FINANCIAL PROFITABILITY AND RESOURCE USE EFFICIENCY OF JUTE CULTIVATION IN MADARIPUR DISTRICT OF BANGLADESH

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CERTIFICATE

This is to certify that the thesis entitled **'FINANCIAL PROFITABILITY AND RESOURCE USE EFFICIENCY OF JUTE CULTIVATION IN MADARIPUR DISTRICT OF BANGLADESH'** submitted to the Department of Agricultural Economics, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science (MS) in Agricultural Economics** embodies the result of a piece of *bona-fide* research work carried out by **JANNATUL FERDOUS, Registration No. 14-06280** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information, received during the course of this investigation has been duly acknowledged.

Dated: June, 2021
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DEDICATED

TO MY

BELOVED PARENTS

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ABBREVIATIONS AND ACRONYMS

BBS	**: Bangladesh Bureau of Statistics**
BDT	**: Bangladeshi Taka**
TVC	**: Total Variable Cost**
NGO	**: Non-Government Organization**
PI	**: Problem Index**
BCR	**: Benefit Cost Ratio**
GOB	**: Government of Bangladesh**
MP	**: Muriate of Potash**
SAAOs	**: Sub-Assistant Agricultural Officers**
Ha	**: Hectare**
Kg	**: Kilogram**
Sq km	**: Square Kilometers**
Tk.	**: Taka**
DAE	**: Department Agricultural Extension**
et al	**: and others (at elli)**
GR	**: Gross Return**

Abstract

The present study was conducted to estimate financial profitability & resource use efficiency of Jute production in Madaripur district of Bangladesh. Two villages of Madaripur district under Madaripur sadar upazila were purposively selected for the present study. A total of 80 samples were collected for this study. The study is mainly based on primary data which were collected by the researcher herself through direct interviewing the sample farmers. Cobb-Douglas production function was used to satisfy the objectives. For calculating resource use efficiency, seven factors like cost on human labor, cost of seed, cost of urea, cost of TSP, cost of MP, cost of pesticides and cost of irrigation were considered. The jute producers had the opportunity to increase their productivity as well as profitability by proper utilization of these resources. In this study, Per hector variable cost and total cost of jute production were Tk. 50380 and Tk. 70380 respectively. The average gross return and net return were Tk. 128500 Tk. and 58120 per hactor respectively. Undiscounted BCR was 1.82 which implies that Tk. 1.82 would be earned by investing Tk. 1.00 for jute production. Gross margin was found 2.55. So, the Jute farming was found to be profitable for farmers. Returns to scale is 1.1 which means that the production functions exhibit increasing returns to scale. An increasing amount of investment in this production would further increase the returns from the farm. The study revealed that Human labor cost, irrigation and pesticide cost has significant impact on Jute production. Jute production delivers higher returns to farmers, as evidenced by the findings of this study. Farmers in the survey stated that improved yield and income encouraged them to continue producing jute. The study also identified some of the problems of Jute at different stages of Jute production. Institutional supports from Government and Non-government organizations for credit, input and technology may be helpful to increase jute production as well as income of jute farmers. Finally, on the basis of findings some recommendations were made for the development of jute sector in Bangladesh.

CHAPTER I
INTRODUCTION

1.1 Background of the Study

Jute is one of Bangladesh's main cash crops. Bangladesh is an agro-based country with a population of 164.7 million (BER, 2020) encompassing an area of 147,570 square km. (BBS, 2020). With the increase in population at 1.37% (BER, 2020), agricultural land is decreasing at alarming rate. Agriculture remains the most important sector of Bangladesh economy contributing 13.16% to the GDP (BER, 2020). The three main dominated crops in Bangladesh are rice, jute, and tea (BJSA, 2019-2020). Rice is grown almost entirely for domestic consumption, while jute and tea are the main export earners (BJSA, 2019-2020). In addition to these products, farmers also produce sugarcane, tobacco, cotton, and various fruits and vegetables. Although jute is grown in almost all the districts of Bangladesh, **Faridpur, Madaripur, Jessore, Dhaka, Sirajganj, and Jamalpur** are considered the better growing areas (EPB, 2020).

The contribution of the jute sector to the economy of Bangladesh is enormous. In Bangladesh, Jute is a vital sector from economical, agricultural, industrial, and commercial perspectives. Different kinds of jute products are made in Bangladesh and the products are environmentally friendly as well. Every year Bangladesh earns an amount of foreign currency by exporting jute and jute products in different countries all over the world. That contributes to the national income of Bangladesh. Jute was once called Bangladesh's ‘Golden Fiber’. But this industry's present and future prosperity and growth are vulnerable. There are numerous issues in Bangladesh's jute industry, including a lack of scientific knowledge and modern tools, market tools, unavailability of quality seeds, low productivity, incorrect market forecasting, land fragmentation, natural calamities, conflicts, and global economic crisis, among others. Bangladesh's most important fiber crop is jute (Kabir, 2018). Bangladesh came in second place in terms of fiber production among the world's jute-growing countries.

1.2 Importance of Jute in the Economy of Bangladesh

Bangladesh used to have a monopoly on the manufacturing and sale of jute and jute products on the international market. Bangladesh is currently the world's second-largest jute producer, after India (BBS, 2020). Due to its good temperature and soil conditions, Bangladesh produces the highest quality jute. The country produces 1.18 million bales of raw jute in 1.235 million acres of land per year which is a great share of world production (BJSA, 2019-2020). Out of these, 0.46 million bales are exported which is about Tk. 9740 million and 0.68 million bales are used by the jute mills. The remaining part is used for domestic use and carryover. About 0.583 million tones of jute goods are produced annually in the country out of which 0.020 million tones is used internally and 0.494 million tone of jute goods are exported and the export earnings from jute goods is about Tk. 23,340 million. Bangladesh approximately earns foreign currency worth about Tk. 33.080 million from exporting raw jute and jute goods every year. Jute industry is the second largest industrial employer in the country and about 10% of the total labor force is engaged in this sector (BER, 2020).

1.3 Production situation of Jute in the world

Bangladesh is one of the world's largest jute producers. Jute was used to weave coarse packaging materials, farmer market bags, grocery bags, shopping bags, floor mats, ropes, and twines in Bangladesh. Since age, jute fabric is perfect for use as bags or sacks for packing since it is one of the strongest and most durable fabrics available.

There are few countries which produce jute. It is evident from the Table 1.1 that India scores the highest position in production of jute which is about 1968,000 MT. Bangladesh is in the second position which is about 1452044 MT (FAO, 2018).

Table 1.1 Jute Production in top jute producing countries in the world

Country	Production (in metric tons) per year
India	1968000
Bangladesh	1452044
China	45500
Uzbekistan	20000
Nepal	18000
Myanmar	17000
Thailand	12000
Vietnam	12000
Sudan	3350
Egypt	2508

Source: FAO Stat Database

1.4 Properties of Jute

Jute is a natural fiber that is 100 percent biodegradable, recyclable, and hence environmentally friendly. It is a coarse fiber. It has a golden and silky sheen. After cotton, it is the second most significant and widely farmed vegetable fiber (Kabir, 2018). It has a high tensile strength combined with a low extensibility, which aids in the production of high-quality industrial yarn and fabric for packaging. It is attacked and damaged by the action of micro-biological agents like bacteria, fungus, moths, insects etc. in worm damp condition. Yellowing of the fiber is observed due to the effect of sunlight. Better quality fibers have fairly high luster but inferior quality fibers are used for matt and pitted surface with very poor strength. Jute is a versatile natural fiber that has been utilized in packaging, textiles, non-textiles, and agriculture as a raw material. Jute stem has very high volume of cellulose that can procured within 4-6 months, and hence it also can save the forest and meet wood requirement.

