ANALYSIS OF PROFITABILITY AND EXISTING MARKETING CHANNEL OF BORO RICE IN BANGLADESH: STUDY BASED ON SELECTED AREAS OF SHERPUR DISTRICT

SHAMIM MIA

DEPARTMENT OF AGRIBUSINESS AND MARKETING

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

DHAKA-1207

JUNE, 2022

ANALYSIS OF PROFITABILITY AND EXISTING MARKETING CHANNEL OF BORO RICE IN BANGLADESH: STUDY BASED ON SELECTED AREAS OF SHERPUR DISTRICT
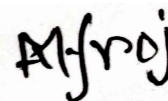
BY

SHAMIM MIA

REGISTRATION NO: 15-06668
Email: Shamimmia1066@gmail.com
Mobile: 01967259806

A Thesis
Submitted to the Faculty of Agribusiness Management,
Sher-e-Bangla Agricultural University, Dhaka,
in partial fulfilment of the requirements
for the degree of

MASTER OF SCIENCE (MS)

IN

AGRIBUSINESS AND MARKETING

SEMESTER: JANUARY-JUNE, 2022

Approved by:

<table>
<tr><td>_____
Noor Md. Rahmatullah
Professor
Department of Agricultural Statistics
Sher-E-Bangla Agricultural University
Supervisor</td><td>_____
Mahfuja Afroj
Assistant Professor
Department of Agribusiness and Marketing
Sher-E-Bangla Agricultural University
Co-supervisor</td></tr>
</table>

_____
Dr. Sharmin Afrin
Chairman
Examination Committee
Department of Agribusiness and Marketing
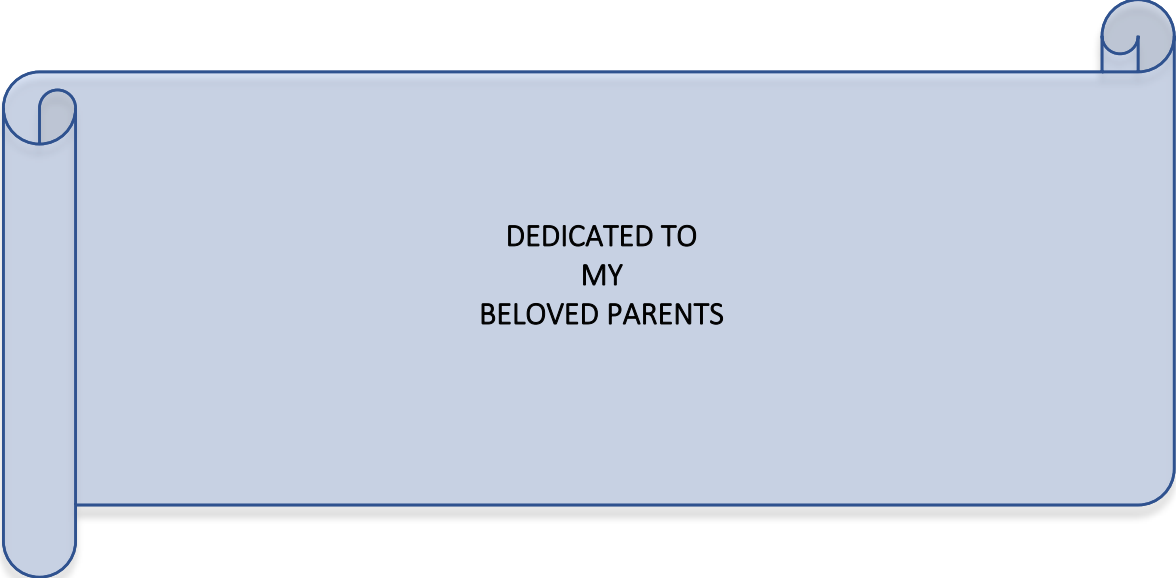Sher-E-Bangla Agricultural University
Dhaka-1207

CERTIFICATE

This is to certify that thesis entitled, **"Analysis of Profitability and Existing Marketing Channel of Boro Rice in Bangladesh: Study Based on Selected Areas of Sherpur District"** submitted to the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science** in **Agribusiness and Marketing,** embodies the result of a piece of Bonafede research work carried out by **Shamim Mia,** Registration **No. 15-06668** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated: June, 2022	_____
Dhaka, Bangladesh	**Prof. Noor Md. Rahmatullah**
	Supervisor
	Department of Agricultural Statistics
	Sher-e-Bangla Agricultural University
	Dhaka-1207

DEDICATED TO
MY
BELOVED PARENTS

ACKNOWLEDGEMENTS

ANALYSIS OF PROFITABILITY AND EXISTING MARKETING CHANNEL OF BORO RICE IN BANGLADESH: STUDY BASED ON SELECTED AREAS OF SHERPUR DISTRICT

ABSTRACT

This study was undertaken to assess the comparative profitability and existing marketing channels of boro rice production in Bangladesh. Sherpur district were selected as these are the surplus rice producing area and it was assumed that as rice is a homogeneous product so rice price moves in similar way in the whole country by excluding the transfer costs from one place to another and the findings will provide and insight about the rice market although the sampling population was very low (only 180 from different rice marketing channels including the grower's from the study areas). A total of 80 Boro producing farmers, taking 40 from each Upazila (Sreebardi and Sherpur sadar) were selected for the study. Again, a total of 100 intermediaries, taking 50 from each Upazila (Sreebardi and Sherpur sadar) such as Faria, Bepari, Arathdar, miller, and retailer were selected for this study. Survey data were collected using structured questionnaire in 2021. Tabular technique and statistical analysis were done to achieve the objectives of the study. The major findings of the study were that the cultivation of boro rice was profitable from the view point of farmers and the marketing personnels. The net margins or profits of Faria, Bepari, miller, Arathdar and retailer were estimated at Tk. 20.25, Tk.15.00, Tk. 24.25, Tk. 20.00 and Tk. 64.00 per quintal respectively. Retailer received the highest net margin of Tk. 64.00 per quintal followed by miller, wholesaler and Bepari. The lowest marketing cost might be the possible reason for the highest net margin of the retailers. Per hectare benefit cost ratio (BCR) of Boro cultivation was 1.52 was achieved by the boro rice farmers of Sherpur District Because of intensive care of land and quickly identified disease infestation and took measurable action and reduced damages. For this reason Boro farmer's production rate was higher. Among the intermediaries, Retailer's net marketing margin were the highest. The study also showed that farmers producing boro rice faced some problems, mainly related to production and marketing of the crops. It may be concluded that the farmers should be encouraged to grow more boro rice as a means of increasing farm income through diversification of crop production in the area under study.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATION AND ACRONYMS

DAE   = Department of Agricultural Extension

HYVs   = High Yielding Varieties

BRKB   = Bangladesh Rice Knowledge Bank

BADC   = Bangladesh Agricultural Development Corporation

BARI   = Bangladesh Agricultural Research Institute

BBS   = Bangladesh Bureau of Statistics

BKB   = Bangladesh Krishi Bank

cm   = Centimeter

CDP   = Crop Diversification Programmers

DAM   = Department of Agricultural Marketing

et al.   = et alia (and others)

etc.   = et cetera

gm   = Gram

GOEP   = Government of East Pakistan

ha.   = Hectare

HYV   = High Yielding Varieties

i.e.   = That is

Kg   = Kilogram

m. tons = Metric Tons

MS   = Master of Science

No.   = Number

pp.   = Pages

Tk.   = Taka (Bangladeshi currency)

USDA   = United States Department of Agriculture

Some Marketing Concepts

Market and Marketing: The term market has got a variety of meanings. Abbott and Makeham (1979), defined market as an area in which exchange can take place. It also means the people living there who have the means and the desire to buy a product. Thus, there can be a "local" market, a "domestic" market, and a "world" market. The limits of this kind of market are set not by a physical boundary fence but by the ease of communication, transportation, political and monitory barriers to the free movement of goods and money. Mendoza (1995) also defined marketing as a system because marketing usually comprises several interrelated structures along the production, distribution and consumption units underpinning the economic process. According to Casavant *et al.* (1999), marketing encompasses all of the business activities performed in directing the flow of goods and services from the producer to the consumer or final user. These activities are usually classified into six stages. These are: production, assembly, processing, wholesaling, retailing and consumption.

Marketing Channels: According to Giles (1973), the term "channels of distribution" refers to the system of marketing institutions through which goods or services are transferred from the original producers to the ultimate users or consumers. Most frequently a physical product transfer is involved, but sometimes an intermediate marketing institution may take title to goods without actually handling them.

Marketing Efficiency: Market efficiency is defined as the movement of goods from producers to consumers at the lowest cost consistent with the provision of the service that consumers desire and are able to pay for. The efficiency of a market can be evaluated (one approach) through analysing the existing channels according to price and service provided. The prevailing price should reflect cost plus a profit margin and the profit must be just sufficient to reward investment at the going rate of interest rate. The quality of service should be neither to high nor too low in relation to cost and consumer's desire. Factors that count for efficiency can also be evaluated by examining marketing enterprises for structure, conduct and performance (Abbott and Makeham, 1981). The marketing efficiency model is stated from shepherd's formula. Market efficiency of 100% is perfect efficiency. While above 100% is excess profit. Shepherds formula is given by (Oscar and Chukwuma, 2008).

$$E = \frac{V}{I} - 1$$

Where,

E = market efficiency,

V = Value of marketed Rice (value added or profit),

I= Total marketing cost. Marketable Surplus:

According to Atteri *et al.* (2003), marketable surplus can be defined as the residual production of agricultural produce left with the producer after meeting his requirements of family consumption, farm needs (seed and feed), kind payments, etc. The importance of increasing marketable surplus for meeting the increasing demand for food, raw materials and other agricultural products by the non-farming population is well recognized. If the size of marketable surplus in an economy does not rise, it may well contribute a fundamental limiting factor on the tempo of development by reducing supplies available for urban consumption, for industries and exports.

CHAPTER 1

INTRODUCTION

1.1 General Background

Bangladesh's primary meal is rice, which is also a symbol of food security. Many populations in Asia, Central America, the Caribbean, and Africa rely heavily on rice for their sustenance. 95% of the world's production is produced in developing nations, with China and India alone accounting for about half of it. While Bangladesh's population was around 70.88 million in 1971, the nation produced roughly 10.59 million tons of rice overall. To feed its 160 million citizens, the nation is now generating roughly 33.2 million tons. The introduction of contemporary Boro rice cultivars was primarily responsible for this rise in rice output. The Department of Agricultural Extension (DAE) has estimated that 36.40 million tons of Boro rice was produced in the country during 2020-2021, apparently crossing the official production target. The output of hybrid rice and High Yielding Varieties (HYVs) was discovered to be better this year, according to DAE field level authorities. The maximum yield (10 t/ha) during the current Boro season was produced by the super hybrid rice variety SL-8H, which was just introduced in Bangladesh.

Regrettably, 220 acres of agricultural land are being transferred daily to non-agricultural uses. As the amount of arable land has decreased due to the rapid population expansion, Bangladesh has continued to have an annual shortfall of roughly 1.5 million tons of food grains despite a tripling of rice output since the introduction of new varieties in the early 1970s. Nonetheless, the nation produces over 30 million tons of rice annually, which is nearly enough to feed its population of over 150 million people. Seasonal variations affect Bangladesh's rice output. Nowadays, Boro from January to June and Aman from July to December and March to July have the largest harvests.

1.2 Present Status of Bangladesh Agriculture

Bangladesh is primarily an agricultural nation, and the sector's contribution to rapid economic growth is crucial. In order to guarantee long-term food security for humans, it is crucial to create a lucrative, sustainable, and environmentally friendly agricultural system. Bangladesh's broad agricultural sector has been given top emphasis in an effort

to make the country food self-sufficient. The Government made the decision to grow the whole agricultural sector while keeping in mind the objectives outlined in the National Agricultural Policy and the Seventh Five Year Plan. Over the last few years, there has been an increasing trend in food production. Agriculture sector plays an important role in overall economic development of Bangladesh. The agricultural sector (crops, animal farming, forests and fishing) contributes 11.63% (BBS, 2022) to the country's GDP, provides employment about 39% of the labour force according to Quarterly Labour Force Survey 2021-22 (BBS, 2022). Moreover, agriculture is the source of wide range of consumer demanded agricultural commodity markets, especially in rural areas.

In 2018/2019, the total production of rice in Bangladesh was 36,391,000 (36.4 million) metric tons (MT), of which boro rice accounted for 53.8 percent; aman rice, 38.6 percent; and aus rice, 7.6 percent. In 2019, boro rice prices in Bangladesh were depressed due to a bumper harvest of the boro rice crop. GDP From Agriculture in Bangladesh averaged 9012.60 BDT Million from 2015 until 2020, reaching an all-time high of 10739.10 BDT Million in 2021 and a record low of 7017.10 BDT Million in 2016. (BBS, 2022). According to the final estimate of BBS, the volume of food grains production in FY 2020-21 stood at 388.17 lakh MT of which Aus accounted for 22.89 lakh MT, Aman 134.83 lakh MT, Boro 189.38 lakh MT, wheat 13.48 lakh MT and maize 27.59 lakh MT. In FY 2001-21 food grains production stood at 388.14 lakh MT of which Aus accounted for 21.33 lakh MT, Aman 136.56 lakh MT, Boro 180.24 lakh MT, wheat 14.23 lakh MT and maize 35.78 lakh MT.

