./ha)
- a = Constant or intercept value
- X₁ = Cost of human labour (Tk./ha)
- X₂ = Cost of seeds (Tk./ha)
- X₃ = Cost of fertilizers (Tk./ha)
- X₄ = Cost of irrigation (Tk./ha)
- X₅ = Cost of transportation

- X₆ = Cost of power tiller (Tk./ha)
- X₇ = Cost of insecticides (Tk./ha)
- U_i = Stochastic disturbance term
- ln = Natural logarithm
- b₁, b₂,.....b₇ = Coefficient of respective variables

Socio-economic Condition of Sugarcane cultivation of FulbariaUpazilla Based on Field Survey

In Fulbaria Upazilla farmers produce sugarcane, they process it and make red sugar. In 2018, farmers of this area cultivated sugarcane on 1,280 hectares and produced 7,082 tonnes of sugar. In 2019, they produced 6,746 tonnes of red sugar from sugarcane on 1,280 hectares. In 2020, they produced 6,746 tonnes of sugar from 1285 hectares. In 2021, farmers made 6,682 tonnes of red sugar from sugarcane planted in same area of land. Red sugar is made naturally without using any chemicals. As the process of making red sugar is traditional, only those who have traditionally involved in this profession make this sugar. There is some uniqueness to red sugar and so the demand for handmade red sugar is high. The production and popularity of this traditional sector is increasing day by day. It's a profitable farm business for the people of this area. So, maximum farmers of this area are related with sugarcane production.

Process to make red sugar

Red sugar is made naturally without using any chemicals. The production cost of handmade red sugar is low and most farmers here work with their family members, so there is no need to hire workers from outside. To press and process the sugarcane jointly farmers choose an empty piece of fallow land. To squeeze out the sugarcane juice they use a land crusher or "Ghani" pulled by buffaloes or cows. Then it will be taken to "jalaghor" to boil the juice. After boiling the juice 20-25 minutes, the juice will be thickening. Then the farmers briskly stir the juice with a wooden spoon and it eventually turns into red sugar. Then they sell it to the market.

Present Scenario of Sugarcane cultivation in Fulbaria Upazilla

Farmers of Fulbaria Upazilla sold around TK 54 crore worth of sugar this year. According to the local agriculture office, 5.2 tonnes of sugar was produced this year per hectare. The scenario of sugarcane production in our study area for nearest years is shown by following table.

Table 1: Scenario of sugarcane cultivation in recent years

Years of production	Amount of land cultivation (in hectares)	Amount of production (in tonnes)
2016	1250	6839
2017	1255	6390
2018	1280	7082
2019	1280	6746
2020	1285	6746
2021	1285	6682

Age distribution of the sugarcane farmers

Income generating activity depends on age of people. Young age people are more energetic, middle age and old age people are more experienced. Here we have classified sample farmers into four age groups. These are 21 to 30 years, 31 to 40 years, 41 to 50 years and 51 to above.

Table 2: Distribution of Sample farmers according to Age groups

Age Groups	No. of respondents	Percentage
21-30	24	26.66
31-40	30	33.33
41-50	26	28.88
51-above	10	11.11
Total	90	100

Source: Field survey 2021.

Age of the respondents is an important factor for any economic purposes. The selected sugarcane farm owners under with and without intercrops farm management were classified into four categories according to their age. These are 18 to 30 years, 31 to 40 years, 41 to 50 years and 51 years and above. The age group 31 to 40 years was the largest among all age groups. About 33.33% farm owners belong to this age group. This age group is energetic as well as experienced. So productivity and profitability of this group is high.

Firm size and employment generation

In Fulbaria Upazilla from various sugarcane farmers we have taken 90 farms as sample. From which 43 farms (01-20 khata) are small farms, 37 farms (21-40 khata) are medium, and 10 farms (41-above) are large farms. Among these farms total 440 labors are employed. So it is a large source of employment generation.