1.5 Usage of Jute

Jute is the second most important vegetable fiber next to cotton (Sinha, 2018). Jute is used chiefly to make cloth for wrapping bales of raw cotton, and to make sacks and coarse cloth. The fibers are also woven into curtains, chair coverings, carpets, area rugs, hessian cloth, and backing for linoleum. While jute is being replaced by synthetic materials in many of these uses, some uses take advantage of jute's biodegradable nature, where synthetics would be unsuitable. Examples of such uses include containers for planting young trees, which can be planted directly with the container without disturbing the roots, and land restoration where jute cloth prevents erosion occurring while natural vegetation becomes established.

1.6 Different Applications of Jute Products:

1.6.1 Jute Fabrics

Jute is a natural, long and soft vegetable fiber with golden silky shine, also termed as " The Golden Fiber ". It can be spun into coarse and strong threads. This fabric is also known as hessian and burlap. The very fine threads of jute can be separated out and made into an imitation silk. The jute fabric is much soughed item for fashionable clothes, home furnishing and fashion accessories. Jute fabric is most commonly used in the production of carpets, linoleum, cordage, and twines. It's sometimes utilized as webbing to cover the vehicle seat's inner springs. Occasionally used as a fashion embellishment for fashion clothing, tapestries, soft baggage, and other similar items.

1.6.2 Jute Furniture

Besides piece of furniture made from other popular wood types, Jute furniture is also favored by consumers all around the world. The furniture made from Jute doesn't only look good, but can also enhance the area of your living room or drawing room. Jute made furniture has a number of striking features. As a result, it's an excellent choice for constructing long-lasting and durable furniture. Jute furniture is natural, enticing, and quite attractive, and it can be found in a variety of forms and styles all over the world. Today, there are many renowned manufacturers, suppliers and exporters of Jute furniture across the globe. Also, nowadays, there are various

Marketing Agents and wholesale & retail stores from where various exclusive range of Jute furniture can be easily availed by the customers.

Today most of the wholesale suppliers, manufacturers and exporters of jute made furniture provide a complete range of Jute furniture, which covers:

1. Jute Chairs, Stools & Tables
2. Jute Lounge Chairs
3. Jute Beds
4. Jute Sofa Sets
5. Jute chair & table
6. Jute Office Furniture
7. Jute Hotel Furniture
8. Jute Room Divider
9. Jute Cafeteria Chairs & Tables
10. Jute Mattress
11. Portable Jute Bed
12. Jute Hammocks & Hanging Chairs
13. Jute Shoe Rack
14. Jute Multipurpose Racks, and so on…

On top of all that, such furniture can also stay longer without any heavy maintenance or cleaning. Even without any added chemical substance, Jute has the quality to be very immune against water damage and, unlike other materials; there is no point forming into any sort of rust. It is very easy to clean and will rarely need any additional care in order to keep it safe. While this makes Jute furniture perfect for outdoor surroundings such as your backyard or terrace, it also gives a beautiful touch to any area you are looking to beautify within your home or cottage. Jute furniture is less expensive, more appealing to the eye, more durable, and more adaptable to new ideas. Jute furniture is typically affordable to persons in the medium and lower income brackets. As a result, demand for such furniture is rapidly rising on the global market.

1.6.3 Jute Clothes

Jute cloth made by 100% jute fiber, laminated jute cloth, jute hessian fabric, rough jute products, hessian cloth, sackcloth, for pack. Anji Qingyun jute cloth made by 100% jute fiber, 100% jute natural products, laminated jute cloth, laminated jute fabric. Jute cloth has becoming increasingly fashionable in recent years. Fabrics can also be dyed, colored, printed, embroidered, bleached, printed, soft and so on...

1.6.4 Other Uses

Diversified byproducts from jute can be used in cosmetics, medicine, paints, and other products.

1.7 Objectives of the study:

a) To study the socio-demographic profile of jute producer;
b) To assess the profitability of jute production in the study area;
c) To estimate the resource use efficiency of jute production in the study area;
d) To identify the constraints faced by jute producers and to recommend some suggestions.

1.8 Justification of the Study

The jute sector is vital for the economy and poor rural communities in Bangladesh. It provides direct employment to huge number of people in Bangladesh. Poor communities produce jute, which is one of the few crops that usually grow in flood-prone areas. The cultivation of jute is also low cost and low technology intensive, and is therefore, accessible to poor communities. It also provides a vital source of cash and food security for the poor farmers. The policymakers will get information on the profitability level and the factors hindering the profitability about farmers producing jute through this study. Thus, this study may bring socio-economic benefits to both the policymakers, individual farmers, jute traders and jute manufacturers. The key research questions of the study are as follows-

a) What are the demographic characteristics of the jute producers in the study area?

b) What are the socio-economic status of the jute producers in the study area?

d) How much gross margin obtained by jute producers?

e) What is the profit margin of the jute producers?

f) What are the conditions of the efficiency of resources used jute production?

g) What are the constraints faced by the farmers while jute producing?

Finally, the study will serve the basis for further study in the same line. Some suggestions and recommendations are added at the bottom for the overall situations and problem.

1.9 Outline of the Study

The study is divided into 9 chapters. Chapter 1 deals with the introduction of the study. Chapter 2 discusses the review of literature. Chapter 3 presents the methodology as well as the analytical technique applied for the study. Chapter 4 deals with the socio-economic characteristics of the study area. Chapter 5 discusses the costs and return analysis of the sample farmers. Chapter 6 illustrates the factors affecting of the jute production. Chapter 7 is concerned with the resource use efficiency of jute production. Chapter 8 deals with the problems and constraints related to jute production. Finally, in Chapter 9, a summary of the study, policy guidelines, recommendations and limitation of the study and scope for further research are presented in conclusion.

CHAPTER II

LITERATURE REVIEW

2.1 Literature Review

Review of literature generally provides the relevant works done previously. Limited empirical research works are available concerning profitability of jute production and resource use efficiency activities of jute products. However, a brief review of previous research works is presented below:

Alam (2008) investigated the influence of price and non-price factors like rainfall, expected yield and risks (both yield and price) on the production of jute in Bangladesh for the period 1971-87. Production response in terms of area allocation of jute was estimated within the Nerlovian dynamic models framework. Growth of area, yield, production and product price of jute was also analyzed prior to econometric estimates of area responses. The short-run price elasticity of jute was 0.60 during the study period using crop area as dependent variable.

Barua (2001) studied inter-temporal price behavior and price supply relationship in jute crop in Bangladesh for the period 1980/81 to 1998/99. He found deflated price of jute had been significantly falling during the eighties and nineties as estimated by the semi-logarithmic trend equations. Production of jute declined at the rate of 0.7 percent due to decreasing area of jute crop during his study period. Partial adjustment model appeared relevant for jute crop as the lagged area variable came out significant for jute crop. He also found that the price variable was turned to be significant for jute crop and short-run price elasticity was 0.41.

Deb *et al.* (1991) conducted a study on sources of changes in jute crop production in Bangladesh for the period 1947/48 to 1986/87. They showed the changes in production of jute between two sub periods 1947/48 to 1967/68 and 1968/69 to 1986/87 and found that production, area and yield decreased in case of jute. A change in mean production of jute between the two periods was -2.71 percent at national level during the study period. Decrease in jute production, because a change in mean yield was 443.89 percent for jute

crop during the study period. Further. they showed the impact of new technology on jute production variability in Bangladesh agriculture for the period 1968/69 to 1986/87. They estimated changes in production variability and their sources for major crop such as jute. Relative and absolute changes in production variability were measured by standardized (dimensionless) coefficient of variation and variance, respectively. The result showed that in modern technology period both the absolute and relative variability increased in the cases of jute. but the increase in production variance was not attributed to modern technology. The increase in relative variability was due to increase in absolute variability and decrease in average production of jute during modern technology period. Sources of variation in production of jute at national level were mainly for changes in covariance of yield and area. Finally, they reported that production variability decreased in Bangladesh agriculture with the adoption of modern technology.