Table 1.1 Production, area and yield of Boro rice in Bangladesh

Year	Production ('000' ton)	Area ('000'ha.)	Yield (ton/ha.)
2015-16	18937	4770	3.92
2016-17	18014	4780	3.94
2017-18	18013	4475	4.02
2018-19	19575	4859	4.03
2019-20	19645	4762	4.12
2020-21	19885	4786	4.15
2021-22	20185	4815	4.19

Source: Bangladesh Bureau of Statistics (BBS, 2022)

1.3 Importance of Boro Rice

The incredible food grain known as rice is responsible for Bangladesh's nutrition, culture, economy, and way of life. It is the main source of nutrition for 155.8 million individuals. In light of this, achieving food self-sufficiency has been a top aim for every succeeding governments since the country's independence. The country was able to fulfill the rising demand for food grains thanks to the development of high yielding contemporary grain types of rice that are highly sensitive to inorganic fertilizer and pesticides, as well as good soil management and water control (Hayami and Ruttan, 1985). The highest percentage of the overall rice output, which has been mostly consistent over the last few decades, comes from the high yielding boro rice types. The primary food consumed by the majority of Bangladeshis is rice. As a result, there are 2.3 million new residents added to the country's population every year, which drives up the need for rice. Almost 70% of people's daily caloric intake, especially those who work hard, comes from rice. The vast majority of rural employment is provided by the rice industry, which occupies an area of around 11.53 million hectares. (HIES, 2016 and BBS, 2022). The area, production and yield rate of rice, in general and boro, in particular, for different years were shown in Figure 1.1.
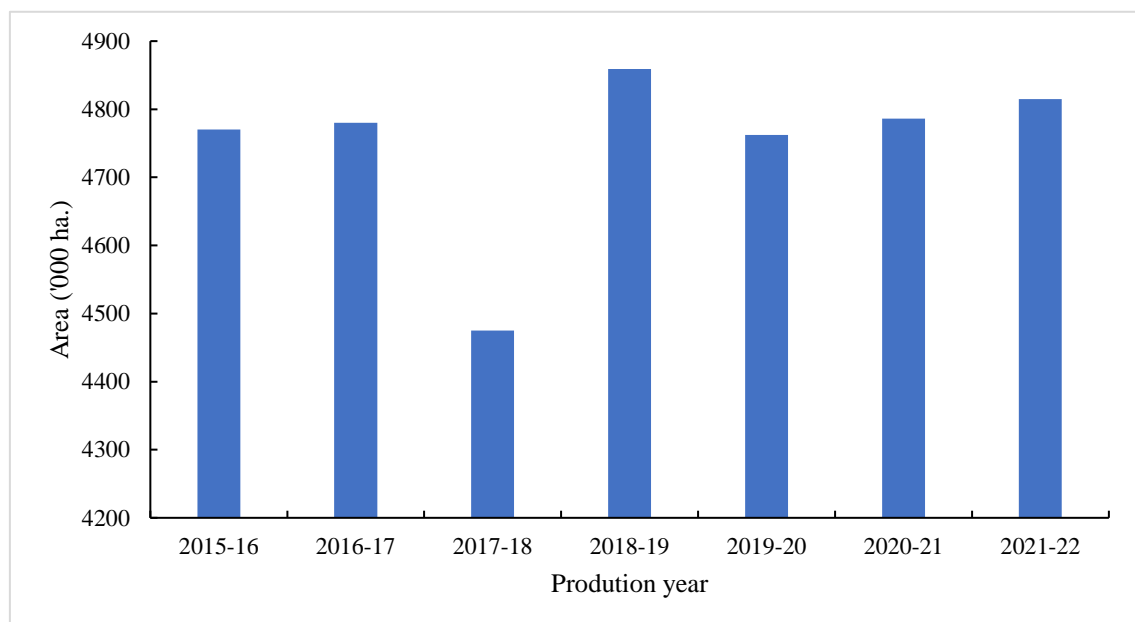
Figure 1.1 Area ('000'ha) under Boro rice cultivation.

For better understanding about the area ('000' ha) under production ('000' ton) of Boro rice and yield (t/ha) the following figures will help us. From the figure, we see that area

Boro rice in different years is more or less same but both production and yield are gradually increased over the years. Yet, because local production cannot satisfy the nation's whole need, Bangladesh must import significant quantities of rice from outside each year in order to feed its people. Imports of rice are influenced by the country's stockpiles, demand, and amount of local production during a given year. After gaining its independence, Bangladesh's population continued to rise. As a result, a significant amount of food was imported from other nations since the country's food supply could not keep up with the population's rate of development.

1.4 Boro Production in Sherpur

Department of Agricultural Extension (DAE, 2022), a total 79443 hectares of land has been brought under the Boro cultivation in the district this season and production target is 329671 tons. "Boro cultivatable land is being tilled by using power tiller and tractor, use of bullock in cultivating land has almost come to an end. Cultivation of this crop totally depends on irrigation. DAE sources a total of 300 deep tube-wells, 29633 shallow tube-wells, 33 power pumps and 1232 irrigation machineries of Teesta Irrigation Project are being used for irrigation purposes in the district.

Table 1.2. Yearly Boro Production in Sherpur

Year	Production ('000' ton)	Area ('000'ha)	Yield (t/ha)
2020-21	190668.73	47.49	4.05
2021-22	147663.05	38.51	3.93

Source: Bangladesh Bureau of Statistics (BBS, 2022)

1.5 Nutritive and Medicinal Value of Rice

For more than half of the world's population, rice is a staple diet. For 17 nations in Asia and the Pacific, 9 in North and South America, and 8 in Africa, it is the main dietary energy source. 20% of the world's dietary energy comes from rice, 19% from wheat, and 5% from maize (corn). According to a thorough review of the nutrients in rice, there are several variables that affect how nutritious rice is. It depends on the type of rice, namely whether it is white, brown, red, or black (or purple), each of which is common in different regions of the world. The majority of the calories consumed by about 40% of the world's

population come from rice. Almost 90% of people live in Bangladesh, Burma, Sri Lanka, Vietnam, and Cambodia. Bengali culture is closely linked with rice.

Table 1.3 Nutrients from Per 100 gm Rice

Composition	Rice
Calories (k. calorie)	325.00
Moisture content (percent)	13.30
Carbohydrate (percent)	79.00
Protein (gm)	6.40
Fat (gm)	0.40
Thiamin	0.21
Riboflovine	0.09
Calcium (Ca) (mg)	9.00
Iron (Fe) (mg)	1.00

Source: Wahed and Anjan, 2008

Importing food may have a significant opportunity cost since it discourages investment and slows economic progress (Ghatak and Ingersent, 1984). Hence, the performance of the agricultural sector is inextricably tied to the entire performance of the economy (Matin, 2004). It follows that Bangladesh must expand its agricultural industry in order to achieve economic prosperity. Bangladesh has a total area of approximately 14.845 million hectares, of which 53.89% is arable, 3.16% is now fallow land, and the remaining 42.95% is made up of settlements, rivers, tidal creeks, lakes, ponds, highways, and other natural features. (BER, 2020).

So, there is just a little window of opportunity remaining to boost agricultural output by cultivating new land. Yet, employing High Yielding Varieties (HYV) and implementing better management and cultural practices might increase agricultural productivity. The majority of Bangladesh's agricultural progress in the past has been focused on the production of food grains, namely rice. Tubers, pulses, spices, oilseeds, roots, and other minor crops saw a fall in productivity as a result of the massive growth in rice production. (Baset, 2003). Thus, Bangladesh has to import spices at the cost of its hard-earned foreign currency. Realizing the importance of minor crops for the improvement of nutritional status of the people, the government of Bangladesh has taken a Crop Diversification Program (CDP) in the Sixth Five-Year Plan (2011-2015). Under the CDP strategy,

emphasis was placed to increase production and consumption of those nutrient rich foods.

1.6 Justification of the Study

Marketing and profitability are the most important aspects of the development process. This is understandable given that economic growth entails increased productive activity on a larger scale. However, we are unable to increase production until the commodities produced have been completely sold out, which is dependent on ideal marketing conditions (Prasad and Prasad, 1995). The successful sale of Boro rice has a significant impact on the revenue of farmers, processors, dealers, and consumers. Farmers, consumers, traders, investors, and others who need the information for specific reasons may benefit from it. Besides, the results also would serve as a reference for researchers to embark upon similar or related work in other parts of the country. During the past decade and a half development economist have shown a growing recognition of the positive relationship and interaction between the goals of development planning on one hand and the structure, conduct and performance of the marketing system on the other. Marketing system efficiency arises from efficient resource use in that sector without which wasteful marketing costs develop as well as qualitative and quantitative losses in the process of the creation of time form and place utility of the products. In addition, commodity prices which perform the functions of resource allocation, intersectional income distribution and capital formation, are generated within the framework of the marketing system.

These three price tasks will be inefficiently fulfilled unless a market structure contains dynamics favourable to the creation of effective pricing. Hence, this study will be valuable for exploring the current market structure. It is important to identify the reasons behind reported inefficiencies and to consider institutional and technical improvements that might improve both physical and financial performance. Even a cursory glance at the agricultural markets in developing nations will reveal how heavily the marketing system is influenced by government involvement and regulation.

Apparently, it seems that the best channel is the one in which the number of intermediaries is the least may not necessarily be the best remunerative to the producers. It is crucial to understand what fair fees for these intermediaries' services should be, as

well as the best marketing channels for certain goods. Understanding the relationship between pricing in geographically distinct markets is the fundamental tenet of market integration measurement. (Goletti and Babu, 1994). Thus integrated markets are defined as markets in which prices of differentiated products do not behave independently (Monke and Petzel, 1984). Markets are referred to as segmented if price changes for a commodity in one market have no bearing on anticipated price changes for the same commodity in other areas (Kumar and Sharma 2003). In other words, two markets are considered to be geographically integrated anytime trade occurs between them and if the price difference for a given good is equivalent to the costs of transferring that good between the two markets. Nonetheless, flaws in the market, particularly those brought on by trader activity, are typically seen as significant contributors to the emergence of divergent price fluctuations in various markets.

The main objective of the price policy is to safeguard the interests of producers and consumers. The producer's interest can best be safeguarded if he is paid appropriate prices for his product. He gets fair prices if markets are well integrated. In well integrated markets, middlemen's share should be reasonable and consumers get produce at fair prices. So it is very important to understand whether commodity markets function efficiently or not. Markets function efficiently when these are integrated in price relationships. That's why this study will be conducted with the following specific objectives.

1.7 Specific Objectives of the Study

In view of the problem as stated above, the following specific objectives were formulated for giving proper direction to the study:

a) To determine and describe some selected socio-economic characteristic of the Boro cultivators
b) To determine the profitability of Boro production.
c) To determine the marketing efficiency of Boro rice in different marketing channels.
d) To identify the problems of Boro rice marketing in the study areas.

1.8 Scope of the Study

The study's focus is solely on the marketing structure and profitability of boro rice, with particular emphasis placed on the various market levels, the roles of market participants in the market channels, price determination, the cost-benefit analysis of boro rice production, cost-margins for producers and traders, buying and selling strategies, transport and market information, as well as market integration, marketing efficiency, and profitability. So, there is a ton of room for further study in this area, including forecasting of demand and prices as well as in-depth examinations of the structure, conduct, and performance of the rice market as well as price and procurement policies.

1.9 Limitations of the Study

Collection of the trader's data was the most difficult task during the survey. Most of the time traders are reluctant to give appropriate information as they link it with taxes and different fees. Besides, they were busy and time specific during interview. Despite being aware of the effect of quality on price, the researcher was able to examine its impact because the intermediaries purchase and sell Boro rice based on their own criteria (this might be a problem in most of the agricultural markets in Bangladesh). There are some limitations of the study thus are indicated below.

a) Most of the data were collected through interview of the farmers and sometimes they did not well-cooperate with the interviewer.
b) The information was gathered mostly through the memories of the farmers which were not always correct.
c) Due to resource and time constraints, broad based and in-depth study was hampered to some extent.

1.10 Organization of the Study

With the above brief introduction, the remaining part of the thesis is organized as follows. Chapter I provided the introduction and background of the study, total production of boro rice, justification of the study with objective. Chapter II deals with review the literature, following chapter III describes the methodology whereas the results and discussion are described in chapter IV, and the summery, conclusion and recommendations are contained in chapter V.

CHAPTER II

REVIEW OF LITERATURE

In this chapter, an attempt has been made to review of pertinent literature keeping in view the problem entitled, "Analysis of Profitability and Existing Marketing Channel of Boro Rice in Bangladesh: A Study Based on Some Selected Areas of Sherpur District" Again, some of these studies may not entirely relevant to the present study, but their findings, methodology of analysis and suggestions have a great influence on the present study. Review of some research works relevant to the present studies, which have been conducted in the recent past, are discussed below.

2.1 Review of profitability studies in Boro Rice

Haile (2015) explained the determinants of technical, allocative and economic efficiencies among small scale Boro growers in the irrigation agriculture of Ethiopia. He found that land related factors described much of technical efficiencies and the socio-economic characteristics of the farmers (age, market access, training access, experience, farm income, responsibility and field visit) significantly and positively effect on both the technical and productive efficiencies. Age of households, plot distance, fertility, source of irrigation water, experience of the farmers, farm income and land fragmentation, and extension visit were treated as the major determinants of economic efficiency.

Asodiya *et al.* (2014) conducted a study to measure input use, cost structure, return and resource use efficiency in wheat production of South Gujarat division of Gujarat, India. A sample of 240 wheat farmers was selected from study area which input - output data collected based on rabi cropping season with a view to examine the input use, cost structure and returns in production and marketing of wheat and the resource use efficiency of wheat growers in year 2013-14. The studies used the log linear type Cobb-Douglas production function. The results of study revealed that the average total cost of cultivation of wheat was 45784.31. It was the highest on large farms followed by 45720.79 on medium farms, and 39016.69 on small farms. The average net profit per hectare over (Cost-C2) was ` 20017.55 and it increased with the increase in size of farms. The overall input-output ratio was 1:1.44 on the basis of total cost of cultivation. It was the highest (1: 1.48) on large farms, followed by medium farms (1:1.43), and small farms (1:1.35). The elasticity of production (Ep) of all the variables summed up to 0.66 meaning

decreasing return to scale, implying that, if these resources are increased by 1%, the output would increase by less than 1%.

Rahman *et al.* (2014) studied about the technical efficiency of fresh water golda (*Macrobrachium rosenbergii*) farming in the coastal impoldered area of Bangladesh. The study used frontier production function and inefficiency model to analyse the cross-section data. The result showed that the inefficiency factors among the golda farmers were level of education, training and farm size.

Rahman *et al.* (2013) conducted a study to estimate the technical efficiency of maize production in Bangladesh. The study used activity budgeting technique to calculate profitability and stochastic frontier production function model to measure the efficiency of maize farming. It showed that the farmers' age, education and training had positive significant impact on efficient maize production.

Baree (2012) focused a study on the overall farm-specific technical efficiency or inefficiency of Boro farms in Bangladesh. The elasticity of output with respect to land, labor and capital cost was estimated to the positive and also significant. On the other hand, seed and irrigation was found to be insignificant. The efficiency of Boro farms varied from 58% to 99% with mean value of 83% which implies that there is a scope to increase output per hectare of Boro by 17% through the efficient use of production technology.

Akter (2011) studied on profitability and resource use efficiency of BRRI Dhan29 in old Brahmaputra floodplain area of Tangail district with a sample of 60 farmers using Cobb-Douglas production function and found that total return of BRRI Dhan29 was higher than total cost. Banu (2011) studied on economic analysis of BR-28, BR-29 and Hybrid Hira rice production in Kurigram district with a sample of 90 farmers considering Cobb-Douglas production function and found that Hybrid Hira was more profitable than BR - 28 and BR-29 rice as the net return was much higher than BR-28 and BR-29.