Table 3: Firm size and employment generation

Particulars	No. of farms	Percentage	No. of labour	percentage
Small (1-20) khata	43	47.77	150	34.09
Medium (21-40) khata	37	41.11	170	38.63
Large(41-above) khata	10	11.11	120	27.27
Total	90	100	440	100

Source: Field survey 2021.

Education level of respondents

In our study area illiteracy rate is high 23%. The education level of respondents is as follows-

Table 4: Education level of respondents

Level of education	No. of respondents	Percentage
Illiterate	23	25.55
Primary	26	28.88
SSC	22	24.44
HSC	12	13.33
Graduate	7	7.77

Source: Field survey 2021.

Education is the backbone of nation. It helps to increase technological knowledge. Ability of an individual age above 6 years to read or write or formal education received up to a certain standard called Education. Education helps individuals to become conscious in all matters of life. Farmers' education plays an important role in increasing the production of farming output. Education also helps farmers to adopt modern technology, and it makes them more capable to manage scarce resources efficiently. AS consequences, they can earn a higher profit. From the education point of view, all the members are the sample farms are divided into 5 categories. These are illiterate, primary, S.S.C, H.S.C and Graduate. IN our study area most of the farmers have passed only primary level of education

(28.88%). Few farmers have passed SSC and HSC Very few farmers are graduates. Our study shows that profit margin is high in the farm of educated farmers.

Occupational status of respondents

Agriculture was the main source of employment for the people of the study area. Sugarcane farmers of our study area are involved in various types of activities such as agriculture, business, service and others. Agriculture is the main source of employment for the people of the study area. Following table shows the occupational status of sugarcane farmers.

Table 5: Occupational Status of the farmers

Occupation	No. of farmers	Percentage
Agriculture	50	55.55
Business	25	27.77
Service	19	21.11
Others	6	6.66
Total	90	100

Source: Field survey 2021.

Source of financing of respondents

Financing is important to do business. In this survey total 90 farmers were taken. They do finance from four categories such as-personal saving, friends and relatives, bank loan, NGO. Most of them collect finance from personal saving. That's why, they can't make large farm. Maximum farmers have not proper knowledge about bank loan and NGO facilities. By gathering knowledge about financing facilities, sugarcane farm can make it more profitable.

Table 6: Source of financing

Sources of finance	Number	Percentage
Personal saving	32	35.55
Friends, Relatives	30	33.33
Bank Loan	20	22.22
NGO	18	20

Source: Field survey 2021.

Farming experience of respondents

Farm experience is a crucial factor to ensure farm productivity. In the study area it was found that average experience of sugarcane farmers of study area to produce sugarcane were 5-10 years per persons per farm.

Table 7: Farming experience of respondents

Experience	No. of respondents	Percentage
Below 5 years	44	48.88
5-10 Years	26	28.88
11-15 Years	10	11.11
16 Years and above	0	0

Source: Field survey 2021

Sources of seeds, fertilizer, irrigation and system of land cultivation:

In this area maximum farmer use hybrid seeds and some of them use seeds produced in their firms. Here farmers use both organic and chemical fertilizers. For irrigation they use deep tube well and sallow machine. Some farmers use plough for cultivation and maximum use power tiller. That is they using modern technologies for producing sugarcane.

Cost and Profitability analysis of Sugarcane Cultivation

Profitability of a farm depends on investment or cost of production. If all inputs are used properly, production as well as return or profit rises. There is a positive relationship between cost of input and output or production. Here cost of production involves seed cost, cost of human labour, power tiller, irrigation, fertilizer, insecticides, interest on operating capital, land use cost, machine cost etc. Here there are two types of cost like variable cost and fixed cost. Fixed cost involves cost of machine and tools, interest on operating capital, land use cost, etc. And variable cost involves seed cost, fertilizer cost, irrigation cost, labour cost, and cost of other variable inputs. It was easy to estimate the costs of these items on the basis of the market rate. But no cash was paid for the home supplied inputs such as family labour, farm supplied animal labour, manures etc. These input items were valued at the prevailing market rates and sometimes government rates in the areas during the survey period or at the prices at which farmers bought. The output also valued at the farm gate price rate. On the other hand, return of sugarcane was measured based on gross return, net return and benefit-cost ratio.