Das *et al.* (2008) conducted a research on productivity and profitability of Tossa jute (Corchorus olitorius) under different weed management practices in jute cropping system. For this, a field experiment was conducted during 2005-06 and 2006-07 in the experimental farm of regional agricultural research station, Shillongani, Nagaon and Assam. They studied the effect of different chemical and cultural methods of weed control in Tossa jute on fibre yield and economics of weed management practices. Among all the methods of weed management, cultural method of weed control by two hand weeding resulted the tallest plant height, basal diameter, lowest dry weight of weeds by the jute crop which ultimately resulted the highest fibre yield. Another cultural management viz. mulching with locally available cheap organic waste (0, 10 t/ha recorded the second highest fibre yield which was only 4.3 per cent lower than the highest fibre yield. Among chemical control method Quizalofop ethyl + one hand weeding recorded the highest fibre yield. The highest net return and benefit cost ratio was recorded under mulching with locally available cheap organic waste (d, 10 t/ha treatment. Second highest benefit cost ratio was obtained under Intercropping of jute-Fred amaranthus treatment followed by Quizalofop ethyl + one hand weeding treatment. There was no residual effect of weed control treatments on toria yield.

Mahapatra *el al*. (2009) conducted a study on research and development in jute (Corchorus sp.) and allied fibres in India. The study showed that jute and allied fibre fanning, trading and industry provide sustenance to over 5 million people of our country. The productivity of jute had doubled from 1.10 tons/ha during independence to about 2.24 tons/ha during 2006-07. Development of high-yielding varieties along with relatively cheaper and user friendly location specific technologies using locally available materials made this possible. Identification of promising herbicides had increased the net return of the production system while judicious use of local organic nutrient sources had improved the productivity as well as soil-health in jute and allied fibre systems. The mechano-microbial retting technology had reduced the water requirement of retting, while the machines developed like multi-row seed drill, bast fibre extractor, flax extractor, nail weeder, herbicide brush etc. had increased the efficiency and profitability of the production system. Successful models of ramie and sisal based multitier systems had been developed for both traditional and non-traditional areas. Significant achievements had been made in fibre quality research also, as it was the prime requirement for product diversification and value addition.

Mahapatra *et al*. (2009) conducted a study on research on jute (Corchorus olitorius and C. capsularis) and kenaf (Hibiscus cannabinus and II. sabdariffa): present status and future perspective. About 5 million people got employment in raw jute (jute and kenaf) farming. trading and industry though the crop occupies only 0.55% of the gross cropped area of the country. The productivity of jute had doubled from 1.10 tons/ha during 1947 to about 2.24 tons/ha in 2006-07. It was made possible through development of high-yielding varieties and improved production technologies though the acreage remains stagnated around 0.80 million hectare. Significant improvement in fibre quality had been attained during this period. The changing climate coupled with variable soil conditions had often exposed the crop to more biotic and antibiotic stresses which were affecting the yield and fibre quality and was also creating considerable regional disparity in yield level of the crop. Stiff competition from low-cost synthetic fibres was compelling towards product diversification and value-addition for which improvement in quality attributed is of paramount importance. This study. attempted to summarize the achievements made in jute and kenaf research and also strive to highlight the constraints faced by the raw jute sector along with its possible mitigation options.

Mollah *et al*. (2016) conducted a study on a precise comparison on luster variation of white jute fibre of Bangladesh. This study was based on area based luster (Brightness) variation of Corcorrus Capsularis variety (white jute) fibre that had not been treated with any brightening agent in view of considerable number of analytical data originated from instrumental determination studied. Forty raw jute samples were collected from different local jute markets of major jute growing districts of Bangladesh during 2006 to 2008. Luster (brightness) of those samples was ascertained using digital photo volt meter as per standard method. A precise comparison of the luster behaviour of white jute in these experiments was accomplished with in respect of their growing area. Result denoted the average brightness value within the range of 16.23 to 39.47. Making an allowance for individual findings, sample no. 0001 collected from Kanaipur of Faridpur district had the highest brightness value i.e. 39.47 and sample no. 0035 collected from Noapara, Jessore showed the lowest brightness value amongst all. The white jute of Faridpur district had distinctly higher luster value appeared to be better than all other districts taken under this study.

All the studies described above were conducted on productivity, supply response, profitability and resource use efficiency of jute. This study is conducted on profitability and resource use efficiency of jute cultivation. It is different from others because no such study was undertaken yet on that issue. Policy makers will get information on the profitability level and resource use efficiency activities of jute and jute products through this study. Thus, this study may bring socio-economic benefits to policymakers, individual farmers and entrepreneurs. Finally, the study will serve the basis for further study in the same line.

Islam *et al*. (2017) conducted a research about Economic Importance of Jute in Bangladesh named Production, Research Achievements and Diversification. Overall view of jute industry in Bangladesh, important jute products produced in Bangladesh, about JDPC. The contribution of the jute sector to the economy of Bangladesh is enormous. Jute is regarded as an economically, industrial, and commercially vital sector in Bangladesh. Once upon a time, jute was called the 'Golden Fibre' of Bangladesh. In trade and industry, jute and mesta crop together known as raw jute as their uses are almost same. The major producing country of jute is India and biggest exporter being Bangladesh, due to their natural fertile soil.

2.2 Research Gaps

Although several studies have been conducted earlier to highlight the socio- economic consequences and problem and the prospect of jute. But the number of studies on the proposed crop is very scanty. Therefore, this study has been taken to estimate the profitability and Resource Use Efficiency of Jute margin of various catrgory of farmers. This study will also investigate the problems associated with jute production and marketing in Bangladesh.

CHAPTER III

METHODOLOGY

3.1 Introduction

This chapter provides a discussion on methodology applied in this study. The tools and methods used and followed for the present study with considering the specific objectives of the study are given below.

3.2 Importance of jute in agriculture

Jute is the most important labor intensive and commercial crop that plays a major role in our agriculture. Various development projects of Bangladesh are financed by the foreign exchange earnings from jute. It also holds an important position in the industrial sector of the economy of Bangladesh. Therefore, considering the significance and contribution of jute sector in the context of Bangladesh economy, jute has been selected for the study.

3.3 Selection of the Study Area

The area in which a farm business survey is to be carried out depends on the particular purpose of the study and the possible cooperation from the farmers. Considering the objectives of the study some preliminary visits were made at two villages namely Kalikapur and silarchor under Madaripur sadar upazila of Madaripur district to collect required information from the jute farmers.

The reasons behind the selection of the present study area were given below:

i) This area was one of the most jute producing areas in Bangladesh.

ii) The area was preferred because of the resemblance to the objectives of the study.

iii) Not that much empirical study was yet undertaken in this area on this issue.

iv) The area was well communicated which helped to communicate with the expected respondents and to make data collection easier for the researcher.

v) It was expected that cooperation from the farmers in this area would be high so that reliable data could be obtained.

3.4 Study Period

Data were collected from 20th november to 20th December 2020, through direct interview with the jute farmers. For rearranging or correcting of any pitfalls of information, secondary visit was done in the study area of Madaripur district.