Kamruzzaman (2011) studied on economic potential of BRRI Dhan-51 and BR-11 rice production in Rangpur district with a sample of 60 farmers considering Cobb Douglas production function and found that BRRI Dhan-51 had higher gross return than BR-11. Kana (2011) studied on economic analysis of salt tolerant Binadhan-8 and HYV BRRI Dhan28 rice production in Satkhira district with a sample of 60 respondents using Cobb

Douglas production function and found that total return of Binadhan-8 was greater than total return of BR-28.

Ahmed (2009) conducted a comparative economic analysis of boro rice and Boro production in some selected areas of Mymensingh district. Both boro rice and Boro were profitable. Boro cultivation was more profitable than boro rice cultivation. Per hectare average yield of boro rice and Boro were 6000 kg and 16302 kg, respectively. Per hectare total cost of production, gross margin and net margin of boro rice were Tk. 58202.74, Tk. 39402.2 and Tk. 24117.26, respectively. On the other hand, the corresponding figures for producing Boro were Tk. 120221.71, Tk. 155436.23 and Tk. 142403.51, respectively.

Hanifa (2009) studied on economic analysis of BR-29 and Hybrid Hira rice production in Netrokona district with a sample of 80 farmers using Cobb-Douglas production function and found that total returns from Hybrid Hira rice per hectare was higher than BR-29.

Siddiqui (2008) studied on economic profitability of BRRI Dhan33 and BR-11 rice production in Kurigram district with 60 farmers using Cobb-Douglas production function and found that gross return for BRRI Dhan33 was higher than BR-11. Ullah (2008) studied on comparative profitability and technical efficiency of aromatic and non-aromatic aman rice production in Sherpur district with a sample of 60 farmers using stochastic frontier analysis and found that profitability of BRRI Dhan 34 (aromatic) was much higher than BR-11 rice (non-aromatic) as the total return from BRRI Dhan 34 was higher than BR-11.

Islam *et al.* (2007) carried out a study to examine the income and price elasticities of demand for different types of rice in Bangladesh. The total budget for cereal field allocated to aromatic, fine, course rice and wheat was 4.0%, 23.3%, 65.2% and 7.5% respectively. The estimated expenditure elasticities of demand for those types of cereal were 0.85, 0.79, 0.29 and 0.55 respectively.

Majid and Haque (2007) conducted a study on Monga mitigation for employment and food security increase through early aman rice production and crop diversification in greater Rangpur region of Bangladesh. Introducing of cash crop in Boro growing time (early to late November) contributed more productivity (32.4 -39.3 MT/ha) than Rice-Non-Rice system as Rice-Rice (13.2 MT/ha). The highest rice equivalent yield associated

with early Aman Rice-Boro-Mungbean (37.4 MT/ha) and Early Aman Rice-Boro-Rice (Bolan/older seedling of BRRI Dhan-33) (32.4-32.6 MT/ha). However, early Aman Rice-Boro-Mungbean gave lower productivity than Rice-Boro Relay Maize/Maize but Mungbean added some biomass in the soil for soil health.

Mondal (2005) attempted to measure and compare resource use, efficiency and relative productivity of farming under different tenurial conditions. It is found that total cash expenses as well as total gross cost producing HYV boro rice was highest in owner - cum-tenants owned land than in rented in land. When individual inputs were concerned it was observed that expenses on human labour shared a major portion of expenses in the production of HYV boro rice under all tenure groups. The fertilizer cost in owner's own land was significantly different from that of tenant's rented land. It was found that owner farmers were more efficient than owner-cum-tenant and tenant farmers. Again, owner-cum-tenants were more efficient in production in the case of his owned land than in rented in land.

Anik (2003) studied on economic and financial profitability of aromatic and fine rice production in Sherpur and Sherpur district with a sample of 100 farmers using Cobb-Douglas production function and found that aromatic rice was more profitable than fine rice as the net return was higher than fine rice. Thakur (2003) studied on local boro and hybrid boro rice production in Brahmanbaria district with a sample of 60 farmers considering Cobb-Douglas production function and found that the net return of hybrid Boro rice was 15.04% higher than local boro rice.

Quazi and Paul (2002) conducted a study on comparative advantages of crop production in Bangladesh. In their study, the economic profitability analysis demonstrates that Bangladesh has a comparative advantage in domestic production of rice for import substitution. However, at the export parity price, economic profitability of rice is generally less than economic profitability of many non-rice crops, implying that Bangladesh has more profitable options other than production for rice export. Several non-cereal crops, including vegetables, Boroes and Boros have financial and economic returns that are as high as or higher than those of High Yielding Variety (HYV) rice.

Rahman *et al.* (2002) attempted to measure the technical efficiencies obtained by owner operated farming and share cropping for boro, aus and aman rice were 86%, 93% and

80%, respectively whereas mean technical efficiencies obtained by sharecroppers for boro, aus and aman rice were respectively 73%, 76% and 72%. The study reveals that owner operators were technically more efficient than sharecroppers in the production of all the rice crops. To reduce the difference of technical efficiencies between owner operator and sharecropper a perfect leasing system is inevitable.

Zaman (2002) conducted a study to accomplish a comparative analysis of resource productivity and adoption of modern technology under owner and tenant farms. It was found that gross cost for producing HYV boro rice were the highest in owner farms and the lowest in tenant farms. Owner operators used more hired labour where tenant operators used more family labour. The maximum return over total cost per hectare was obtained by owner operators and minimum by tenant operators. it was also found that the degrees of adequacy level in the application of modern farm inputs were higher in owner farms than in tenant farms.

Akter (2001) conducted a study on relative profitability of alternate cropping patterns under irrigation condition in some selected area of Barguna district. The relative profitability of 5 dominant cropping patterns in two villages of Barguna district Bangladesh was assessed. The cropping patterns considered were

(1) T. Aus Rice -T. Aman rice-HYV Boro rice;
(2) T. Aus rice-T. Aman rice-wheat;
(3) T. Aman rice-Jute HYV Boro rice;
(4) T. Aman rice -chilli-fallow; and
(5) T. Aman Rice-Jute-Boro.

Data were obtained through interviews with 60 farmers 10 farmers from each cropping pattern during June-August 2000. Cropping pattern 1 had the highest per hectare gross margin (Tk. 43312) and net return (Tk. 27643). While cropping pattern 4 had the lowest gross margin (Tk. 29575) and net return (Tk. 19000). The inclusion of HYV boro rice as a third crop in the cropping pattern increased bom income and employment. Islam (2001) studied on economic potential of Bina-6 rice production in Mymensingh district with a sample of 55 farmers considering Cobb-Douglas production function and found that BINA-6 rice production was profitable because the total return was much higher than total cost of production.

Ali (2000) attempted to measure and compare resource use and land productivity within tenure groups. Total gross cost for producing aman, boro and aus were the highest in owner farms and the lowest in tenant farms. It observed that owner operators used higher level of inputs than owner-cum-tenant and tenant operators. Rice owner-cum-tenant operators obtained higher yield in Aman and Aus production then owner and tenant operators. In Boro rice production tenant operators obtained maximum net return than owner operators and owner-cum- tenant operators in owner land. Finally, it was concluded that tenancy affects positively on resource use and production in a predictable fashion even in small scale peasant agriculture.

2.2 Review of marketing studies in Boro Rice

There are a series of micro and macro level studies on the economics of boro rice mostly emphasizing the production and farm management aspect have been conducted in Bangladesh and abroad. However, the marketing aspect of rice remains relatively neglected and studies on the price behaviour of the intermediaries are also very scanty. In Bangladesh, several empirical studies on pricing efficiency, market integration, market structure and performance, price behaviour, price margin etc. on different agricultural crops including rice have been undertaken since 1960. Some of the studies may not be entirely relevant to the present study, but their findings, methodology and suggestions have a great influence on the present study. Therefore, this section provides a brief review of the studies related to the present study that was conducted in Bangladesh and abroad.

Islam *et al.* (2017) studied on Evaluation of Boro Rice (*Oryza sativa* L.) Production in Less Irrigated Situation in Northern Region of Bangladesh. They found that About 20 to 60% higher grain yield was observed in different farmer's field with BRRI dhan48 over BRRI dhan28, which indicated that BRRI dhan48 is a potential rice variety during Boro season. BRRI dhan48 can be cultivated after Boro harvest or as Boro, Aus after potato harvest. The variety could also reduce the pressure on ground water utilization for rice cultivation during dry season.

N. Chhogyel and Y. Bajgai (2015) to increase rice productivity, interventions like vigorous promotion of modern varieties, providing increased access to irrigation water and farm mechanization, capacity development of farmers and extension 13 staff, and so

on are pursued. Despite all the efforts and initiatives, technology adoption is still quite low and use of modern rice varieties needed a thorough review to reenergize and launch intensified rice development program in the major rice growing areas. The need of the hour is to have higher yielding varieties with resilience to biotic and abiotic stresses.

The national rice variety adoption rate is 42% (Ghimiray, 2012) and it is imperative to assess the impacts of technology promotion drives initiated and implemented over the years. Since the promotion of modern varieties was the cornerstone of the development agenda, this article investigates the rate of adoption of modern rice varieties, an important impact of the various initiatives.

Ismail and Verbeke (2010) conducted a study on "Evaluation of rice markets integration in Bangladesh" and they put emphasis on the liberalization of the agricultural sector in general and the rice subsector in particular that has been a major component of Bangladesh's structural adjustment program initiated in 1992. However, the government has continued to intervene in the rice subsector. Basically their paper examined whether the regional/divisional rice markets was spatially integrated following the liberalization of the rice market or not. Wholesale weekly coarse rice prices at six divisional levels over the period of January 2004 to November 2006 were used to test the degree of market integration in Bangladesh using co-integration analysis and a vector error correction model (VECM). The Johansen co-integration test indicated that there were at least three co-integrating vectors implying that rice markets in Bangladesh during the study period were moderately linked together and therefore the long-run equilibrium was stable. The short-run market integration as measured by the magnitude of market interdependence and the speed of price transmission between the divisional markets was weak.

Tasnoova and Iwamoto (2006) examined the marketing systems of Kataribough rice in Bangladesh with the help of primary data that was collected purposively from 24 farmers and 65 intermediaries from Sadar Thana of Sherpur district. Primary data were collected during the months of January and March, 2000. Attempts were made to identify the marketing system of Kataribough rice to estimate marketing costs and margins as well as investigate marketing problems with probable suggestive measures. Faria, Bepari, the miller, Arathdar and the retailer who were involved in Kataribough rice marketing formed a complex marketing channel in the study area. The total marketing cost of Kataribhog boro rice/rice incurred Faria, and Bepari were Tk.28.44 and Tk.34.00 per

quintal while the marketing cost by the miller, Arathdar and retailer were Tk.92.90, Tk.16.79 and Tk.7.21 per quintal respectively. The marketing margin of Faria, Bepari, the miller, Arathdar and the retailer were Tk.38.50, Tk.49.45, TK.118.98, Tk.39.07 and Tk.45.58 per quintal respectively. The margin was the highest for the millers followed by Bepari, the retailer, Arathdar and Faria. Regarding net margin, retailer received the highest net margin (38.37) followed by miller (26.08), Arathdar (Tk.22.28) and Bepari (Tk.15.45). The Faria obtained the lowest net margin (Tk.10.06). Major problems faced by the farmers and intermediaries were lack of 18 capital, poor communication and transportation facilities, lack of adequate storage facilities, lack of adequate market information, higher market tolls, lack of market facilities etc. The farmers and intermediaries also suggested some solutions to these problems.

Khan (2005) conducted a research on processing of Boro rice and its marketing in selected areas of Sherpur district. The study was conducted to analyze the marketing system of rice and to assess the marketing costs and margins of different intermediaries as well as to identify problems and constraints of millers and intermediaries with probable suggestive measures. The study reveals that rice moves from the millers to consumers through some market intermediaries such as Bepari, local rice Arathdar, Arathdar-cum-wholesaler, wholesaler-cum-retailer and retailer. The total marketing costs of miller, Bepari, Arathdar-cum-wholesaler, wholesalercum-retailer, local rice Arathdar and retailer were Tk. 101.51, Tk. 58.83, Tk. 86.57, Tk. 18.34, Tk. 45.08 and Tk. 9.10 per 100 kg boro rice respectively. The marketing 17 margin of these intermediaries was Tk. 400.58, Tk. 140.50, Tk. 150.00, Tk. 75.00, Tk. 130.00 and Tk. 55.00 per 100 kg respectively. The margin was the highest for millers followed by other intermediaries. The millers also received the highest profit (Tk. 299.07 per 100 kg) followed by local rice Arathdar (Tk. 84.92 per 100 kg) and Bepari (Tk. 81.67 per 100 kg). The retailers obtained the lowest profit if Tk. 45.90 per 100 kg. Major problems faced by the millers were short supply of boro rice, credit related problem, high electricity charges, discontinuous supply of electricity, shortage of working capital and lack of proper transportation facilities. They were also provided some suggestions against these problems like availability of boro rice supply, provision of bank loan, more reasonable electric rates, uninterrupted electricity supply, availability of working capital and improvement of transportation facilities etc.

Zaman *et al.* (2001) also conducted a case study on "The role of rice processing industries in Bangladesh: a case study of the Sherpur district". The objective of that study was to investigate the processing technique and marketing of rice in Bangladesh. Rice processing industries (millers) were one of the most dominant rice-trading agencies in the study area. Their results indicate that this processing sector provides a significant number of jobs to the rural people. Seasonal employment patterns showed that employment opportunities were high during the crop seasons, especially in the Boro (spring boro rice) harvesting season. Women had higher employment opportunities than men in the researched area. The breakeven price per kilogram (kg) of rice was analysed in order to identify the margin for the mill owner. It was found that the millers selling price was higher than that of the breakeven price, indicating that rice trading is a profitable business in Bangladesh.

Zaman *et al.* (2000) conducted a case study on "The benefits of market participation and the rice marketing systems in Bangladesh" and the main objective of that paper was to identify the manner in which farmers participate in the boro rice/rice market. The volume of rice marketed and the marketing systems of surpluses are also studied in that paper. The analysis shows that small farmers benefit the least from open market participation and the price support program. 16 The two main marketing systems identified are direct selling from the home and selling at a local market. They observed different marketing channels for different groups based on farm size in the research area. Rice millers were the dominant rice traders in the surveyed area. To conclude, they point out the need to increase surpluses in order to improve the ability of small farmers to participate in the market.

Miah (1999) conducted a study on Boro rice marketing in selected areas of Tangail district. The study shows that Faria, Bepari, Miller, Arathdar and retailer who were involved in Boro rice/rice marketing formed a complex marketing channel. The margin was the highest for miller followed by Bepari and Arathdar. The millers also received the highest profit. The Arathdar obtained the lowest profit. Major problems in the study area were low price of Boro rice, poor communication and transportation facilities, inadequate credit facilities and lack of adequate storage facilities etc.