Cost of human labor

The human labour is a major accelerator of sugarcane production. There are two types of human labours such as: hired and family labour. Both hired, and family labourers' were employed in producing sugarcane. Family labour included the farmer himself. The variable cost involves the cost of hired labour. It was 500 taka per day. Human labour was required for different operations like land preparation, transplantation, weeding, fertilizer and manure application, insecticides application, harvesting, cleaning, etc. The total labour cost per hectare was estimated at Tk. 54250 (hired + family labour). So labour cost is a crucial factor for influencing production.

Cost of seeds

Sugarcane is different kinds of plant. Here stem cuttings or section of the stalks is called seed pieces. Cost of seeds depends upon the quality. Here most of the farmer collects seeds from their own farm. Very few farmers buy seeds from various seed producing institution or from other farmers. In our study area seed cost for per hectare land is 75000 taka. Soit's a major cost of a sugarcane farm.

Cost of fertilizers

Sugarcane farms or sugarcane growers use all types of fertilizers (chemical and organic) available such as urea, TSP, MOP, gypsum and cow dung. Cost of fertilizer is 17260 taka per hectare in our study area.

Cost of insecticides

Various kinds of insects damage sugarcane. So farmers in our study area use insecticide to protect their crops from pest attack. In our study area per hectare insecticide cost was 3000 taka.

Cost of irrigation

Irrigation water was very essential for sugarcane cultivation. It's a long period crop. So in dry session watering become essential. Farmers use sallow machine, deep tube well for irrigation. The cost of irrigation water was Tk. 12790, which was 5.19 percent of the total cost.

Cost of power tiller

Land preparation is pre-condition for land cultivation. Proper land cultivation helps to increase productivity. Here per hectare cost of power tiller for land preparation was estimated at Tk. 10000, which shared 4.06 percent of total costs.

Land use cost

Land is the gift of nature. But productivity of land depends on fertility level. So land use cost depends on area to area upon the soil type, topography, location and security of the particular crop field. Land use cost may be calculated using one of the following concepts: a) Interest on the value of land; b) Valuation of land at its cash lease price per year; and c) Forgoing income from alternative use. Therefore, it

was used in this study. The average lease values of land per year were estimated at Tk. 40000 per hectare. It is 16.26 percent of total cost.

Total Cost

Total cost in economics is the sum of all costs incurred by a firm in producing a certain level of output. It is typically expressed as the combination of all fixed costs and all variable costs. In common usage, total cost is the monetary value of all goods and services that producers and consumers purchase. The formula to calculate total cost is the following: $TC \text{ (total cost)} = TFC \text{ (total fixed cost)} + TVC \text{ (total variable cost)}$. Here total cost amounted TK 245970 for per hectare land.

Table 8: Per hectare Production Cost and returns of Sugarcane cultivation

Items	Unit	Average unit price	Total cost(TK/ha)	Percentage of total cost
A) Variable cost	TK		1,75,970	
Human labour Cost	Per day	450	54,250	22.05
Cost of seed	Per khata	500	75,000	30.49
Cost for fertilizer	Per season	--	17,260	7.01
Cost for irrigation	Per hour	200	12,790	5.19
Transportation cost	Per season	---	3,670	1.49
Cost of power tiller	Per hour	250	10,000	4.06
Cost of Insecticides	Per season	--	3,000	1.21
B) Fixed Cost			70,000	
Land use Cost	Per season	--	55,000	22.36
Machine and tool cost	Per season	--	15000	6.09
Total Cost) (A+B)			2,45,970	100

Source: Field survey 2021.