Figure 3.1 Map of Madaripur Sadar Upazila
Showing a Part of the Study Area
(**Sources:** Internet, 2021)

3.5 Selection of Sample

Sampling was an important part of the survey. There were many farmers in the selected areas. It was not possible and wise to interview all the farmers in the survey due to time, effort, and expenditure and resource constraints. According to W. Y. Yang (1958) 'a sample of representative farms should be chosen in such a way that the information from it can meet the purpose of the survey'. The sample was from the jute farmers. Eighty

sample farmers were selected randomly for the study from Kalikapur and Silarchor village from Madaripur district.

Table 3.1: Selected study areas for primary data collection

Upazilas	Villages	Quantity of Data
Madaripur Sadar	Kalikapur	40
Madaripur Sadar	Silarchor	40

3.6 Preparation of the Survey Schedule

Preparation of survey schedule was of crucial importance in any survey. Considering the specified objectives and data needed for the purpose of the study a well survey schedule was formulated so that it covered all the information needed for analysis. The questions were included logically and in appropriate sequence. Pretest for the survey was done carefully. Care was taken in selecting words in the questions to ensure that they were unambiguous and easily understandable by the respondents. In the survey schedule, items and questions were listed and grouped in logical sequence to facilitate the farmers to recall the required facts. The survey schedule contained the following key information:

i. Identification of the farmers.
ii. General information on farm size, literacy, occupation, land topography and it's using pattern.
iii. Information relating input and output of jute cultivation.
iv. Problems and constraints of jute growers.
v. Suggestions with respects to the problems faced by the jute growers.
vi. Information on profitability and resource use efficiency of Jute in the study area.

3.7 Interviewing the Farmers

Data were collected from the jute farmers through direct interview by the researcher. Before the actual interview, a brief introduction regarding the nature and objectives of the study was given to the sample farmers. It helped to make cooperation in conducting data collection. When they were convinced about the purpose of the study that was simply an

academic exercise, then they tried to be co-operative. Questions were asked systematically and explanation was made whenever it was necessary. After each interview. the information was checked carefully before leaving the field, so that it could be possible immediately to correct the recorded data.

3.8 Editing and Tabulation of Data

After the collection of primary data, the filled schedules were edited for analysis. These data were verified to eliminate possible errors and inconsistencies. All the collected data were summarized and scrutinized carefully. For data entry and data analysis, the Microsoft Excel programs and SPSS programs were used. It might be observed here that information was collected initially in local units and after checking the collected data, it was converted into standard units. Finally, a few relevant tables were prepared according to necessity of analysis to meet the objectives of the study.

3.9 Analytical Technique

In the present study, both the descriptive statistical technique and statistical analysis were used to obtain the objectives of the study. The data were arranged in a tabular form and were analyzed as objectives of the study and to unveil the interrelationship among factors.

3.9.1 Descriptive Statistical Technique

Tabular technique of analysis was generally used to find out the socio- demographic profile of the respondent, to determine the cost, returns and profitability of Jute farm enterprises. It is simple in calculation, widely used and easy to understand. It was used to get the simple measures like average, percentage etc.

3.9.2 Production Function Analysis

The production function represents the technological relationship between output and factor inputs. To estimate the production function, one requires development of its properties leading to specification of an explicit functional form. One of the most widely used production function for empirical estimation is the Cobb Douglas production. This function was originally used by C.W. Cobb and P.H. Douglas in twenties to estimate the marginal productivities of labor and capital in American manufacturing industries. Their main purpose was to estimate the shares of labor and capital in total product; hence they used this function with the constraint that the sum of elasticities or regression coefficients

should total one. Later on, they relaxed this restraint. Cobb and Douglas originally fitted the function to time series 1930s and 1940s; the same form was used for cross section of industries. This form of the function was subsequently used in many production function studies for technical units (crops, livestock) and farm-firms in agricultures. The popularity of this function is because of the following characteristics of the function:

i. It directly provides the elasticities of production with respect to inputs;
ii. It allows more degrees of freedom than other algebraic forms (like quadratic function) which allow increasing or decreasing marginal productivities, and
iii. It simplifies the calculation by reducing the number of regression to be handled in regression analysis.

The original form used by Cobb and Douglas was

$$\mathbf{Q = aL\ \beta\ K_1 - \beta U}$$

This forces sum of elasticities to one.

Their later modification was

$$\mathbf{Q = aL\ \alpha K\ \beta U}$$

Where, $\boldsymbol{\alpha + \beta}$

In agriculture, this form of function has not been used in its original form. Neither the sum of elasticities is kept equal to one nor is the number of variables limited to two. Even then as the basic idea of functional form was provided by Cobb and Douglas, various forms of this function have continued to be called as Cobb-Douglas production function.

The Cobb– Douglas production function, in its stochastic form, may be expressed as

$$Y_i = \beta_1 X_{2i}\ \beta_2\ X_{3i}\ \beta_3\ eui \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where, Y = output

X_2 = labor input

X_3 = Capital input

u = stochastic disturbance term,

e = base of natural logarithm.

From Eq. (3.1) it is clear that the relationship between output and the two inputs is nonlinear. However, if we log-transform this model, we obtain:

$$\ln Y_i = \ln \beta_1 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + ui$$
$$= \beta_0 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + ui \text{ …….. (3.2)}$$

Where $\beta_0 = \ln\beta_1$. Thus written, the model is linear in the parameters β_0, β_2, and β_3

The properties of the Cobb–Douglas production function are quite well known and is therefore a linear regression model. Notice, though, it is nonlinear in the variables Y and X but linear in the logs of these variables. In short, (3.2) is a log-log, double-log, or log linear model, the multiple regression counter part of the two-variable log-linear model.

The properties of the Cobb–Douglas production function are:

1. β_2 is the (partial) elasticity of output with respect to the labor input, that is, it measures the percentage change in output for, say, a 1 percent change in the labor input, holding the capital input constant.
2. β_3 is the (partial) elasticity of output with respect to the capital input, holding the labor input constant.

3. The sum ($\beta_2 + \beta_3$) gives information about the returns to scale, that is, the response of output to a proportionate change in the inputs. If this sum is 1, then there are constant returns to scale, that is, doubling the inputs will double the output, tripling the inputs will triple the output, and so on. If the sum is less than 1, there are decreasing returns to scale—doubling the inputs will less than double the output. Finally, if the sum is greater than 1, there are increasing returns to scale— doubling the inputs will more than double the output.

   Before proceeding further, note that whenever you have a log–linear regression model involving any number of variables the coefficient of

each of the X variables measures the (partial) elasticity of the dependent variable Y with respect to that variable. Thus, if you have a k-variable log-linear model:

$$\ln Y_i = \beta_0 + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \dots \dots + \beta_k \ln X_{ki} + ui \quad \text{..... (3.3)}$$

Each of the (partial) regression coefficients, β_2 through β_k, is the (partial) elasticity of Y with respect to variables X_2 through X_k. Assuming that the model (3.2) satisfies the assumptions of the classical linear regression model.

3.9.3 Specification of the Cobb-Douglas Production Function

The input-output relationships in Jute production was analyzed with the help of Cobb-Douglas production function approach. To determine the contribution of the most important variables in the production process of jute, the following specification of the model was used.

$$Y = aX_1\, b_1X_2\, b_2X_3\, b_3X_4\, b_4X_5\, b_5X_6\, b_6X_7\, b_7\, eui \quad \text{..... (3.4)}$$

The Cobb-Douglas production function was transformed into following logarithmic form so that it could be solved by Ordinary Least Squares (OLS) method.

$$\ln Y = \ln a + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + Ui \quad \text{.....(3.5)}$$

Where, Y= Gross income from year round Jute (Tk/ha);

Y= Return per Hector (Tk/ha);

Ina= Intercept of the function

X_1= Cost of human Labor (Tk/ha)

X_2= Cost of seed (Tk/ha)

X_3= Cost of Urea (Tk/ha)

X_4= Cost of TSP (Tk/ha)

X_5 = Cost of MP (Tk/ha)

X_6 = Cost of Pesticides (Tk/ha)

X_7= Cost of Irrigation (Tk/ha)

b_1, b_2 ….. b_6 = Coefficients of the respective input to be estimated; and

Ui = Error term. Coefficient of the respective variable; i= 1, 2…….6.