Islam (1998) examined the marketing channels, estimated marketing costs and margin and identified the problems faced by the aromatic rice producer and intermediaries in

Sherpur district. He identified a complex marketing channel in the study area which was formed by Faria, Bepari, miller, Arathdar, wholesaler, retailer and consumer. The study revealed that the highest marketing costs (Tk. 34.50/md) incurred by miller followed wholesaler (Tk. 10.59/md). On the other hand highest margin (Tk. 37.40/md) earned by miller followed retailers (Tk. 17.08/md). The profit which is average of marketing margin was highest for retailer (46.84%) followed by miller (34.09%). Major marketing problems faced by the producers and intermediaries were low price, lack of capital, poor communication and transportation system, inadequate credit facilities etc.

Uddin (1997) conducted a study of Boro rice marketing in some selected areas of Jamalpur district and found that profit and marketing cost were highest for the millers. The study reveals that lack of communication, lack of adequate market functionaries, and lack of adequate market information, price fluctuation, lack of marketing facilities 15 and lack of adequate storage facilities along with higher market toll and uncertainty in electricity supply were the major marketing problems.

Chauhan *et al.* (1994) conducted a case study of Banda district of Uttar Pradesh to analyze the economic performance of different boro rice marketing channels and identified the most efficient one. They used six performance indicators to measure the efficiency of channel. These indicators were producers share, marketing costs and margin of middlemen, price deviation, peak period seasonal price variability and lean period seasonal price variability. The producers share in the final product price in different marketing channel was highest in Channel II (63.51%) followed by channel IV and channel III (65.44 and 63.87% respectively) and was lowest in channel I (62.83%). It seemed that the producer's share in each channel was very low while the marketing costs and middlemen's margin were high. To enhance the share of the producer, the regulated markets were suggested to provide more incentives by the governments.

CHAPTER III

METHODOLOGY

3.1 Introduction

All research must include methodology as a necessary and vital component. The right approach was followed in the research, which has a significant impact on how reliable the results are. Exotic outcomes are generally the product of improper approach. A researcher must thus take careful considerations in order to follow a logical and scientific technique when doing his study. It is very important for the researcher to be very clear about the types of research designs, methods, and procedures that should be used when choosing the study areas, using sampling techniques, analysing the data that has been collected, and interpreting the findings in order to reach the correct conclusion. A chronological description of the methodology used in this study is presented below.

3.2 Selection of Study Area

Selection of the study area is an important step for any research. The study areas should be selected considering the higher concentration of boro rice production and boro rice processing mills and easy accessibility of the researcher. Therefore, the present study were conducted at Sherpur district which was purposively selected considering the higher concentration of Boro rice production, processing mills, and also the availability of logistic supports for data collection. Again, two (2) Upazilas namely Sreebardi and Sherpur sadar were selected in consultation with Agriculture Officer and Sub Agriculture Assistant Officer of the respective Upzillas for collecting primary data. A detailed description of the study district is given in the following subsequent sections and in Figure 3.1.

The study district: Sherpur district covers a area of 1359.87 sq km, located in between 24°18' and 25°18' north latitudes and in between 89°53' and 90°91' east longitudes.

It is bounded on the north by India, on the east by Mymensingh district, on the south and west by Jamalpur district. The main rivers of Sherpur district are Bramhaputra, Kongsho and Vogai. Malijhi, Shomeshwari, Nitai, Maharoshi are some minor rivers of this district. Ceramic soil is the main natural resource of this district. The annual average temperature

19

of this district varies from maximum 33.3°C to minimum 12°C. The annual rainfall is 2174 mm.

Figure 3.1 Map of Sherpur district (★ Study locations)

According to the 2011 Bangladesh census, Sherpur District had a population of 1,358,325, of which 676,388 were males and 681,937 females. Rural population was 1,170,219 (86.15%) while the urban population was 188,106 (13.85%). Sherpur District had a literacy rate of 37.91% for the population 7 years and above: 40.17% for males and 35.70% for females.

The literacy rate of this district is 62.1% The number of educational institutions of this district are Government college 3, non-government college 16, government high school 3, non-government high school 146, junior high school 27, government primary school 358, non-government primary school l46, madrasah 292, agricultural training institute 1, nursing training institute 1, vocational training institute 1. The economy of Sherpur is mainly agricultural and trading based, although non-farm economic activities performing a substantial share in the development-oriented program of the district. Majority of the population are traders and farmers. Out of total 335,460 holdings of the district, 60.12% holdings are farms that produce varieties of crops namely local and HYV rice, wheat, jute, mustard, potato, pulses, different kinds of vegetables, tobacco and others. They are also involved in trading and other business activities. Various fruits like banana, mango, black berry, coconut, betel nut, date, jackfruit, palm, jambura, bel, papaya, boroi, Monkey fruit, ataphal, salita etc. are grown. Fish of different varieties are abound in this district and as in other parts of the country. Varieties of fish are caught from rivers, tributary channels and creeks. The popular fresh water fishes comprise ruhi, catla, mrigel, kalbaus, chital, boal, airh, pangas, gazar, shoul, pabda, koi, shing, phali, bele, tengra etc. Besides, newly introduced exotic varieties of fishers are tilapia, nilotica, silver carp, grass carp etc. Besides crops, livestock and fishery are the main source of household income. Non-agricultural activities also play an important role in the economy of the district. (Banglapedia and Encyclopedia, 2022).

3.3 Sampling Design

Sampling is an important part of survey work. It was not possible to interview all the farmers and intermediaries of the study area due to time limits and resource constrains. According to the specific objectives of the study, the target population is all the people (i.e. farmers, market intermediaries, consumers) from the producing point to the consuming point of rice sector. Therefore, proper sampling is needed for representing the population. However, both boro rice farmers and intermediaries (i.e. millers, wholesalers, Beparis, Farias, and retailers) in this study were selected at random from the study areas.

A total of 80 Boro producing farmers, taking 40 from each Upazila (Sreebardi and Sherpur sadar) were selected for the study. Again, a total of 100 intermediaries, taking 50 from each Upazila (Sreebardi and Sherpur sadar) such as Faria, Bepari, Arathdar, miller, and retailer were selected for this study. Primary data were collected through

personal interview with the respondents using pre-tested interview schedule. The numbers of samples that were selected randomly from the purposively selected district are shown in Table 3.1.

Table 3.1 Category of sample respondents in the study areas.

Respondent category	Sample size	Reserve list
Farmers	80	10
Faria	20	5
Bepari	20	5
Wholrsheller	20	5
Miller	20	5
Retailer	20	5
Total	180	35

3.4 Research Instruments

The success of a research and survey depends on the proper design of the schedule. Keeping in mind the research objectives, a preliminary structured interview schedule and checklist was carefully designed for collecting data from the selected respondents. The preliminary schedule was pre-tested with a few farms of the study area by the researcher himself. During interview, if any correction, change or modifications were needed then field editing was done and thus some parts of the draft schedule were improved, modified and re-arranged in the light of the actual and practical experience gained from the pretesting. The schedule was finally developed in a simple manner so that accurate information could be obtained without repetition and misunderstanding. Researcher followed the main aspects of a schedule viz. the general form, question sequence and question formulation and wording to prepare schedule. Different set of questionnaires was prepared for different group of intermediaries. Questionnaire had contained such type of questions which are relevant (i.e. cost of production, cost of buying and selling, cost of milling, number of mills, buying and selling price of different intermediaries in different channel, etc.) to the study.

3.5 Type of Data and Its Sources

To fulfil the stated objectives of the present study both primary and secondary data were needed and collected from different sources. The type of data and their sources are described in the following sub-sequent sections.

Primary data: Generally, cross-sectional data are data on one or more variables collected at the same point in time (Gofran, 2005). The researcher collected data on buying and selling cost of boro rice from intermediaries, cost of boro rice cultivation from farmers, and problems faced in producing and running boro rice and business from respectively producers and intermediaries at a specific point in time from the study areas. Primary data were collected through personal interview with the respondents of the study areas.

Secondary data: The study also used secondary data which were mostly time series data in nature. Time series data may be collected at regular time intervals, such as daily, weekly, monthly, quarterly, annually, etc (Gofran, 2005). Secondary data were collected from different published sources, such as DAE, BBS, BRAC, DAM, BRRI, Internet, research reports, publications, DD office of Sherpur district, etc.

3.6 Period of Data Collection

Data were collected from the selected producers and traders of Boro rice. The peak and the lean period of Boro rice in the study areas were opined to be April-June and July-September respectively. However, data for this study were collected from Sreebardi and Sherpur sadar Upazila during January-February 2022.

3.7 Collection of Data

Data were collected from the respondents through face-to-face interviews by the researcher himself. During data collection the objectives of the study were clearly explained to the respondents so that they could respond freely. The traders were interviewed at boro rice markets and Haats. Producers were interviewed at the selected Upazilas under Sherpur district (Sreebardi and Sherpur sadar). The respondents were interviewed during their leisure time so that they could respond easily. The questions were asked systematically in a very simple manner and the information was recorded on

the interview schedule. In order to minimize errors, data were collected in local units. However, those units were later converted into standard unit.

To overcome errors and to ensure the accuracy of data from the field/study area, all possible measures were taken. Such as, after completion of each interview, each schedule was checked and verified to make sure that answer to each item had been properly recorded. If there were any items which were overlooked and contradictory, the respondents were again interviewed for relevant correction. Adequate measures were taken to make the information was reliable and accurate and thereby to make them meaningful for the present study. The data collected through a pre-tested questionnaire included the followings:

(1) Data on quantity of Boro rice marketed, price of Boro rice supplied, total acreage of Boro rice cultivated, expenditure on factors of production, distance from market, size of output, access to market, market information, land holding, credit access, family size were collected.

(2) b) Purchase and sale price of Boro rice and costs involved in different aspects of Boro rice marketing were collected and used to analyse the marketing cost, margin, and profit of different intermediaries.

d) Data on market information system, exchange arrangements, system of storage, transport facilities, price setting strategy, purchasing strategy, selling strategy, barriers to entry were collected from sample informants using questionnaire, and these were used to investigate the structure and conduct of the Boro rice market.

3.8 Pre-testing the questionnaire

The questionnaire was pre-tested to examine the time necessary to complete the interview, test the reliability i.e. whether it captured the information desired, and also investigated the consistency whether the information gathered by it was related to the whole purpose of the survey. The test had also targeted to check the logistics required for successful operation of the survey. In order to ensure the best performance of the questionnaire in respect of data collection, processing and analysing, the pre-testing was carried out during the month of December 2021 and January 2022 prior to the survey at selected Upazila (Sreebardi and Sherpur sadar) of Sherpur District. Myself chosen some of the farmers at random as the respondents.

3.9 Finalization of the Questionnaire & Method of Data Collection

After addressing all the changes following the recommendations evolved from the pre-test, the questionnaire was placed to my supervisor. My supervisor also put notable contribution to the questionnaire. Eventually, the questionnaire had been finalized with the approval. Face to face interview had been carried out following questionnaire.

3.10 Data editing and coding

The first step was taken to scrutinize the data of each and every schedule to find out any inconsistency or omission in the data collection and to avoid irrelevant information. The data were edited carefully to eliminate possible errors contained in the schedules while recording information. Processed data were transferred to excel spread sheet and compiled with a view to facilitating tabulation. Information was collected initially in local units. After checking them these were converted into quantitative form by using suitable scoring. Necessary tables were prepared by summarizing the data. The collected data were analysed according to the objectives of the study. Inconsistencies in the data were removed.

3.11 Data processing

Data processing involved many steps that were very important because it affected survey results according to the involved steps. During data processing following steps had been taken. Data entry > Appending and Merging files > Data validation (further computer checking, editing, and imputation) > Final decision on errors > Completion of data processing and generation of data files > Final documentations > Conversion of data files to another software. > Storage of all files.

3.12 Processing, tabulation and analysis of data

The collected data were manually edited and coded. Then all the collected data were summarized and scrutinized carefully. Moreover, data entry was made in computer and analyses were done using the concerned software Microsoft Excel and SPSS-26. It may be noted here that information was collected initially in local units. After necessary checking it was converted into standard international units.

3.13 Analytical Techniques

Data were analysed with a view to achieving the objectives of the study. Several analytical methods were employed in the present study. Tabular method was used for a substantial part of data analysis. This technique is intensively used for its inherent quality of purporting the true picture of the farm economy in the simplest form. Relatively simple statistical techniques such average and arithmetic mean or average were employed to analyse data and to describe socioeconomic characteristics of boro growers.

3.13.1 Profitability Analysis

The net returns of boro were estimated using the set of financial prices. The financial prices were market prices actually received by farmers for outputs and paid for purchased inputs during the period under consideration in this study. The cost items identified for the study were as follows-

- Land preparation
- Human labour
- Seedlings
- Urea
- TSP
- MoP
- Insecticide
- Irrigation
- Interest on operating capital
- Land use

The returns from the crops were estimated based on the value of main products. In this study variable cost, fixed cost and total cost had been described. Total variable cost (TVC) included land preparation, human labour, seedlings, organic manure, urea, TSP, MoP, insecticides, irrigation and interest on operating capital. Fixed cost (FC) included only rental value of land. Total cost (TC) included total variable cost and fixed cost.

Cost of Land Preparation

Land preparation considered one of the most important components in the production process. Land preparation for boro production included ploughing, laddering and other activities needed to make the soil suitable for planting seedling. It was revealed that the number of ploughings varied from farm to farm and location to location.

Cost of Human

Labour Human labour cost was considered one of the major cost components in the production process. It is generally required for different operations such as land preparation, sowing and transplanting, weeding, fertilizer and insecticides application, irrigation, harvesting and carrying, threshing, cleaning, drying, storing etc. In order to calculate human labour cost, the recorded man-days per hectare were multiplied by the wage per man-day for a particular operation.

Cost of Seed

Cost of seed varied widely depending on its quality and availability. Market prices of seeds of respected boro rice were used to compute cost of seed. The total quantity of seed needed per hectare was multiplied by the market price of seed to calculate the cost of seeds for the study areas.

Cost of Urea

Urea was one of the important fertilizers in boro production. The cost of urea was computed on the basis of market price. In order to calculate cost of urea the recorded unit of urea per hectare were multiplied by the market price of urea.

Cost of TSP

The cost of TSP was also computed on the basis of market price. In order to calculate cost of TSP the recorded unit of TSP per hectare were multiplied by the market price of TSP.

Cost of MoP

Among the three main fertilizers used in boro production, MoP was one of them. To calculate the cost of MoP per hectare, the market price of MoP was multiplied by per unit of that input per hectare for a particular operation.

Cost of Insecticides

Farmers used different kinds of insecticides for 5-7 times to keep their crop free from pests and diseases. Cost of insecticides was calculated based on the market price of the insecticides which was used in the study areas per hectare.