Based on this table cost items can be presented by following pie chart-

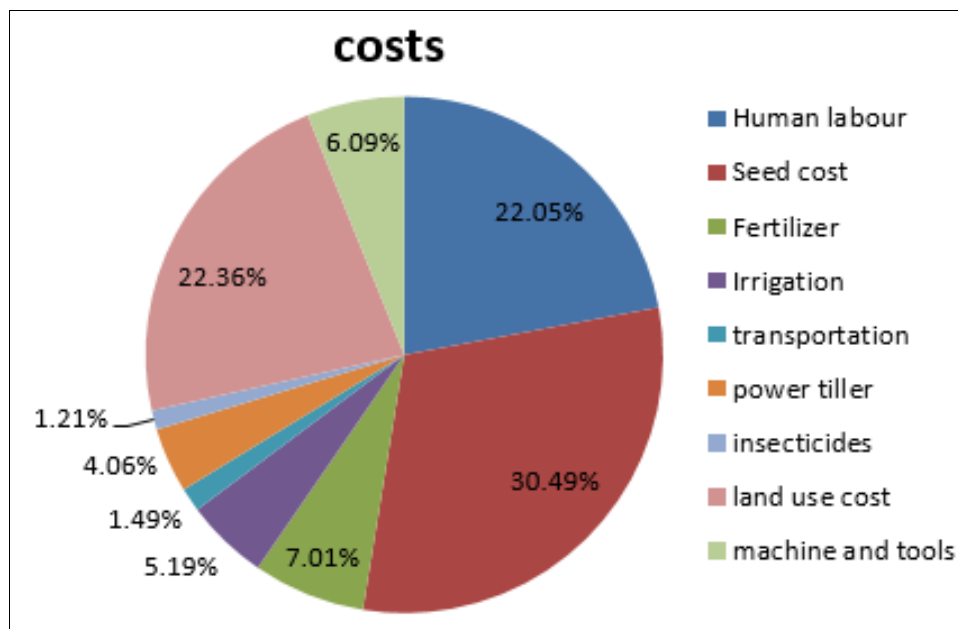


Fig 1: Cost of sugarcane cultivation (variable and fixed)

Gross Return

Gross return per hectare was calculated by multiplying the total amount of product and by product by average farm gate price. That is, gross return is the summation of return from main products and by products. The gross rate of return is the total rate of return on an investment before the deduction of any fees, commissions, or expenses. IT is also known as the nominal return or nominal interest. Gross

return for per hectare land was 420,000TK. IT was divided into two forms i.e. price of sugarcane and price of by-product. Price of sugarcane was 33000 and price of by-product was 90000.

Net Return

Net return is a very useful term to analyze and compare performance of enterprise. It is calculated by subtracting

total cost from total return. A net rate of return is the investment's return after costs, such as taxes, inflation, and other fees. It is the real return or effective interest. Net

return is calculated by subtracting the gross cost from a gross return. In our study area average net return per hectare was TK. 174030.

Table 9: Total cost, total return and benefit cost ratio of the farm.

Items	Unit	Average total cost and return
A) Gross cost	Per season	2,45,970
B) Gross return	Per season	4,20,000
Sale of sugarcane	Per season	330000
Sale of by product	Per season	90000
C) Net return (B-A)		1,74,030
D) Benefit cost ratio		1.70

Source: Field survey 2021.

From the information of this table a bar diagram can be drawn as follows:

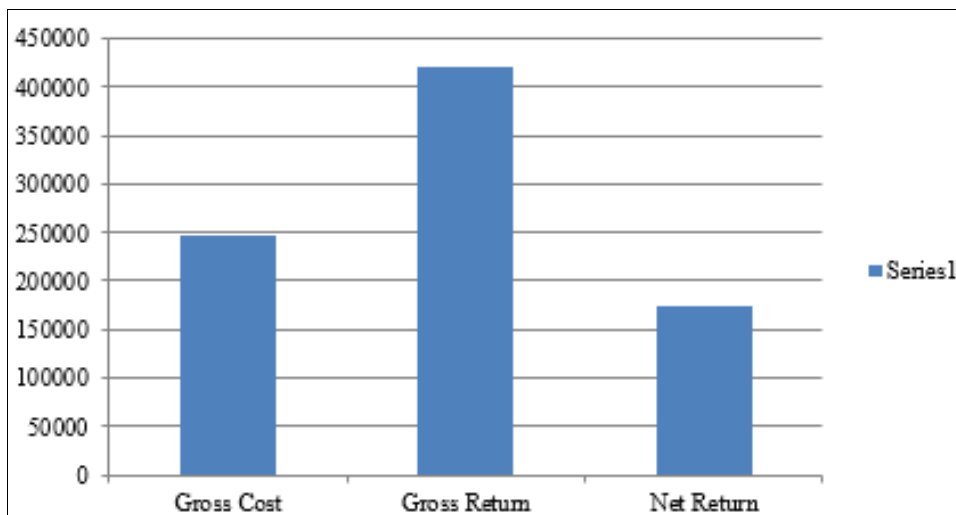


Fig 2: Gross return, Gross cost and Net return per sugarcane firm.

Benefit Cost ratio

A benefit cost ratio is an indicator which is used in cost benefit analysis. It attempts to summarize the overall value for money of a project or proposal. That means, it compares the present value of all benefits with that of the cost and investments of a project.

The formula of benefit cost ratio = Gross Return/Total Cost
Value range of Benefit Cost ratio: Generic interpretation

BCR > 1 = Investment option is profitable

BCR=1=Investment is neither Profitable nor Loss.

BCR< 1 =Investments options generates losses.

By calculating the BCR we get, 1.70. That means, investment for Sugarcane is much more profitable.

Factors affecting Sugarcane production

Sugarcane production is a complex process. It can be measured as a function of several variables. In the analysis we have used seven independent variables namely human labour cost, cost for fertilizer, watering cost, Transportation cost, Cost of seed, Cost of insecticides and others cost which have great impact on production.

Functional Relationship

Functional Relationship refers to the effect of an independent variable on a dependent variable. If changes in the independent variable result in changes in dependent variable, then there is a functional relation between the two variables. In this analysis we represent the estimated coefficient and related statistics of Cobb-Douglas

production function for sugarcane Production.

$$\ln Y = 4.640 + 0.340 \ln X_1 + 0.085 \ln X_2 - 0.003 X_3 + 0.038 X_4 + 0.258 X_5 + 0.037 X_6 + 0.008 X_7$$

Interpretation of Input Co-efficient

- **Human Labour Cost (X₁):** The regression co-efficient of human labour cost was positive and significant at 0.340. One percent increase in human labour cost would increase gross return by 0.340 per cent.
- **Cost of seed (X₂):** The co-efficient for seed cost was 0.085. a one percent increase in seed cost would increase gross return by 0.085 percent.
- **Cost of fertilizer (X₃):** The co-efficient for fertilizer cost was -0.003. Thus the relationship between fertilizer cost and gross return is negative. That means if fertilizer cost rises then productivity reduces. Over impose of fertilizer reduces fertilizer as well as productivity.
- **Cost for irrigation (X₄):** The regression coefficient of irrigation cost was positive. The value of coefficient indicates that keeping all other factors constant, 1 per cent increase in irrigation cost would increase gross return by 0.038 per cent.
- **Transportation cost (X₅):** The coefficient of transportation cost 0.258. Which was positive and statistically significant and also it indicates that transportation cost had significant impact on gross return.
- **Cost of power tiller (X₆):** The coefficient of power

tiller costs was positive and significant which is 0.037. It indicates that holding other factors constant, 1 per cent increase in power tiller cost would increase the gross return by 0.037 percent.

- **Insecticides cost (X7):** The coefficient of insecticides cost was 0.008, which was positive and statistically significant and also it indicates that insecticides cost had significant impact on gross return.

Value of R²

The coefficients of determination, R² of the model were

0.70. It indicates that explanatory variables can explain the variations of gross return of the farms by 70 percent in the model.

F-value

The F-values of the equation derived for the farms were 12.36 which were significant. It indicates that, at 1 per cent level implying that all the explanatory variables were important for explaining the variations in gross returns for the farms.