3.10 Profitability Analysis

Cost and return analysis is the most common method of determining and comparing the profitability of different farm household. In the present study, the profitability of jute is calculated by the following way.

3.10.1 Calculation of Gross Return

Per Hactor gross return was calculated by multiplying the total amount of product and by-product by their respective per unit prices.

Gross Return= Quantity of the product * Average price of the product + Value of by product.

3.10.2 Calculation of Gross Margin

Gross margin is defined as the difference between gross return and variable costs. Generally, farmers want maximum return over variable cost of production. The argument for using the gross margin analysis is that the farmers are interested to get returns over variable cost. Gross margin was calculated on TVC basis. Per hectare gross margin was obtained by subtracting variable costs from gross return.

That is,

Gross margin = Gross return – Variable cost.

3.10.3 **Calculation of Net Return**

Net return or profit was calculated by deducting the total production cost from the total return or gross return. That is,

Net return = Total return – Total production cost.

The following conventional profit equation was applied to examine farmer's profitability level of the jute producing farms in the study areas.

Net profit, $\pi = \Sigma PmQm + \Sigma P_fQ_f - \Sigma (P_{xi} X_i) – TFC.$

Where, π = Net profit/Net return from jute farming (Tk/ha);

Pm = Per unit price of jute (Tk/kg);

Q_m = Total quantity of the jute production (kg/ha);

Q_f = Per unit price of other relevant jute (Tk/kg);

P_f = Total quantity of other relevant jute (kg/ha);

P_{xi} = Per unit price of i-th inputs (Tk);

TFC = Total fixed cost (Tk); and

Xi = Price of the i-th inputs (kg/ha);

i = 1, 2, 3,....., n (number of inputs).

3.10.4 Undiscounted Benefit Cost Ratio (BCR)

Average return to each taka spent on production is an important criterion for measuring profitability. Undiscounted BCR was estimated as the ratio of total return to total cost per hectare.

BCR= Total Return /Total Cost

BCR>1, the return from jute was economically satisfactory;

BCR<1, the return was not economically satisfactory; and

BCR=1, there exist economic breakeven point of jute production.

3.10.5 Problem Faced Index

In study it was undertaken to identify the major problems faced by farmers. They faced various problems like lack of quality seed, lack of capital, lack of labor availability, higher price of inputs, storage problems, lack of fertilizer, lack of irrigation and price instability.

3.11 Resource Use Efficiency

In order to analyze the resource use efficiency, the ratio of marginal value product (MVP) to the marginal factor cost (MFC) for each input was computed and tested for its equality to 1,

i.e. $MVP \div MFC = r$

Where,

MVP = Value of change in output resulting from a unit change in variable input (Tk.) and

MFC = Price paid for the unit of variable input (Tk.).

Under this method, the decision rules are that, when;

I. $r > 1$, the level of resource use is below the optimum level, implying underutilization of resources. Increasing the rate of use of that resource will help to increase productivity.

II. $r < 1$, the level of resources use is above the optimum level, implying over utilization of resources. Reducing the rate of use of that resource will help to improve productivity.

III. $r = 1$, the level of resource use is at optimum implying efficient resource utilization.

The marginal productivity of a particular resource represents the additional to gross returns in value term caused by an additional unit of that resource, while other inputs are held constant. When the marginal physical product (MPP) is multiplied by the product price per unit, the MVP is obtained. The most reliable, perhaps the most useful estimate of MVP is obtained by taking resources (X_i) as well as gross return (Y) at their geometric means (Dhawan and Bansal, 1977).

Since all the variables of the regression model were measured in monetary value, the slope co-efficient of those explanatory variables in the function represented the MVPs, which are calculated by multiplying the production co-efficient of given resources with the ratio of geometric mean (GM) of gross return to the GM of the given resources,

i.e.;

$$\ln Y = \ln \alpha + \beta i \ln Xi$$

$$\frac{dy}{dx} = \beta \frac{y}{x}$$

Therefore, MVP (Xi) = bi [$\bar{Y}$(GM) ÷ $\bar{X}$i(GM)]

Where,

$\bar{Y}$ = Mean value (GM) of gross return

$\bar{X}$i = Mean value (GM) of different variable input

i = 1, 2,……..

MFC is the price of input per unit. If the MFC of all the inputs expressed in terms of an additional taka in calculating the ratio of MVP to MFC, the denominator will always be one, and therefore, the ratio will be equal to their respective MVP.

3.12 Problem Faced in Collecting Data

During the period of data collection, the researcher faced the following problems:

i) Most of the farmers felt disturbed to answer questions since they thought that the researcher might use the information against their interest. To earn the confidence of the farmers a great deal of time was spent.

ii) The farmers do not keep records of their activities and day to day expenses. Therefore the author had to depend upon their memory.

iii) The farmers were usually busy with their filed works. So, the researcher sometimes also had to pay extra visits to meet the farmer.

CHAPTER IV

SOCIOECONOMIC CHARACTERISTICS

4.1 Introduction

The socioeconomic characteristics of sample farmers are covered in this section. In inferring the planning of production, the socioeconomic features of farmers are significant. The sample households finished by studying socioeconomic aspects. These included age distribution and family size, Occupation, employment, pattern of land ownership, etc. These aspects are discussed briefly below.

4.2 Age Distribution of the Respondents

The study classifies all groups of farmers in the study area as set out in Figure

The Figure shows that the majority of farmers in the study area are middle aged. Out of the samples, 26% were in the 20-35 year age group, 51% belonged to the 35-50 year age group and, 23% fall into the over 51 year age group. This result suggests that the majority of sampling farmers were in the 31-50 year age group suggesting that they can provide more physical efforts for jute production.

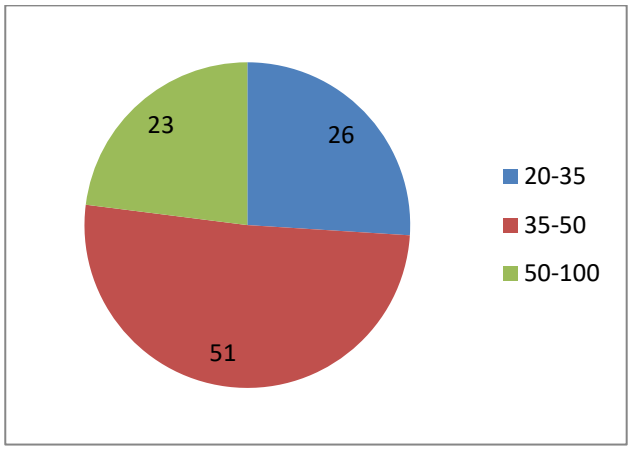

Figure 4.1: Age distribution of the respondent.

4.3 Educational status

Education improves people's effectiveness. Table 4.1 indicates that 9% of the farmers were iliterate, 43% had a primary school, 26% of the farmers had a J.S.C level education, 13% were secondary school graduates and 9% were HSC and 2% were graduation holder.

Table 4.1 Educational status of the respondent

Level of education	**Percentage (%)**
Illiterate	9
Primary school certificate	43
Junior school certificate	26
Secondary School Certificate	13
Higher Secondary School Certificate	7
Honors passed	2

Source: Field Survey, 2020.