Cost of Irrigation

Water management helps to increase boro production. Cost of irrigation varies from farmers to farmers. It was calculated based on how many times irrigation was needed per hectare and what was its cost. Interest on Operating Capital Interest on operating capital was determined on the basis of opportunity cost principle. The operating capital actually represented the average operating cost over the period because all costs were not incurred at the beginning or at any single point of time. The cost was incurred throughout the whole production period; Hence, at the rate of 12% per annum interest on operating capital for four months was computed for chili. Interest on operating capital was calculated by using the following formula:

$IOC = AIit$

Where,

IOC = Interest on operating capital

i = Rate of interest

AI = Total investment/2

t = Total time period of a cycle

Land Use Costs

Land use cost was calculated on the basis of opportunity cost of the use of land per hectare for the cropping period of four months. So, cash rental value of land has been used for cost of land use.

Calculation of Returns

Gross Return Per hectare 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.

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.

Gross margin = Gross return – Variable cost

Net Return

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

Net return = Total return – Total production cost.

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 (Gross return)/Total cost

3.13.2 Marketing channel analysis

Estimation of marketing cost

The total marketing cost incurred by the growers and intermediaries in a channel was estimated by the following formula:

$$MC = MC_p + MC_{m1} + MC_{m2} + MC_{m3} + \ldots\ldots\ldots + MC_{mi}$$

Where,

MC = Total marketing cost in a channel

MC_p = Marketing cost paid by the producer

MC_{mi} = Marketing cost incurred by the ith intermediaries in the process of buying and selling of rice in a channel (i= 1, 2. 3………………………n).

Estimation of gross marketing margin

Gross marketing margin is the difference between purchase price and sale price. Marketing margin can be calculated by the following three methods:

a) By selecting specific lots of truckloads of any commodity and tracking them through the marketing system.

b) By estimating the difference between the purchase and sale prices of the quantity handled at different points in the marketing channel.

c) By comparing prices at different level of marketing.

The relative advantage of these methods depends on the particular objectives of the study and the interest of the investigator. In the present study marketing margin has been computed using the second method of calculation. Marketing margins of different groups of intermediaries are calculated separately to examine their relative performance of marketing activities. In this study, marketing margin was estimated by the following formula:

$$MM_g = P_s - P_P,$$

Where,

MM_g = Gross marketing margin

P_s = Sale price of Boro rice

P_p = Purchase price of Boro rice

Net marketing margin

Net marketing margin or profit was found by the difference between gross marketing margin and marketing cost. It was determined by using the following formula:

Net margin (Tk./quintal) = Gross marketing margin (Tk./quintal)-Marketing cost (Tk./quintal)

3.14 Problems Faced During Data Collection

During the period of data collection, the following problems were encountered by the researcher:

1. Most of the respondents were not well educated in the study areas. They had no previous idea about such a study. They were suspicious about the researcher and therefore did not want to cooperate for the first time and it was therefore difficult to explain the purpose of this research to convince them. At last the respondents were convinced due to our efforts.

2. Sometimes the producers and intermediaries were not available at their home or their business premises because they remained busy with their outside works. That is why; sometimes more than single visit was required to get information from them. So, the researcher had to give extra effort and time to collect the relevant information.

3. Generally, most farmers in Bangladesh do not keep written records on annual or daily transactions or activities. So, it was difficult to some extent to collect data and the researcher had to rely completely on the memory of the farmers.

CHAPTER IV

SOCIO-ECONOMIC CHARACTERISTICS OF THE FARMERS

4.1 Introduction

Socio-economic background and characteristics of the Boro rice farmers influence the area under Boro rice production and marketing and marketing behaviour to a great extent. So, a brief description of characteristics is necessary for analysing the main objectives of the present study. Therefore, information regarding age, family composition, level of education, occupation, annual income etc. of the respondents was collected for the study. A brief description of these characteristics is presented below.

4.2 Age Distribution

After collecting data, the respondents were classified into three age groups such as 0 to 35 years, 36 to 50 years and above 50 years. Age of the farmers ranged from 30 to 72 years, the average being 57.38 years. All the variables were categorized on the basis of their possible scores except age was categorized based on the classification provided by the Ministry of Youth and Sports, Government of the People's Republic of Bangladesh. The distribution of the Boro rice farmers according to their age is shown in Table 4.1.

Table 4.1 Age distribution of Boro rice farmers according to farm size

Categories	Farmers		Mean
	Number	**Percent**	
Young aged (0-35)	6	7.50	
Middle-aged (36-50)	53	66.25	
Old (>50)	21	26.25	57.38
Total	80	100	

Source: Field survey, 2021

Table 4.1 showed that the highest proportion 66.25% of the farmers fell in the "middle aged" category, while 7.50% of them fell in the "young aged" category and 26.25% in the "old aged" category. The findings indicate that a large proportion (97.1) of the farmers were middle to old aged.

4.3 Education distribution of farmers

The education scores of the farmers ranged from 0 to 12. The average was 6.04. On the basis of their educational scores, the tomato growers were classified into four categories, namely "illiterate (0-0.5), primary (1-5), secondary (6-10) and above secondary (above 10). This distribution was supported by Hoque (2016) and Munda, (2007) and shown in the Table 4.2.

Table 4.2 Distribution of the farmers according to their education

Categories	Farmers		Mean
	Number	**Percent**	
Illiterate (0-0.5)	11	13.75	
Primary level (1-5)	16	20.00	
Secondary level (6-10)	35	43.75	6.04
Above secondary level (>10)	18	22.50	
Total	80	100	

Source: Field survey, 2021

Similar result was observed by Nasreen *et al.* (2013) where highest numbers of respondents were completed up to secondary education level. Table 4.2 indicated that the majority (43.75%) of the farmers had secondary level of education compared to 13.75% of them having illiterate. About 20% of the farmers were primary level education, while 22.50% had above secondary level of education.

4.4 Family size

To describe the family size of the respondents, the category has been followed as represented by 31 Poddar (2015). Family size scores of the fanners ranged from 3 to 9 with an average of 5.37. According to family size, the respondents were classified into three categories as shown in Table 4.3. Data contained in Table 4.3 indicates that (47.50%) of the farmers had medium family while 21.25% of them had large family and 31.25% of them had small family. Thus, about two third (68.75%) of the farmers had medium to large family.

Table 4.3 Distribution of the farmers according to their family size

Categories	Farmers		Mean
	Number	**Percent**	
Small family (3-4)	25	31.25	
Medium family (5-6)	38	47.50	5.37
Large family (above 6)	17	21.25	
Total	80	100	

Source: Field survey, 2021

4.5 Occupational Status

The main occupation of farmer was that occupation which was the main source of family income i.e. from which most of the income was earned. Table 4.3 shows that agriculture was the main occupation for 74.25% of farmers followed by business and service 25.75%. It was observed that agriculture was found to be the main occupation of the majority of sample farmers which was 74.25%, 41.25% and 54.25% for the small, medium and large farmers respectively. The rest of the farmers in each category reported either business or service as their main occupation.

Table 4.4 Occupation of the Boro rice producers according to farm size (in%)

Farm Size	Agriculture	Business	Service
Small (≤0.02 ha.)	74.25	25.75	0.00
Medium (0.021-1.00 ha.)	41.25	28.50	30.25
Large (>1 ha.)	54.25	30.50	15.25

Source: Field survey, 2021

4.6 Household Income

Agriculture being the main occupation of the selected farmers, their income mainly came from agriculture. Sources of income included also business and service. Total annual income of the respondents was TK. 68,000, TK. 87.500 and TK. 115,500 for small, medium and large farm size. Average income of them was TK. 5800.50, TK 7150.50 and 9535.50 respectively. According to Table 4.5, average income was the highest for the large farmers followed by the medium and small farmers due to the fact the large farmers possessed more land were more educated and had large business.

Table 4.5 Annual household income of the Boro rice farmers (In Taka)

Farm Size	Total annual income	Average income
Small	68,000	5800.50
Medium	87.500	7150.50
Large	115.500	9535.50

Source: Field survey, 2021

4.7 Socio-economic Characteristics of Intermediaries

The socio-economic characteristics i.e. age, level of education and occupation of the selected intermediaries are discussed below.

4.7.1 Age distribution of the intermediaries

The selected intermediaries of Boro rice were classified into three age groups such as 0 to 35 years, 36 to 50 years and above 50 years. Table 4.6 reveals that about 58.50% of the Farias belonged to the age group of 36-50 years followed by about 21.75% of Farias in 0 to 35 years age group and the rest about 20.75% were in the age group of above 50 years. It is evident from Table 4.6 that the highest proportion of different intermediaries belonged to the age group of 36 to 50 years.

Table 4.6 Age distribution of the intermediaries

Intermediaries	Age group (in year)		
	0-35	36-50	Above 50
Farias	21.75	58.50	20.75
Beparis	28.75	50.25	21.00
Millers	25.15	48.50	26.35
Wholesaler	10.00	60.00	30.00
Retailers	38.75	40.25	21.00

Source: Field survey, 2021

4.7.2 Occupational status

So far, the occupation of the selected intermediaries was concerned 76.25% had rice business as the only occupation while 18.25% did business together with agriculture and only 5.50% involved in business with service. Table 4.7 shows that only business was

the main occupation of 100% millers and Wholesaler while 70% of Farias and 80% Beparies were involved in only business. Business with agriculture was the main occupation for 30% of the Farias and 20% Beparis. 70% of the retailers participated only in business followed by 10% in business along with service and only 20% were engaged in business with agricultural activities.

Table 4.7 Occupation of the intermediaries

Intermediaries	Business	Agriculture + Business	Service
Farias	70	30	--
Beparis	80	20	--
Millers	100	--	--
Wholessller	100	--	--
Retailers	70	10	20
Total	76.25	18.25	5.50

Source: Field survey, 2021

4.7.3 Educational status

Education plays an important role in efficient marketing of Boro rice. Because the educational intermediaries would be more aware of information and would be make rational marketing decisions. The educational level of intermediaries is presented in Table 4.8. After collecting data, the selected intermediaries were grouped into four categories according to their level of education.

Table 4.8 Literacy levels of different sample intermediaries

Categories	Farias	Beparis	Millers	Wholesaler	Retailers
Illiterate (0-0.5)	30.45	5.00	0.00	0.00	8.60
Primary level (1-5)	54.21	19.00	10.00	0.00	10.35
Secondary level (6-10)	10.84	54.75	8.75	38.75	39.15
Above secondary level (>10)	4.50	21.25	81.25	61.25	41.90
Total	100	100	100	100	100

Source: Field survey, 2021

CHAPTER V

PROFITABILITY ANALYSIS AND EXISTING MARKETING CHANNEL OF BORO RICE

5.1 Profitability of Boro Production

5.1.1 Variable Costs

5.1.1.1 Cost of Land Preparation

Land preparation is the most important components in the production process. Land preparation included ploughing, laddering and other activities needed to make the soil suitable for Boro cultivation. For land preparation in Boro production, no. of tiller was required 2 times with Tk. 2500 per tiller. Thus, the average land preparation cost of Boro production was found to be Tk. 5000 per hectare, which was 4.59% of total cost (Table 5.1).

5.1.1.2 Cost of Human Labour

Human labour cost is one of the major cost components in the production process. It is one of the most important and largely used inputs for producing Boro. It is generally required for different operations such as land preparation, sowing, weeding, fertilizer and insecticides application, irrigation, harvesting and carrying, threshing, cleaning, drying, storing etc. The quantity of average hired human labour used in Boro production was found to be about 70 man-days per hectare and average price of human labour was Tk. 500 per man-day. Therefore, the total cost of hired human labour was found to be Tk. 35,000 representing 32.12% of total cost (Table 5.1).

5.1.1.3 Cost of Seed

Cost of seed varied widely depending on its quality and availability. Per hectare total cost of seed for Boro production were estimated to be Tk. 4500.00, which constituted 4.13% of the total cost (Table 5.1).

5.1.1.4 Cost of Urea

In the study area, farmers used different types of fertilizers. On an average, farmers used urea 260.0 kg per hectare. Per hectare cost of urea was Tk. 5200.00, which represents 4.77% of the total cost (Table 5.1).

5.1.1.5 Cost of TSP

Among the different kinds of fertilizers used, the rate of application of TSP (105.00 kg). The average cost of TSP was Tk. 5250.00 which representing 4.82% of the total cost (Table 5.1).

5.1.1.6 Cost of MoP

The application of MoP per hectare (110.0 kg). Per hectare cost of MoP was found Tk. 4400.00, which represents 4.04% of the total cost (Table 5.1).

5.1.1.7 Cost of Gypsum

Among the different kinds of fertilizers used, the rate of application of Gypsum (115.0 kg). The average cost of Gypsum was found Tk. 2875.00 which representing 2.64% of the total cost (Table 5.1).

5.1.1.8 Cost of Insecticides

Farmers used different kinds of insecticides to keep their crop free from pests and diseases. The average cost of insecticides for Boro production was found to be Tk. 3000.00 which was 2.75% of the total cost (Table 5.1).

5.1.1.9 Cost of Irrigation

Cost of irrigation is one of the most important costs for Boro production. Production of Boro largely depends on irrigation. Right doses application of irrigation water help to increase bulb diameter, number of cloves, and number of leaves and plant height. As a result, yield per hectare is being increased. The average cost of irrigation about 8-12 times and the average irrigation was found 10 times in survey area and Tk 1500 to be per hectare, which was found Tk. 15000 per heater that represents 13.76% of the total cost (Table 5.1).

5.1.1.10 Cost of manure

It was observed in the present study area that farmers used cow dung for producing their enterprises. They bought a large portion of cow dung from the milk producers. It was found about Tk. 2500 per hectare.

Table 5.1 Per Hectare Costs of Boro (Tk.)

Cost Items	Quantities	Price per unit (tk.)	Cost/returns (tk/ha^{-1})	Total (%)
A. Gross Return				
Main product (Rice)	8075.50	25.00	162,873.25	98.13222914
By-product (Straw)			3100	1.867770861
Total return			**165,973.25**	
B. Gross Cost				
C. Variable Cost				
Seedlings			4500	4.13
Irrigation	10	1500	15000	13.76
Power tiller	2	2500	5000	4.59
Hired labor	70	500	35000	32.12
Urea	260	20	5200	4.77
TSP	105	50	5250	4.82
MoP	110	40	4400	4.04
Gypsum	115	25	2875	2.64
Total Fertilizers cost			**17,725.00**	**16.27**
Manure	250	10	2500	2.29
Insecticides			3000	2.75
Total			**82,725.00**	**75.91**
D. Fixed Cost				0.00
Land use cost			7000	6.42
Family labor	40	400	16000	14.68
Interest on operating capital @ 9%			3250.5	2.98
Total Fixed cost			**26,250.50**	**24.09**
E. Total costs			**108,975.50**	**100.00**

Source: Field survey, 2021

5.1.1.11 Total Variable Cost

Therefore, from the above different cost items it was clear that the total variable cost of Boro production was Tk. 82,725.00 per hectare, which was 73.59% of the total cost (Table 5.1).