Table 10: Effects of independent variable on dependent variable

Explanatory Variables	Estimated co-efficient	Standard errors	t- values	95.0% confidence interval for B	
				Lower bound	Upper bound
(constant)	4.640	.634	7.321	3.379	5.900
Human labour cost (lnX ₁)	.340	.055	6.206	.231	.448
Seed cost (lnX ₂)	.085	.053	1.612	-.020	.191
Fertilizer cost (lnX ₃)	-.003	.052	-.064	-.108	.101
Irrigation cost (lnX ₄)	.038	.050	.765	-.061	.138
Transportation cost (lnX ₅)	.258	.053	4.899	.153	.362
Power tiller cost (lnX ₆)	.037	.052	.721	-.065	.140
Insecticides cost (X ₇)	.008	.077	.105	-.145	.161
R ²	.700				
Adjusted R ²	.662				
F value	12.36				

Source: Field survey 2021.

Constraints of Sugarcane Cultivation

Sugarcane farmers of the study area faced various problems. The basic problems confronting the cane growers are to meet up the high cost of cultivation. Marketing and financial problems are becoming very acute. But these problems vary from famer to farmer. The constraints of sugarcane cultivation are categorized into three types: Economic constraints, Technical constraints and Marketing constraints.

1. Economic Problems: Economic problems and constraints refer the problems of financial difficulties. Lending from money lender, lack of capital, high input price are the economic problems. Most of the farmers of sugarcane production face difficulties of lacking of capital.

- **Lending from money lender:** Informal suppliers i.e. money lenders, friends and relatives provide most of the credit. But it is a matter of great sorrow that farmers have to bear excess amount of interest for lending from money lenders. In our study area 37.77% face the problem of money lending from rural money lenders.
- **Lack of Capital:** The inability funding will inhibit yours to get business’s ability to purchase assets and resources. It can kill a business.55.55% respondents have faced problems of lacking capital.
- **High input price:** There has a great impact of input price on productivity and profitability of sugarcane production. Higher input price refers the lower profitability. In this analysis, 52.22% farmers have faced the problems of high input price.

2. Technical Constraints: Technical constraints are major concern for Sugarcane production. It is related to production techniques and technology. Most of the farmers face the problems of training facility, scarcity of labour.

- **Lack of clean seed:** About 36% farmers reported that they did not get good quality of seeds. But good quality

seed is so much important for any type of production.

- **Infestation of disease and pests:** It may cause damage to the growing point in young plants. 27.77% farmers reported that their farms face the problems of disease and pests. To prevent disease, insecticides and fertilizers are very essential input for sugarcane production.
- **Lack of irrigation facility:** Irrigation problem is the major concern for sugarcane production. Irrigation is the most essential for any type of agricultural production. 43.33% respondent’s havefaced the problem of irrigation facility which is the biggest amount. Because without irrigation we cannot produce any type agricultural production.
- **Lack of training facility:** There have negative effects of lack of adequate training facilities on the production of sugarcane. When there are no training, do not understand how to do their jobs and none of these goals are possible. 86.66% that means maximum amount of farmers did not get training facility.
- **Scarcity of labor:** Scarcity of labor refers labor insufficiency or inadequate labor. At the time of harvest lot of manual work is done. Thus a lot of labor is required for sugarcane cultivation. But 62.22% respondents face the labor scarcity at the harvesting period. It hampers productivity of sugarcane farms.
- **Lack of credit facility:** A credit facility is a type of loan made in a business or corporate finance. Lack of access to credit facilities has been highlighted a key constraint to farmers investment. In this analysis we have get influential farmers get credit facilities easily while small and poor farmers have no access to these facilities in the country. 36.66% farmers did not get credit facilities.

3. Marketing Constraints: The major constraints in this

category were marketing constraints. In this category farmers have faced low price of sugarcane, lack of transport facility, lack of communication facility, interference of the tenure.