4.4 Occupational Status of the Respondent.

Farmers are involved in different activities in this study area (Table 4.2). It was noted that agriculture was the primary occupation for Jute farmers (39%) followed by business (21%) and service (10%).

Table 4.2: Occupational status

Types of occupation	**Percentage (%)**
Agriculture	
Crop Sectore	39
Fisheries	7
Livestock	11
Non-agricultural	
Service	10
Business	21
Rickshaw or van pulling	12
Total	100

Source: Field Survey, 2020.

4.5 Gender and marital status

Table 4.3 depicts that 98 percent of selected farmers were male and 2 percent were female. In the study respondents, 91 percent of the farmers were married and 9 percent were unmarried.

Table 4.3: Gender and marital status

Particulars	**Percent (%)**
Male	98
Female	2
Married	91
Unmarried	9

Source: Field Survey, 2020

4.6 Income status

In the study area, the farmers' incomes were divided into less than Tk.150, 000 from Tk.150, 000 to Tk.250, 000 and more than Tk.250, 000. It is evident from the Table 4.4 that most of the farmer's (47 %) yearly income belonged to the category of less than Tk.150, 000. About 44 percent of the farmers were earned Tk. 150,000 to 250,000 per year, 47 percent of the farmers were earned Tk. less than 150,000 per year and 9 percent farmers were earned Tk. above 250,000 per year.

Table 4.4: Income status, Field Survey, 2020

Total income	**Percentage (%)**
Less than Tk. 150,000	47
Tk.151,000-250,000	44
Above Tk. 251,000	9

4.7 Access to medical services

Table 4.5 indicates that 22 percent farmers in the sample took treatment by the MBBS physician, 48 percent had access by the village doctor to the health service, 23 percent had access by the homeopathic medical services. Very few farmers had provided quack medicine.

Table 4.5: Access to medical services

Types of treatment	Percentage(%)
MBBS doctor	22
Village doctor	48
Homeopathic doctor	23
Quack	7

Source: Field Survey, 2020

4.8 Sources of Facilities of the Respondent

For all forms of agriculture, availability of fund is an important factor. Banks, NGOs, relatives and their own funds were the source of capital for jute farmers. Around 10% of the farmers were borrowing from banks, 37% from NGOs and 12% from their family members. About 41% of farmers used their own money (Table 4.6).

Table 4.6 Sources of Credit Facilities of the Sample Farmers

Items No.	Quantity	Percentage(%)
Bank	8	10
NGOs	30	37
Relatives	10	12
Money Lender	32	41

Source: Filed Survey, 2020

CHAPTER V

COSTS AND RETURNS ANALYSIS OF JUTE PRODUCTION

5.1 Introduction

In the decision making process of farmers, cost of any input used for producing an enterprise plays a vital role. In calculating profit or loss, the cost benefit items need clarification. Farmers used both purchased and home supplied inputs in producing different corps. For purchased inputs they had to pay in cash, but for home-supplied inputs they made no cash payment. Therefore, costing of home-supplied inputs was quite difficult. To determine the relative profitability of different crops however, it was necessary to compute all the cost items which were deducted from the value of output. The input items were valued at the prevailing market rates. The output was also valued at the prevailing market rate. Purchased inputs involved out of pocket or direct expenses. Since no payment was made for the home-supplied inputs, the costs of these inputs were estimated by using the opportunity cost. For analytical advantages the cost items were classified under the following heads:

i. Human labor
ii. Seed
iii. Fertilizers
iv. Manure
v. Pesticides
vi. Power tiller
vii. Irrigation

5.2 Variable Cost

5.2.1 Cost of Human Labor

Human labor was the most important and largely used input for producing jute. There were two types of human labor i.e. family labor and hired labor. Family labor included the operator himself plus other male and female members of his family and hired labor included casually and or the permanently paid labor. The hired labors were

usually paid in cash and in some cases were paid in kind. The cost of family labor was determined by applying principle of opportunity cost. The cost of hired labor was calculated as the actual wage paid by the farmers with meal or without meal. Labor was measured in terms of man-days, which usually consisted of 8 hours. In case of children, man days equivalent hours were estimated. This was computed by converting all women and children hours into man-days equivalent hours assuming 1:1.5:2 (Yang, 1958). Cost of human labor differs from one class to another class of farmer. Average cost of human labor was reported to be priced at the rate of Tk. 500.00 per man-day. The wage rate varied from Tk. 500 to Tk. 600 per man-day depending on the season, ability and availability of the labor in the study area.

Human labor was employed for jute production in the following phases:

i. Land preparation includes trimming of ails, corner breaking, harrowing.
ii. Breaking of clods, cleaning of stables, leveling of land, etc.
iii. Seed sowing
iv. Fertilizer application
v. Weeding (3 times)
vi. Harvesting, making bundles
vii. Carrying jute for retting
viii. Retting Separating fiber
ix. Carrying rotten fibre at the nearest water body and jute stick at the farm Gate
x. Drying fiber, tying bundles and storing and
xi. Drying and staking of jute stick

5.2.2 Cost of Seed

In the study area, all the sample farmers used purchased seeds. Jute seeds were sown in broadcasting method. The farmers in the study area purchased jute seeds form nearest local market. All the sample farmers cultivated Tossa jute. Tk 148 to Tk. 190 per kg according to the quality of seed in the study area.

5.2.3 Cost of Urea

Three kinds of fertilizers namely Urea, Triple Super Phosphate (TSP) and Muriate of Potash (MP) were used in jute production. The cost of urea was for one hactor is Tk 250. The cost of urea is 16 taka per kg. It is very useful to get the bumper production.

5.2.4 Cost of TSP

The cost of TSP was for one Hactor is Tk 750. The cost of TSP is 22 taka per kg.

5.2.5 Cost of MP

Cost of MP for one Hactor land is Tk 500. The cost of MP is 15 taka per kg.

The costs of fertilizers were charged at the prevailing market prices in the study area during study period.

5.2.6 Cost of Zinc

Cost of MP for one Hactor land is Tk 300. Manure is useful and the most important input to incrmse organic matter of soil to eventually increase crop yield. Some of the sample farmers in the study area used cowdung during land preparation.

5.2.7 Cost of Pesticides

Cost of MP for one Hactor land is Tk 200. The cost of insecticides was calculated according to the amount of money which the farmer actually paid.

5.2.8 Cost of Irrigation

Irrigation is not a leading input for jute production because rain is always available during the period of jute production. However, cost of irrigation for one Hactor land is Tk 3000.

5.2.9 Production of jute for per Hactor

Table 5.1 Per hactor Cost of Jute Production:

Cost Items	**Quantity**	**Price/Unit (Tk)**	**Total Cost (Tk)**	**% of total cost**
Human Labor	60 man days	500	30000	55.98
Seed	6	148	888	1.66
Power Tiller Cost			10000	18.66
Fertilizer Urea TSP MP	 16 kg 30 kg 25 kg	 16 22 15	 256 660 375	 0.48 1.40 0.93
Plowing Cost	-		3000	5.60
Manure	50 kg	1	50	0.094
Pesticides			150	0.28
Irrigation			6000	11.20
Other Cost			2000	3.73
Total production Cost			53594	100
IOC (Interest on working capital for 4 months @ 9%)			1786	
Variable cost			55380	

5.3 Interests on Operating Capital

Interest on operating capital was calculated by taking into account all the operating costs incurred during the production period of Jute. Per hactor interest on operating capital was Tk 1786 and land cost value of one Hactor land was Tk. 15000.00 for Jute production.