5.1.2 Fixed Cost

5.1.2.1 Rental Value of Land

Rental value of land was calculated on the basis of opportunity cost of the use of land per hectare for the cropping period of four months. Cash rental value of land has been used as cost of land use. On the basis of the data collected from the Boro farmers the land use cost was found to be Tk. 7000.00 per hectare, and it was 6.42% of the total cost (Table 5.1).

5.1.2.2 Cost of Labour

Human labour cost is one of the major cost components in the production process. It is one of the most important and largely used inputs for producing Boro. It is generally required for different operations such as land preparation, sowing, weeding, fertilizer and insecticides application, irrigation, harvesting and carrying, threshing, cleaning, drying, storing etc. The quantity of average family supply labour (Without hired labour) used in Boro production was found to be about 40 man-days per hectare and average price of human labour was Tk. 400 per man-day. If we pay those labour it was found to be Tk. 16,000 representing 14.68% of total cost (Table 5.1).

5.1.2.3 Interest on Operating Capital

It may be noted that the interest on operating capital was calculated by taking in to account all the operating costs incurred during the production period of Boro. Interest on operating capital for Boro production was estimated @ 9% as bank rate and calculated Tk. 3250.50 per hectare, which represents 2.98% of the total cost (Table 5.1).

5.1.3 Total Cost (TC) of Boro Production

Total cost was calculated by adding all the cost of variable and fixed inputs. In the present study per hectare total cost of producing Boro was found to be Tk. 108,975.50 (Table 5.1).

Table 5.2 Per Hectare Cost and Return of Boro Production (Tk.)

Cost Item	Cost/Returns (Tk/ha)
A. Gross Return	165,973.25
B. Gross Cost	
C. Variable Cost	82,725.00
D. Fixed Cost	26,250.50
E. Total costs	108,975.50
F. Gross Margin (A-C)	83,248.25
G. Net Return (A-E)	56,997.75
H. Undiscounted BCR (A/E)	**1.52**

Source: Field survey, 2021

5.1.4 Return of Boro Production

5.1.4.1 Gross Return

Return per hectare of Boro cultivation is shown in table 5.2. Per hectare gross return was calculated by multiplying the total amount of product with respective per unit price. It is evident from table that the average yield of Boro per hectare was 7575.50 kg and the average price of Boro was Tk. 21.50. Therefore, the gross return was found to be Tk. 162,873.25 per hectare (Table 5.2). And remain by product (straw) estimated value Tk 3100 for per hectare Boro Cultivation. Total return or Gross margin was found Tk. 165,973.25 for per hectare.

5.1.4.2 Gross Margin

Gross margin is the gross return over variable cost. Gross margin was calculated by deducting the total variable cost from the gross return. On the basis of the data, gross margin was found to be Tk. 83,248.25 per hectare (Table 5.2).

5.1.4.3 Net Return

Net return or profit was calculated by deducting the total production cost from the gross return. On the basis of the data the net return was estimated as Tk. 56,997.75 per hectare (Table 5.2).

5.1.5 Benefit Cost Ratio (Undiscounted)

Benefit Cost Ratio (BCR) is a relative measure, which is used to compare benefit per unit of cost. Benefit Cost Ratio (BCR) was found to be 1.52 which implies that one taka investment in Boro production generated Tk. 1.52 (Table 5.2). From the above calculation it was found that Boro cultivation is profitable in Bangladesh.

5.2 Marketing Channels of Boro rice

The chain of intermediaries through which the transaction of goods takes place between producers and consumers constitutes a marketing channel. In other words, a marketing channel refers to a path composed of middlemen who perform such functions that are needed to ensure the secure, smooth and sequential flow of goods and services from producers to consumers in order to achieve the marketing objectives of the producing farms. In the study areas, the boro rice moves from the producer-seller to the consumers through some market intermediaries such as Faria, Bepari, miller, Arathdar and retailer. It was observed that Boro rice transported a long distance from the production points in order to reach the consumers. Marketing channels of Boro rice as observed in the study area are shown in Figure 5.1. On the basic of Figure 5.1, the following channels were identified in the study areas.

1. Farmer > Consumer
2. Farmer > Retailer > Consumer
3. Farmer > Faria > Bepari > Miller > Retailer > Consumer
4. Farmer > Faria > Bepari > Miller > Wholesaler > Bepari > Retailer > Consumer
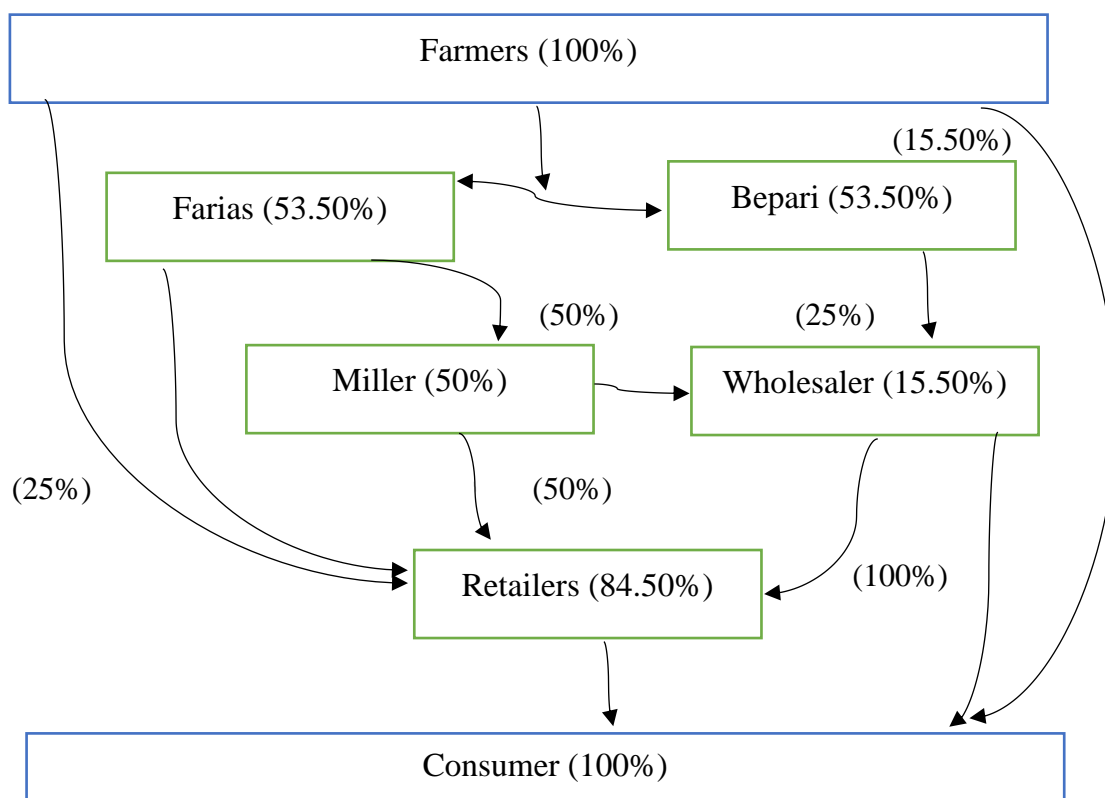5. Farmer > Miller > Retailer > Consumer

Figure 5.1 Marketing channels of Boro rice in the study area

5.3 Market Intermediaries

Chains of intermediaries are working in the boro rice marketing of Bangladesh. They are Kutials, Faria, Bepari and Wholesaler, millers, assembler, wholesalers and retailers. As enough information is not available on these intermediaries, however, some major issues concerning them are discussed for the understanding of the role and importance of these intermediaries in the marketing channel. The following discussion is mainly based on the data of Sherpur district.

5.3.1 Faria /Bepari

Faria /Bepari in Bangladesh literature on food marketing, there is a slight distinction between Farias and Beparis which is based on their scale of operation Baulch *et al.* (1997). In some studies, they are categorized as different kinds of agents, and in some studies, they are classified in the same category. There are no particular guidelines from the DAM on their function for us to follow. For the sake of clarity, the terms

Faria/Beparis were used to refer to the same kind of boro rice assemblers. Small-scale, unlicensed boro rice assemblers working mostly in local markets include Faria and Beparis. They don't have a fixed place of business; instead, they move from village to village buying rice straight from the producers. They occasionally also purchase boro rice at the local market. Several of the people in this category are also boro rice wholesaler agents. Most of them are seasonal. Several of them also worked in small-scale farming, selling labour to others, and other related professions.

Generally, they operate their business with their own capital. They use rickshaws and vans for transporting boro rice from the grower's house to their own house and from their own house to the market. There is a general complaint against them that they adopt unfair weighing methods while purchasing rice from the growers and are able to keep a profit margin even selling and purchasing at the same price Baulch *et al.* (1997). They store boro rice from 2-8 days at their house. The monthly transactions of these boro rice assemblers vary from 6-20 ton of rice.

5.3.2 Wholesaler

Boro rice Wholesaler is the commission agents who generally work for the millers. However, there are some boro rice wholesaler, who do not act as miller's agents, they work independently. Both categories have permanent business premises in the Upazila market. Generally, they purchase boro rice from the Upazila market. Some of the wholesaler buy boro rice directly from the growers on the understanding that the growers can ask them for cash any time when desired. In general, wholesaler get capital from the millers. They supply boro rice to the millers within 3-7 days of taking an order.

That type of Wholesaler who was working for millers have little freedom in their purchasing and selling decisions. They follow the decisions of the millers. All time they are stay connected with the millers to take decision whether they will purchase the boro rice or 40 not at the prevailing prices. They purchase about 25% of boro rice from the farmers and the rest from the Bepari/Piker. On an average, they received Tk. 1,50,000 in advance from the millers for purchasing boro rice and the rest, if any, they receive after delivering the full quantity of boro rice. Millers bear all the expenses of buying boro rice. They come to the wholesaler premises for taking boro rice for delivery and sometimes wholesaler send the purchase volume through truck or other vehicles along with the

buying receipt and after then the millers pays the rest amount of money. In return for the service, Wholesaler received Tk.5.00 for each 40-kg of boro rice as commission. Those, who do not act as agents of millers, utilize their own capital for the business and act independently. The Wholesaler who are stored boro rice for a few days, if undelivered, at their business premise. The average period of storage varies from 3-7 days. They handle more than 2500 ton of boro rice annually.

5.3.4 Rural retailer/Kutial

Rural retailers/Kutials are the seasonal rice retailers. These small traders purchase boro rice from the growers directly at the village market. Parboiled and dried at the home yard by family labour. The dried boro rice is then taken to the small rice mills situated nearby close to the village market for milling. For milling the boro rice, rice millers charged Tk. 20.00 per mound from the Kutials. After milling, they sell the rice to the village consumers during the weekly (Haat) and daily bazaar days. Their monthly transactions vary from 0.9-1.0 ton of boro rice. In general, marginal and landless growers, and rickshaw or van pullers are involved in this type of business. These rice retailers also work for the wholesaler as daily laborers. In the study areas different marketing channels were found for different categories of farmers (i.e. small, medium and large). In the following figures are shown:
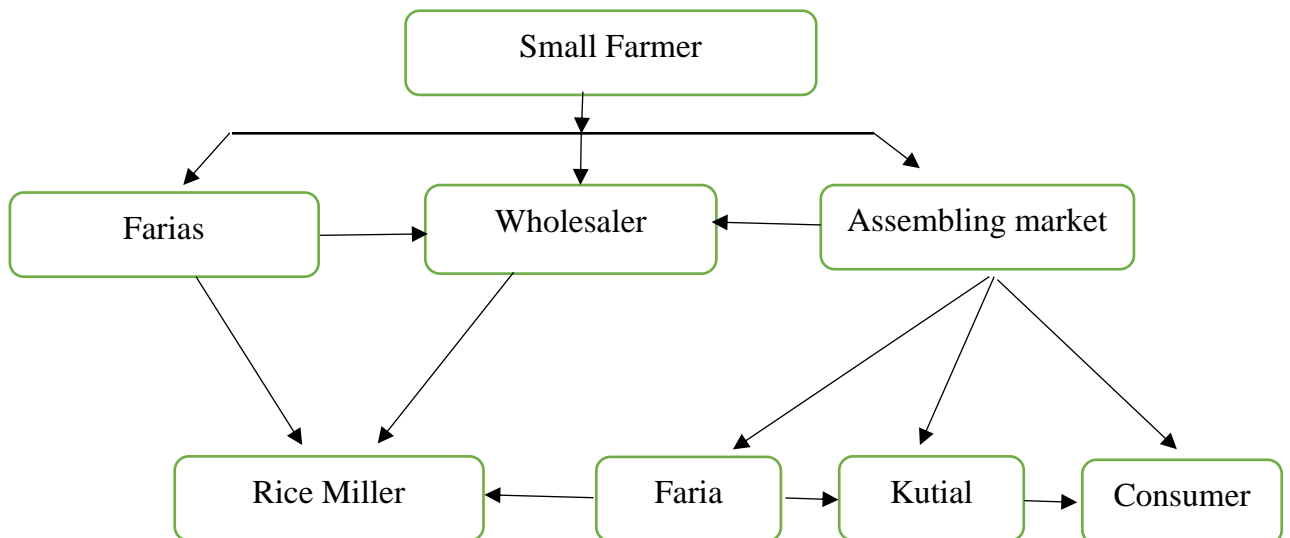
Figure 5.2 Boro rice marketing channels for small farmers

45

Figure 5.1 to 5.4 shows that the marketing channel for large farm groups and medium farm groups were different from the small farm group. They have direct access to the rice mill. The important characteristic of the survey area was the involvement of large number of the rice mills in the marketing of boro rice and rice. Rice millers buy the boro rice from different itinerant especially from wholesaler (commission agent), Faria, and local Bepari.