- **Low price of sugarcane:** Farmers are get minimum support price compared to the cost of production. 71.11% respondents have faced the problems of low price of sugarcane.
- **Lack of transport facility:** Transportation facility is an important factor for improvement of any type of industry. Lack of transportation facility hampers production and marketing. 30% farmers did not get the transportation facility.
- **Lack of communication facility:** Lack of communication facility is another problem for sugarcane production. Easy communication facilitates production.
- **Interference of tenure:** Interference of tenure lessens the price of sugarcane. For the effects of interference of tenure farmers did not get reasonable price. 55.55% respondents have faced the problems of interference of tenure.

Table 11: Problems faced by Sugarcane Cultivation

Constraints	No of respondents	Percentage
1) Economic Constraints		
Lending from money lender	34	37.77
Lack of capital	50	55.55
High input price	47	52.22
2) Technical Constraints		
Lack of clean seed	32	35.55
Attack of disease and pests	25	27.77
Lack of irrigation facility	39	43.33
Lack of training facility	78	86.66
Scarcity of labour	56	62.22
Lack of credit facility	33	36.66
3) Marketing constraints		
Low price of sugarcane	64	71.11
Lack of transport facility	27	30
Lack of communication facility	49	54.44
Interference of tenure	55	61.11

Source: Field Survey 2021

Findings and result discussion

From our study area we have found that in case of percentage production profitability is higher for sugarcane production. Again in case of BCR it is high for sugarcane production. In this model all R^2 , adjusted R^2 , t-value F-value are significant. That is, a sugarcane farm is efficient farm production. As Fulbaria Upazila is a model of Bangladesh, we can say that, the climate of Bangladesh is suitable for sugarcane cultivation. So, in case of Bangladesh sugarcane cultivation is very profitable farm business.

Summary and Recommendation

Sugarcane cultivation is a profitable farm business. It helps the farmers to reduce the poverty. Sugarcane farmers are now financially strong and there living standard are rising day by day. Cost and benefit ratio shows that sugarcane is now one of the leading cash crops in the study area. But farmers of this area also face various problems. Among these, insect pests make considerable losses. Necessary steps should be taken to control insects and pests in study area. People are working round the year in sugarcane field

and they are earning handsome amount of money every month in our study area. Disease free clean seed and modern production technology should be provided in this area. Proper management practice will help sugarcane farmer to earn more profit. Following activities should be done for the improvement of sugarcane cultivation:

- Bangladesh Sugarcane Research Institute should provide high yielding sugarcane seeds.
- Disease free clean seed should be provided among the sugarcane farmers so that production of sugarcane increases in the study area.
- Government and higher authority should help farmers to establish sugar processing and preservation house.
- Authority should take necessary steps to establish sugar milling the study area so that farmers can easily supply their sugarcane to the mill authority.
- Price of sugarcane is very low. Price of sugarcane should be increased to enhance the interest of the farmers toward sugarcane cultivation.
- Authority should provide credit facility to the farmer in study area. Credit system of our country is very poor. It should be developed.
- To reduce irrigation problem of farmer's deep tube-well and shallow machine should be easily available. Because it will increase profitability of sugarcane cultivation.
- Government should take necessary steps to provide training on modern sugarcane production technology. Because training increases efficiency, effectiveness and knowledge among farmers.
- For protecting sugarcane from the attack of insects and pests should develop integrated pest management system.
- For better marketing system transportation and communication system should be developed.
- For smooth progress of sugarcane cultivation political disorder and corruption should be reduced.
- Government should provide subsidy to the sugarcane growers so that profitability rises and other farmers become interested to cultivate sugarcane.
- Awareness among sugarcane farmers should be developed to minimize various problems.

Conclusion

Sugarcane cultivation is profitable farm business in the study area. Here benefit cost ratio is high 1.70. So producing sugarcane can increase the living standard of general people. The different cost variables have a significant impact on sugarcane production. And R^2 value is also significant which indicates viability of this sector in the study area. But the farmers face various problems in producing the sugarcane. If this problems can be solved the volume of sugarcane production will increase significantly. And it can play a crucial role in the national economy of Bangladesh. So it is necessary to take essential action by government or higher authority to reduce problems and take other steps for the development of sugarcane farming in the study area.

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