5.4 Fixed cost

Fixed cost is calculated with family labor and land use cost. Here, per hactor fixed cost is 20000 Tk

5.4.1 Family Labor

Family labor included the operator and other male and female members of his family, while hired labor included part-time and full-time workers. Here family labor was counted Tk 500 for per man days.

5.4.2 Land Use Cost

Land cost means the total cost of purchasing a parcel of land or lot with specific land use and ownership**.** Here land use cost is Tk 15000

Table 5.2: Per Hactor Fixed cost of Jute production

Items of costs	**Unit**	**Quantity**	**Total value (Tk)**
Family Labor	500 Tk	10 man days	5000
Land Use Cost	Tk	15000	15000
Total Fixed Cost	Tk		20000

Total Variable Cost: Total Variable cost for per hactor jute production was

calculated by deducting family labor from total cost.

Table 5.3 : Total Variable Cost

Items of returns/costs	**Unit**	**Quantity**	**Total value (Tk)**
Variable Cost	**Tk**	**55380**	**55380**
Family Labor	**Tk**	**5000**	**5000**
Total Variable cost			**50380**

5.5 Total cost (Total Variable cost + Total Fixed cost)

In order to estimate total cost per hactor all the resources used in Jute production in Hactors been recaptured together. Per hactor total cost of Jute production was Tk. 70380

Table 5.4 Total Cost

Items of costs	Unit	Total Variable cost	Total Fixed cost	Total (Tk)
Total cost	**Tk**	**50380**	**20000**	**70380**

Source: Field Survey, 2020

5.6 Gross returns

Here gross returns of the Jute production is = (Main product+ By-product). The quantity of main product is 1900 Kg. Total value of is 121000, if the Jute per unit is 55 Tk. The quantity of by-product is 4000 Kg. Total value of is 24000, if the Jute per unit by-product is 6 Tk.

Table 5.5: Gross return

Items of returns/cost	Unit	Quantity	Price per unit (TK)	Total Value (Tk)
Main product	Kg	1900	55	104500
By-product	TK	4000	6	24000
Gross returns	TK	-	-	128500

Source: Field Survey, 2020

5.7 Net Return

The net return of Jute production is depending on both gross return and total cost of

the Jute production. Net return was Tk. 58120

Table 5.6: Net return (Gross return – Total cost)

Items of returns/costs	Unit	Gross return	Total cost	Total net Return value (Tk)
Net return	Tk	128500	70380	58120

Source: Field Survey, 2020

5.8 Undiscounted BCR

Benefit cost ratio was calculated by dividing gross return by gross cost or total cost. It implies return per taka invested. It helps to analyze financial efficiency of the farm. It was evident from the study that the benefit cost ratio of Jute farming was accounted for 1.82 implying that Tk. 1.82 would be earned by investing Tk. 1.00 for jute production. Gross margin was found 2.55. So, the Jute farming was found to be profitable for farmers (Table 5.7).

Table 5.7: Undiscounted BCR

Gross Return	Gross cost/ Total variable Cost	Undiscounted BCR
128500	70380	1.82
128500	50380	2.55

Source: Field Survey, 2020

5.9 Concluding Remarks

It was evident from the results that Jute cultivation provides higher returns to the farmers. Sample farmers showed their opinion that higher yield and income

encouraged them to continue Jute production.

CHAPTER VI

FACTORS AFFECTING OF JUTE PRODUCTION

6.1 Introduction

In this Chapter, the effects of main variables on Jute production are identified and measured. In order to assess the contribution of the major variables to the Jute production process the Cobb-Douglas production function Hactors been chosen. Table 6.1 presents the estimated values of the model.

6.2 Functional Analysis for Measuring Production Efficiency

Output function is a relationship or mathematical function, which indicates the total output to be achieved with certain inputs to a certain technological level. In order to estimates the effect of the inputs on output seven explanatory variables are selected taking into account the objectives of the study and considering the effects of explainable variables on production of Jute. Other independent variables like water quality, soil condition, time etc., which might have affected production of farm enterprises, were excluded from the model on the basis of some preliminary estimation. A brief description is presented here about the explanatory variables included in the model.

6.3 Estimated Values of the Production Function Analysis

i. F-value was used to measure the goodness of fit for different types of inputs.
ii. The coefficient of multiple determinations (R^2) indicates the total variations of output explained by the independent variables included in the model.
iii. Coefficients having sufficient degrees of freedom were tested for significance level at 1 percent, 5 percent and 10 percent levels of significance.

Table 6.1: Estimated Values of Coefficients (Cobb-Douglas Production Function).

Explanatory variables	Values of coefficients	Standard Error	P-value
Intercept	6.737***	0.636	>0.001
Human labor	0.341***	0.078	0.008
Seed	0.187	0.057	0.305
Urea	0.025	0.087	0.858
TSP	0.128	0.035	0.277
MP	-0.009	0.098	0.956
Pesticide	0.191*	0.067	0.081
Irrigation Cost	0.237***	0.045	0.002
F	21.067***		
R^2	0.672		
Returns to scale	1.1		

Note: Here,

*p< 0.10 denotes 10% level of significance.

**p< 0.05 denotes 5% level of significance.

***p< 0.001 denotes 1% level of significance.

Source: Authors Estimation

6.4 Interpretation of the results

Human Labor

The magnitude of the seed cost regression coefficient was 0.341 with a positive sign and significant at 1% level. This means that one percent increase in labor costs will lead to an increase of 0.341 percent in gross revenue for Jute, holding other factors constant (Table 6.1)

Pesticide

It can be seen from Table 6.1 that the magnitude of the regression coefficient of pesticides were 0.191 for jute. It was positive and statistically significant at 10% level. This indicates that an increase in one percent of pesticides cost remaining other factors constant, would result in an increase in the gross return by 0.091 percent.

Irrigation Cost

The coefficient of irrigation was 0.237 with a positive sign and significant at 1% level. This means that one percent increase in irrigation will lead to an increase of 0.237 percent in gross revenue for jute holding other factors constant (Table 7.1).

Coefficient of multiple determinations (R^2)

It is evident from Table 6.1 that the value of the coefficient of multiple determinations (R^2) was 0.672 for jute. It indicates that about 67 percent variation of the total of the gross returns are explained by the explanatory variables included in the model.

Goodness of fit (F - value)

The F-value was 21.067 for jute, which implies good fit of the model that is, all the explanatory variables included in the model were important for explaining variation of jute production.

Returns to scale

The summation of all the production co-efficient indicates returns to scale. For jute production, the summation of the coefficients was 1.1 which means that the production functions exhibit increasing returns to scale. An increasing amount of investment in this production would further increase the returns from the farm.

6.5 Concluding Remarks

It is evident from the Cobb-Douglas production function model that labor, pesticides

and irrigation experience had significant and positive impact on jute production.

CHAPTER VII

RESOURCE USE EFFICIENCY OF JUTE

7.1 Findings of the Resource Use Efficiency of Jute

Resource use efficiency means how efficiently the farmers can use their resources in the production process. Because of the scarcity of resources, its efficient use is important. For calculating resource use efficiency, seven input factors like cost on human labor, seed, urea, TSP, MP, pesticides and irrigation were considered.