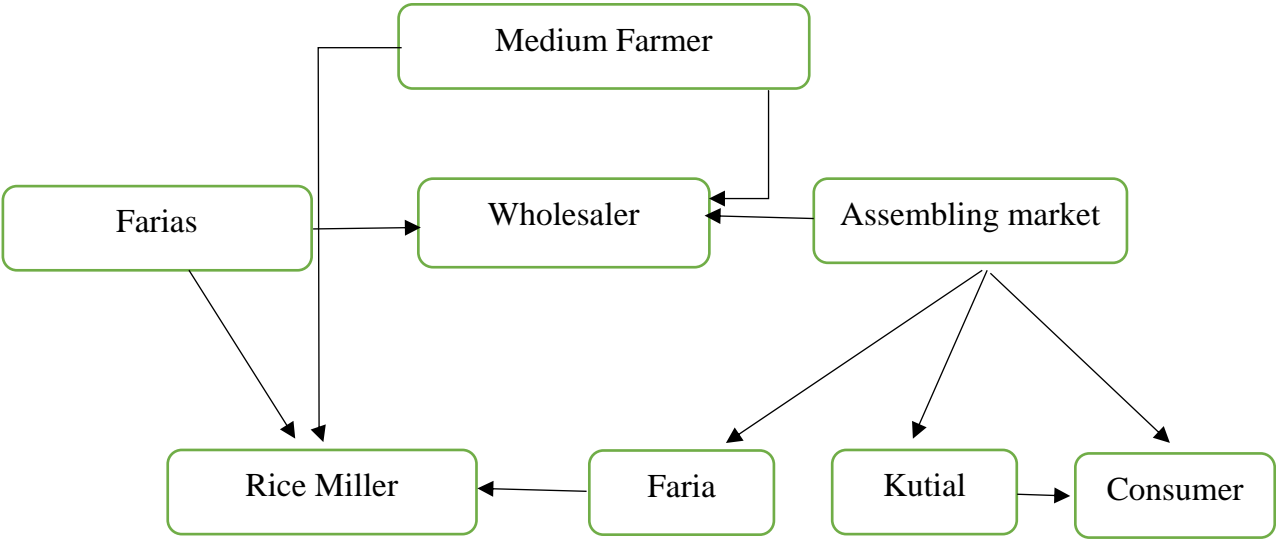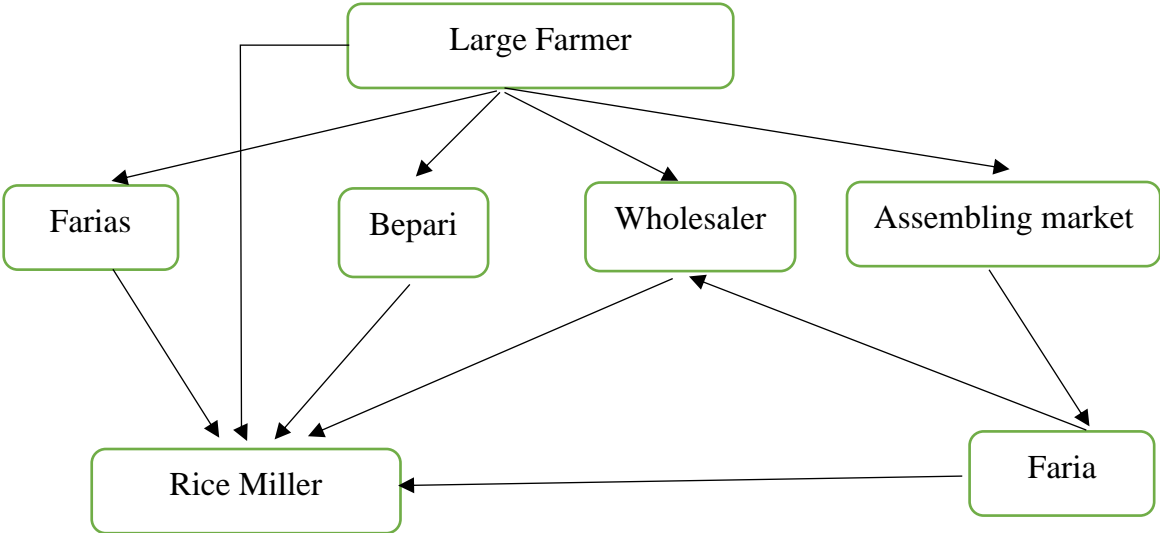**Figure 5.3 Boro rice marketing channels for medium farmers**

Figure 5.4 Boro rice marketing channels for large farmers

Besides, they buy boro rice directly from the farmers. Sometimes rice millers have tacit understanding with the large farm strata. Based on the understanding, large farmers supply the surplus boro rice to the rice miller with the condition that the rice miller could be asked for money during the need of the farmer. This may be called as credit sells of boro rice. Both the farmers and the rice miller acknowledged are benefited by the system. In one way, it was helping the rice miller to operate their mill smoothly without worrying for the supply of the boro rice. On the other way, farmers were benefited in the sense that they could sell the surplus to a single party without worrying for the market.

5.4 Role of Rice Mills

When the boro rice is harvested from fields, it needs to be processed for consumption. Parboiling, drying and milling are the different stages of rice processing. These are done both at home (small scale) and at the rice mills (large scale). Processing at home, the non-commercial sector of milling is perhaps the oldest and almost obsolete form of rice processing method in Bangladesh. In this method, boro rice is processed in after it is Large Farmer Faria Bepari Assembling market Rice Miller Faria Arathdar 43 parboiled and dried. Boro rice processing and milling in Bangladesh is mostly performed at the rice mills. These mills are called commercial milling center. There are two kinds of commercial mills available in Bangladesh: one type is the rice miller those purchase boro rice directly or through their agents from the local bazaar or Haat. In these facilities, after parboiling, drying and milling the boro rice, they usually supply the milled rice (finished products) to the wholesalers and assemblers of the big cities. On the other side, after parboiling and drying the boro rice at home facility, the processed boro rice is milled for finished rice in a small husking machine that situated in the nearby village bazaar. These huskers also husk boro rice for the small itinerant's traders of the village. Recently vendor huskers are also available in the villages. Number of commercial rice millers is increasing over the years.

These commercial processing units have been playing a significant role in the rice marketing system. Three types of rice mills are available in Bangladesh. According to the Ministry of food (FPMU, 2006), these are husky, major and automatic rice mills. For the study a total of 11 mills were randomly selected from Sherpur among them 7 were auto rice mill and the rest 4 were husky rice mill. Data were collected on different aspects. It was difficult to receive data from the rice millers. Initially they were suspicious about

the purpose, after repeated request and explaining the purpose clearly to them they agreed to talk with the researcher but in some cases the millers did not respond according to the need. To overcome some of these problems, the researcher had also accumulated some detailed information from a single auto rice miller. Though there might be some limitations in the analysis and the sample numbers might not symbolize the whole Bangladesh, these efforts will provide a good overview on the functions and characteristics of the commercial rice mills of the study area yet.

5.4.1 Rice millers as boro rice buyers

Rice millers in the study areas are most significant members of the marketing system. In fact they play a vital role in boro rice purchasing and selling operations. They buy boro rice either directly or through the wholesaler, a commission agent, who has permanent business premises in the upazila market. That type of commission agents per capital (money) in advance from the millers for supplying boro rice to the mills. The amount of money varies from mill to mill. wholesaler supplied boro rice to the mill within 3-7 days of purchasing boro rice. How much boro rice would be purchased and at what prices was the decision of the millers and controlled by them. After receiving money, wholesaler are ordered to maintain liaison with the millers for necessary direction on boro rice purchase process. Millers follow closely the information of nearby markets about the price and volume of boro rice transacted at each market in the Haat day.

This information helps the millers to order their suppliers on further line of action. Based on the direction, wholesaler supplied the desired quantity of boro rice to the millers and received a fixed commission from the millers. Generally, millers bear all the purchasing cost. No risk is involved for the wholesaler for purchasing and delivering the boro rice at the mill gate. Not only wholesaler are the suppliers of boro rice to the millers but also the millers purchase boro rice from growers and Bepari/Faria also.

5.5 Volume of business

The present study reveals that on an average 320 quintals of Boro rice were handled by Faria per area or 104 Haats (sit twice in a week). It was found from the observation that on an average 800 quintals of Boro rice were purchased and sold by the Beparis per year in the study areas. Each of millers purchased on an average 2000 quintals Boro rice and sold rice after processing. They sold their processed rice to the retailers, local wholesaler,

wholesalers of the other districts. The Farias transported 10%, 30% and 60% of their Boro rice by head load/shoulder load, rickshaw/van and van respectively.

The Beparis transported 58% and 42% of their Boro rice by bullock/buffalo carts and van respectively. But the millers and wholesaler mostly used truck for carrying Boro rice from the primary market to the secondary market. Sometimes they used rickshaw and tractor/van. The millers and wholesaler transported 80% and 86% of their boro rice by truck respectively. The rest were transported by bullock/buffalo carts and van. The retailers carried 40% and 60% of their rice by rickshaw and van respectively.

Table 5.3 Mode of transportation used by farmers and intermediaries (%)

Mode of transportation	Farmers and intermediaries				
	Farias	**Beparis**	**Millers**	**Wholesaler**	**Retailers**
Head load/ shoulder load	10.00	00.00	00.00	00.00	00.00
Rickshaw/van	30.00	58.00	10.00	4.00	40.00
vans	60.00	42.00	10.00	10.00	60.00
Truck	00.00	00.00	80.00	86.00	00.00

Source: Field survey, 2021

5.6 Risk in the Boro rice Marketing

Risk is an essential component for boro rice intermediaries in the study areas. But in the study area traders at local market were found to bear risk themselves. They did not resort to insurance policy for risk aversion. On the other hand, in the secondary market the millers and wholesalers protect themselves from risk through insurance policies.

5.7 Market Information System

Market information is a facilitative function for efficient operation of the marketing system. Most of the intermediaries got their market information through market visits 48 and personal observations and from fellow traders. Millers and wholesalers usually used telephone to collect information (Table 5.4). Although the DAM of Bangladesh is engaged in the task of regularly disseminating the market price of agricultural products through newspaper, weekly bulletin and radio but there is no information on price of Boro rice/rice.

Table 5.4 Sources of market information of the intermediaries (%)

Sources of information	Intermediaries					
	Farias	Beparis	Millers	Wholesaler	Retailers	**Average**
Market visit and personal observation	60.00	70.00	10.00	0.00	60.00	40.00
Fellow traders	30.00	20.00	20.00	4.00	5.00	15.80
Mobile phone	10.00	10.00	70.00	96.00	35.00	44.20

Source: Field survey, 2021

5.8 Marketing cost and margin of the intermediaries

5.8.1 Marketing Cost

Marketing costs refer to the expenses incurred by the intermediaries in the process of performing various marketing functions to reach a commodity from producers to the ultimate consumers. Different types of expenses such as transportation, loading and unloading, market toll, personal expenses etc. were incurred by the different intermediaries in the marketing channel of Boro rice. In the study attempts have been made to quantity the marketing cost Boro rice for the intermediaries of Farias, Beparis, millers, wholesaler and retailers only.

5.8.1.1 Marketing Cost of Farias

The Farias purchased boro rice from the various local market and sold them to the local markets and the secondary markets in original form and no processing was involved there. The cost involved in performing these services include transportation, loading and unloading, market tolls, cost of bag, weighing charges, personal expenses etc. They carried Boro rice by carts, van or rickshaw for their trading. Sometimes they carried Boro rice by bi-cycle when distance was very short. Table 5.5 depicts the per quintal cost of Farias. Total marketing cost per quintal of Boro of Farias was Tk. 28.44. Buying and selling cost contributed 56.15% and 43.85% of total marketing cost respectively. The highest cost (28.48%) incurred by Farias was for transportation followed by loading and unloading 9.40%. They had to pay market tolls 9.87%. Other component of expenses included cost of bag 6.15%, weighting charges 4.50%, and personal expenses 2.15% etc. during running their business. They also spent on others 2.25%.

5.8.1.2 Marketing Cost of Beparis

The Beparis generally purchased Boro rice from the farmers and Farias. They sold their Boro rice to the millers without any processing. The costs involved in performing these services included rent, loading and unloading, transportation, cost of bags, market tolls, electricity, personal expenses etc. They carried Boro rice by van, cart, and rickshaw for their trading. Table 5.5 depicts per quintal marketing cost of the Beparis. Total marketing cost per quintal of Boro rice of Beparis was Tk. 34.00. Buying and selling costs contributed 68.30% and 31.70% of total marketing cost respectively. Out of total marketing cost, transportation was the highest 30.25% followed by cost of loading and unloading 18%. They also incurred other costs such market tolls 10.50%, cost of bags 6%, personal expenses 1.30%, rent 2.25%, electricity 1.775% and others 4.80%.

5.8.1.3 Marketing Cost of Millers

The millers purchased boro rice from farmers, Farias and Beparis at the local market and secondary markets. They sold rice after necessary processing of Boro rice. They processed their Boro rice in their own mills. Then they sold their rice to the wholesalers and retailers at the Sherpur town. Sometimes they sold their rice to wholesalers of other districts of Bangladesh. The average cost per quintal incurred by the millers was Tk. 92.90. From Table 5.5 it is observed that buying and selling cost contributed to Tk. 26.67% and 73.33% of total marketing cost respectively. The highest cost incurred for processing and milling charge of Boro rice 50.05% followed by wholesaler's commission 12.90%. They had to pay wholesalers commission at the rate of Tk. 20.00 per quintal for negotiating their sales. They also incurred other costs such as cost of bags 1.76%, loading and unloading 1.50%, transportation 10.76% and market tolls (1.90%) respectively.

5.8.1.4 Marketing Cost of wholesalers

The wholesalers purchased rice from the millers and sold to other wholesalers and wholesalers. The wholesalers bought rice and sold rice in the different places of Bangladesh. In Table 5.5 it is observed that total cost of marketing of wholesalers was Tk. 20.00 per quintal. The highest marketing cost was incurred for transportation (30.75%). Although they purchased Boro rice from the local millers of Sherpur district of selected Upazilas yet the transportation cost was high. They used truck, van and rickshaw. They bought rice according to the volume of demand by other wholesalers.

They sent their rice to different districts of Bangladesh such as Dhaka, Chittagonj, Rajshahi, Sylhet, Comilla, Jessore, Bogra, Pabna etc. So the distance and amount of rice buying and selling would not be measured. The volume of transaction varied from time to time.

Table 5.5 Marketing cost (%)

Cost heading	Intermediaries (Cost % of total)				
	Farias	Beparis	Millers	Wholesaler	Retailers
Rent	0.00	2.25	0.00	10.50	0.00
Loading and unloading	9.40	18.00	1.50	10.25	0.00
Transportation	28.48	30.25	10.76	30.75	28.25
Market tolls	9.87	10.50	1.90	3.75	15.75
Cost of bags	6.15	6.00	1.76	1.50	0.00
Personal expenses	2.25	1.30	10.75	1.25	0.00
Sub total	56.15	68.30	26.67	58.00	44.00
Transportation/Rent	25.20	0.75	12.90	9.50	30.50
Loading and unloading	9.75	11.50	3.25	7.05	5.75
Personal/Processing expenses	2.15	12.90	50.05	1.18	0.00
Weighing/Electricity charges	4.50	1.75	4.63	14.80	16.25
Others	2.25	4.80	2.50	9.47	3.50
Sub total	43.85	31.70	73.33	42.00	56.00
Grand total (A+B)	100.00	100.00	100.00	100.00	100.00

Source: Field survey, 2021

[Note: a) Average cost = Total cost/Total amount, b) % of total cost= One item/Total cost×100, c) Personal expenses. Bidi, Cigarette, betel leaf, sweet meats, tea etc. d) Others: Charity, weight problems, extra labor cost, loss of grain etc.]