Table 7.1 Resource Use Efficiency of Jute

Variable	**Geometric mean *(GM)***	**$\bar{Y}$(GM)/ $\bar{X}_i$(GM)**	**Co-efficient *(β)***	MVP (X_i)	**r =MVP/ MFC**	**Decision rule**
Yield of Jute *(Y)*	54201.30					
Human labor *(X1)*	28042.82	1.93	0.341	0.65	0.65	Over-utilization
Seed *(X2)*	785.44	69.00	0.187	12.90	12.90	Under-utilization
Urea*(X3)*	1689.02	32.09	0.025	0.802	0.802	Over-utilization
TSP *(X4)*	704.82	76.90	0.128	9.84	9.84	Under-utilization
MP *(X5)*	826.782	65.55	-0.009	-0.59	-0.59	Over-utilization
Pesticides *(X6)*	260.34	208.19	0.191	39.76	39.76	Under-utilization
Irrigation (X_7)	4240.52	12.78	0.237	3.02	3.02	Under-utilization

From the Table 7.1 it is evident that the ratios of marginal value products (MVP) and marginal factor cost (MFC) of seeds, TSP, pesticides, irrigation were greater than unity which indicates the under-utilization of those resources. Increment of use of those resources would be helpful to further increase the productivity. Same ratios for labor, urea, MP were less than unity, thereby indicating over-utilization of the said variables. Reduction of use of those resources would be helpful to further improvement of the productivity.

7.2 Concluding Remarks

Among the studied input factors seeds, TSP, pesticides, were found as the most influential factors of jute production. Key inputs of these were not fully utilized. The jute producers had the opportunity to increase their productivity as well as profitability by proper utilization of these resources.

CHAPTER VIII

PRODUCTION RELATED PROBLEMS FACED BY DIFFERENT STAKEHOLDERS

A multiple number of social, economic, biological and institutional problems were faced by different stakeholders involved in jute production. The respondents were asked to give their opinion regarding constraints of jute production. They gave more than one opinion as regards to the problems. All of these problems are briefly discussed in this chapter.

8.1 Problems Faced by the Jute Farmers

Jute farmers faced many problems in jute production. Problems faced by the jute farmers are given below:

i. High price of seed plays very important role in jute production. The price of jute seed was higher in the study area.
ii. Irrigation was not required for jute cultivation. But due to lack of rainfall, some farmers had to depend on irrigation.
iii. Retting is very important function for jute production. In the study area, farmer had to go to a long distance for retting jute and thus, cost of jute production was increased significantly.
iv. Jute is a labor intensive crop. So, the farmers required hired labor besides family supplied labor for performing different operations during jute cultivation.
v. High labor wage during the jute manufacturing season, wage climbs dramatically due to labor shortages.
vi. Because of lack of adequate knowledge about retting. In the study area, farmers were not well trained about retting.
vii. Some farmers also reported that attack of insects lead to decrease in jute production.
viii. High transportation cost Farmers usually sold their product at farm gate.

Due to high transportation cost, they always sold their product at farm gate

8.2 The challenges of jute production are discussed below:

- The cultivable land is decreasing due to increase in population day by day.

- To meet the demand, farmers motivate to take up to high earning agricultural activities resulting in decreased jute production.

- Water is very necessary for jute retting. Scarcity of water will threat jute retting in future resulting motivates farmers to take up other agricultural activities.

- Other countries have successfully established favorable image of their diversified jute products in the international market.

- Indian jute, because of their product range and depth, colors, styles, and quality, they get good amount from export. Chinese and Vietnamese diverse there jute items which are more popular (Rahman, 2007). Governmental help, as well as with the support from neighboring countries, the jute industry of Bangladesh can be increased and can get the competitiveness of its jute goods in worldwide markets.

8.3 Suggestions about Jute Production

For enhancing the production of jute, farmers as well as government should take proper step for maximum production of jute with minimum input. Various steps can be taken by the government to boost the production of Jute. There are given some suggestions related to this matter below:

i. Improvement of the quality jute so that farmers can get good amount of money by exporting.
ii. Ensuring good prices to the jute farmers is a mandatory thing. Government should frequently monitor the market for this purpose.

iii. Enhancing the yield per hectare of jute is also a major category for getting more products of jute.

iv. Access to micro-credit, availability of quality input such as seed, fertilizer, insecticide, etc., marketing facilities, improve technologies, and training all lead to increase jute production.

v. Institutional supports from Government and Non-government organizations for credit, input and technology may be helpful to increase jute production as well as income of jute farmers.

CHAPTER IX
SUMMARY CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of findings, conclusions and recommendations of the study. The summary of the study shows the findings in brief. By conclusion, the main points of the report can be identified quickly. Recommendation draws the attention of the respective authority to implement some strategy for improving the situation of the jute production.

9.1 Summary

Agriculture being one of the of Bangladesh economy contributes about 12.07 % to the GDP and provides employment to the 42.4% of its national labor force (BBS, 2020). Thus its importance in the economy cannot be exaggerated. However, due to capacity of capital and modern technology, agricultural productivity is lower in this country, even though the country is blessed with most fertile soils. Agriculture sector has great contribution to the economy of Bangladesh, where jute plays vital role to the economy of huge export earnings. Jute is produced about more than 55 districts in Bangladesh. This country has got relative advantage on the production of best quality jute fibre. Though usage of traditional jute products is declining, jute has versatile intrinsic and extrinsic properties. So, a wide range of diversified jute products can be produced by exploring these properties. These diversified products are biodegradable, photo biodegradable, non-toxic, non-plastic, non-acidic, hydrophilic, eco-friendly. These products not only preserve environment but also help to protect environment from degradation. Due to its diversified usage, a huge number of people are involved in jute production. The present study was undertaken with a view to calculate the profitability and resource use efficiency of jute production.

Accordingly. the present study was designed with the view to achieve the following objectives:

a) To study the socio-demographic profile of jute producers;
b) To assess the profitability of jute production in the study area;

c) To estimate the resource use efficiency of jute production in the study area;
d) To identify the constraints faced by jute producers and to recommend some suggestions.

The study is mainly based on primary data which were collected by the researcher himself through direct interviewing the sample farmers. For achieving the objectives, field survey was conducted in two villages namely Kalikapur and Silarchor under Madarfipur Sadar upazila of Madaripur district. A total of 80 samples were collected for this study. Data was collected by direct interview. The collected data were then sorted and scrutinized. Finally, costs, returns and functional analysis were estimated by using statistical and tabular techniques to fulfill the objectives of the study. With regard to the major problems faced by the farmers, the findings revealed that unavailability of fertilizers, high price of seed, high irrigation cost, lack of retting place, high labor wage etc. were the major obstacles of jute production in the study area. As measures to overcome these problems it was suggested that supply of agricultural inputs at lower cost and repairing canal were more important measures, which could encourage farmers to expand jute production. The farmers in the study area also mentioned that jute is more profitable than the rice production. This study also revealed that production performance of jute was low due to unavailability of inputs and improved technology, whether the resources were efficiently used.

9.2 Recommendations

On the basis of the findings of the present study, the following specific recommendations may be made for the development of jute sector:

i. Department of Agricultural Extension and non-government agencies should strengthen extension program in order to increase area under jute production.

ii. Farmers were aware of using organic/compost fertilizer, but due to unavailability of compost in the market they depend on cow dung which was not optimum. Improved techniques of compost making and its availability will lead to increase production of jute in the selected areas.

iii. In the study area, water bodies were not enough for retting jute. The government should take step to reform the prevailing canal so that the jute farmers can get water for retting jute.

iv. Furthermore, enhanced production techniques should be made available to jute growers with ease of access.

9.3 Limitations of the Study

One of the major limitations of the present study is that, for data collection, the researcher had to rely on the memory of the farmers. Since majorities of the farmers did not keep any written records, they had to furnish information mainly from their memory. The study was conducted on a small size of samples and with one geographic area due to time and fund constraints. If the study were conducted on a large sample covering broad area, the result might be more reliable and accurate.

9.4 Scope for the further Research

Since the present study was not a comprehensive study, it is very difficult to arrive at any specific generalization. Thus the present study might be helpful for the researcher, Policy makers and to other concerned authorities for conducting further comprehensive research or to arrive at any plan for the development of the jute farmers.

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