5.8.1.5 Marketing Cost of Retailers

Retailers generally purchased rice from the millers and sold to the consumers. Out of thirty, only two retailers were purchased Boro rice from the farmers. In Table 5.5, it is observed that the total cost of marketing incurred by retailers was Tk. 8.00. They incurred the highest cost for rent 30.50% followed by transportation cost 2.825%, loading and

unloading cost 5.75%. They also bore charges such as market tolls 15.75% and electric bill 16.25%.

5.8.2 Marketing Margin of the Intermediaries

Marketing margin of a particular stage of product flow may be defined as the difference between purchase price and sale price of a commodity. According to Kohls, and Uhl (1980), marketing margin may be defined as the difference between what is paid by the consumers and what the producer receives. Marketing margin of each intermediary was estimated by deducting the purchase price of Boro rice from sale price while the net margin was estimated by deducting marketing cost per quintal from the marketing margin. It is revealed from Table 5.6 that marketing margin of Faria, Bepari, miller, wholesaler and retailer were estimated at Tk. 50.25, Tk. 50.00, Tk. 124.50, Tk. 40.50 and Tk. 74.50 per quintal respectively. The margin was the highest for miller followed by Bepari, retailer and wholesaler. The highest marketing margin of the miller was earned by adding more value to the product through creation of form utility and time utility. In the harvesting period they bought Boro rice processed and stored it. They sold it later on at the highest price. On the other hand, Faria received the lowest marketing margin in the study area. According to the same Table it is seen that the costs of marketing of Faria, Bepari, miller, wholesaler and retailer were estimated at Tk. 30.00, Tk. 35.00, Tk. 100.25, Tk. 20.50 and Tk. 10.50 per quintal respectively. Marketing cost was the highest for miller followed by Bepari, Faria and wholesaler. On the other hand, marketing cost was the lowest for the retailer Tk. 10.50 per quintal in the study area.

Table 5.6 Marketing margin of different intermediaries (Tk.)

Intermediaries	Purchase price	Sale price	Marketing margin	Total marketing cost	Profit or net margin
	A	B	C=B-A	D	E=C-D
Farias	1200.25	1250.50	50.25	30.00	20.25
Beparis	1275.50	1325.50	50.00	35.00	15.00
Millers	1400.50	1525.00	124.50	100.25	24.25
Wholessller	1480.00	1520.50	40.50	20.50	20.00
Retailers	1475.50	1550.00	74.50	10.50	64.00

[Source: Field survey, 2021; Note: One hundred kg of Boro rice is equivalent to 62.50 kg of rice]

The net margins or profits of Faria, Bepari, miller, Arathdar and retailer were estimated at Tk. 20.25, Tk.15.00, Tk. 24.25, Tk. 20.00 and Tk. 64.00 per quintal respectively. Retailer received the highest net margin of Tk. 64.00 per quintal followed by miller, wholesaler and Bepari. The lowest marketing cost might be the possible reason for the highest net margin of the retailers. Marketing margin, total marketing cost and net margin are shown in Figure 5.5.
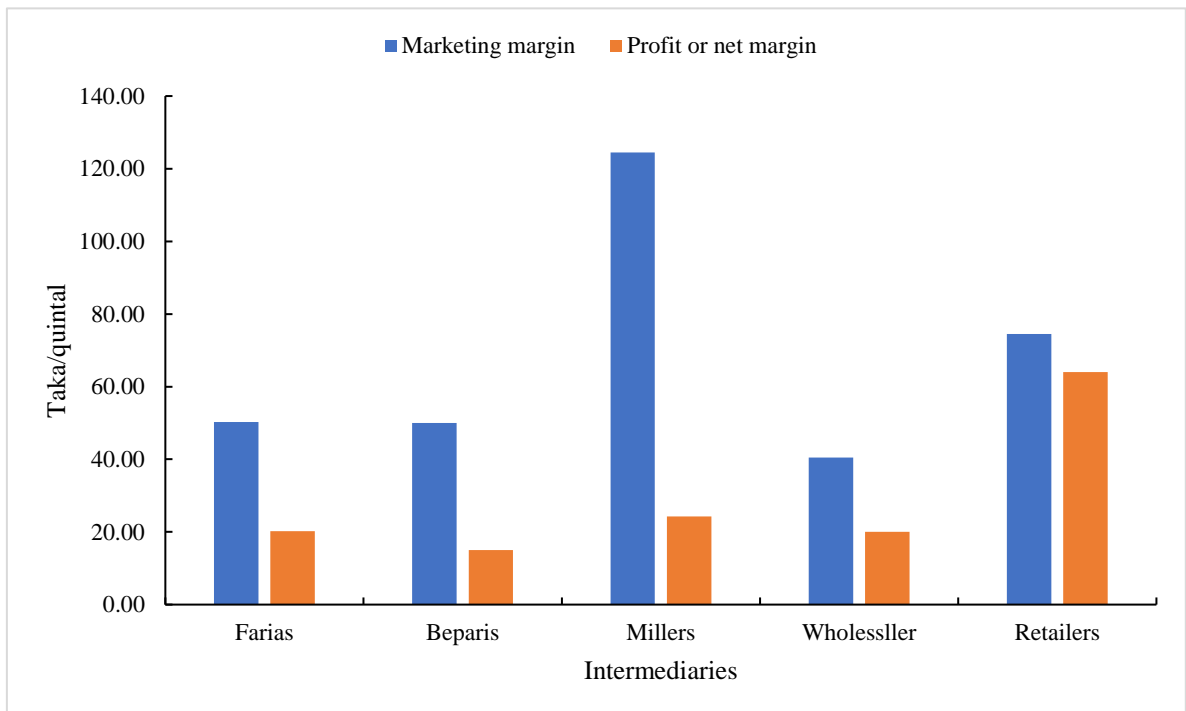
Figure 5.5 Marketing Margin of Intermediaries

5.9 Conclusion remarks

Per hectare benefit cost ratio (BCR) of Boro cultivation was 1.52 was achieved by the boro rice farmers of Sherpur District Because:

i. Intensive care of land.
ii. Quickly identified disease infestation and took measurable action and reduced damages.

For this reason Boro farmer's production rate was higher. Among the intermediaries, Retailer's net marketing margin were the highest.

54

CHAPTER VI

CONSTRAINTS TO PRODUCTION AND MARKETING OF BORO RICE

6.1 Introduction

In Bangladesh, agricultural production and marketing system is not free from problems. From production to selling all the channel members including growers are facing with different problems at different stage of marketing. The problems that are described in below is only the case of the researchers study area but it was assumed that across the whole country, the problems faced by the farmers and the intermediaries of rice marketing channel were more or less same as Boro rice is a homogeneous product. The logic behind the discussion of production and marketing constraints in this section was that, problems faced by the farmer and intermediaries may be determiner of marketing efficiency that is the more the problems the less the efficiency. In the previous section, channel wise efficiency was examined that is which channel is more efficient than others but by learning about the problems, theoretically one can guess the efficiency of the market and for so researcher took an attempt to analyse the nature of the problems in the rice marketing system in the later.

6.2 Producer's Constraints

The producer's in the study areas were asked to what sort of problems they are facing and they answered that they are facing a lot of problems and a summary of these problem is shown in table 6.1 with a brief description of the major problems. Shortage of land: Shortage of land was the primary problem of the producers. It was about 63.05% of the farmers respond for this problem. This situation reduces directly Boro rice production and forces the farmers to produce rice by renting/leasing land.

Diseases and pests: About 24.95% of the farmers also respond facing with problem of diseases and pests. The identified diseases/pests for rice were wave worm, shoot fly and rice blast.

Shortage of seed supply and adequate storage facilities: This was another problem as 20.80% of farmers perceived it. It is also observed that 62.70% of the farmers were lacking of improved post-harvest management technologies such as storage and storage

facilities. Due to absence of well storage facilities farmers sold their boro rice immediate after the harvest. The farmers usually used a part of their dwelling for storing the boro rice and Duli, Motka (Bamboo made), container made from cement, gunny bag etc. But the methods for storing were rudimentary and unscientific. For this reason boro rice got moisture and infested by insect which degrade the quality of the boro rice and hence when they want to sale it, they got lower price.

Malpractice in selling method (Scaling or Weighing): About 20.80% of the respondents were complaining various malpractices such as scaling or weighing, deduction and quoting of lower prices than actual.

Lack of market: About 25.13% also respond that there were market problems associated with low output price, maintenance of standards and grades. For Example, during husking, grains are broken in to pieces (farmer usually used traditional threshing i.e. by beating with stick and using ox) and this broken grain decreases market demand.

Lack of information exchange: Poor contact or communication was also one of the problems of farmers. Actual or reliable information on market price, demand and supply is also mentioned as a problem by sample households. Transportation problem: About 67.15% of the sampled farmers were responding positively about transportation problem. The local markets were not well connected to the villages. Due to poor communication system farmers could transport their produce to the distant markets where higher prices prevailed.

Lack of capital and credit availability: About 42.90% for capital shortage and 45.50% for credit availability of the sample producers respectively have responded these problems. Farmers have an urgent need for money immediately after harvest. Even if the price of boro rice is always at lowest during that period, farmers badly needed cash during this period in order to pay their rent and debts as well as to buy certain necessities. Most of the time, lack of post-harvest credit forces farmers to sell their produce immediately after harvest, when prices are low.

Table 6.1 Production, marketing and institutional problems of sample farmers

Types of problems	% of responses
A. Production aspect	
1. Problems of availability of improved rice variety	25.71
2. Problems of fertilizer supply for rice production	20.78
3. Chemical supply problem	16.75
4. Seed supply problem	20.80
5. Shortage of land	63.05
6. Disease problem	24.95
7. Problems of farm implement	16.50
8. Problems of post-harvest technology /storage loss	62.70
B. Marketing aspect	
1. Lack of market	25.13
2. Problem of price setting	45.67
3. Malpractice in selling method (scaling or weighing)	20.80
4. Information exchange problem	62.25
5. Problem of storage facilities	25.25
6. Problems of threshing machine or miller/quality	33.33
C. Financial and institutional aspect	
1. Loan repayment problem	45.50
2. Lack of capital availability	42.90
3. Problems of credit facility	67.15
4. Transport problems	37.25
5. Lack of institutional support	17.00
6. Problem of theft	8.15
7. Problems of excess water (flooding)	25.00

Source: Field survey, 2021

CHAPTER VII

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This section begins with reviewing the accomplishments of the previous chapters. From these results, broad prospects, summary, conclusion and recommendations were presented.

7.1 Summary of the Findings

Bangladesh's primary meal is rice, which accounts for approximately 35% of all family spending. Around 80% of Bangladesh's agricultural output comes from only the crop sector, with rice making up roughly 82% of that total. Yet, behind China, India, and Indonesia, the nation produces the fourth-largest amount of rice in the world. With a per capita consumption of little over 150 kilograms of milled rice yearly, rice is among the top foods consumed worldwide. It weighs 166 kg every year in Bangladesh. It provides 76% of the average Bangladeshi person's daily calorie intake and 66% of their daily protein intake. One of the highest ratios ever recorded. The data sources that are now accessible in Bangladesh show that, despite a decline in the area farmed for boro rice output, overall production is rising in tandem with population growth. Yet, Bangladesh still has to import a substantial amount of rice every year from overseas. In Bangladesh, rice is generally available, which means that the price per unit should be fair to all. But the fact is different; the price of rice is significantly more than the cost of production, but what is the cause of this? So an effort was taken by the researcher to evaluate the rice marketing system in Bangladesh and for this purpose both primary or cross-sectional data and secondary data were collected.

For collecting primary data, Sherpur district were selected as these are the surplus rice producing area and it was assumed that as rice is a homogeneous product so rice price moves in similar way in the whole country by excluding the transfer costs from one place to another and the findings will provide and insight about the rice market although the sampling population was very low (only 90 from different rice marketing channels including the grower's from the study areas) and reason behind this was both time and budget constraint. The selected rice variety was Boro because this cover more than 70% of total production of boro rice/rice of the country. Other necessary data or information was collected from newspaper, from different web addresses which were related to the

present context of the study. Primary data as well the secondary data were collected by the researcher himself. After reviewing related literature and setting up the objectives and appropriate analytical procedure, the necessary data were collected and the collected data were analysed to fulfil the following objectives:

(1) The state/role of the growers, marketing channels, intermediaries and other functionaries involved in the marketing process

(2) the nature of marketing margins and costs in relation to spatial price differentials

(3) the spatial price relationships among the selected markets

(4) the present marketing system in terms of efficiency and the nature of competition. The summary of the findings under each objective were as follow

7.2 Conclusions and Recommendations

Bangladesh is an agro-based nation, and of its 5.37 crore laborers over the age of 15, 43.60% are directly employed in the agricultural industry. When all of the interests of the participants are effectively satisfied, a market is considered to be efficient. As the issues relating to each channel, including the growers, are effectively resolved, the rice market will become more productive. To protect the interests of producers on the one hand and of consumers on the other, improvements are required in a number of areas, including government pricing and marketing regulations. Knowledge of price spreads gives an insight into how income is distributed among the growers, middlemen and consumers. However, the following recommendations are made by the study for the improvement of existing rice marketing system:

a) At the harvesting period as there exist lowest price of the boro rice, the government should increase the direct purchase from the farmers at such an price that are slightly more than the existing market price so that the grower's feel interest to sell to the government depot and prices should be provided in cash not in credit and instantly and temporary procurement centre should be opened at the rural areas not in the Upazila market so that transportation cost be minimum.

b) Public storage facilities should be increased in the rice producing area so that the producers can store their produce during harvest period instead of selling immediately after the harvest and storage cost should be kept lower than the

private storage centres and hence seasonal fluctuations in the prices of rice will be controlled.

c) As most of the rice markets are well integrated in Bangladesh so it would be easy for the government to take a centralized effective intervention to achieve food sufficiency, remove nutritional deficiency and implement efficient market policy.

d) Large number intermediaries are involved in the rice marketing system which increase the marketing cost and margins and reduce the margins of the growers. So the proper steps should be taken so that the farmers can sell their produce through the efficient channel that was mention earlier that mean not only the large and medium farmers but also the small farmers can sell directly to the millers.

e) Efficient and effective monitoring committee should be appointed who will monitor the markets, the pricing strategy in each market, the storage condition of the millers and any other discrepancy in rice marketing channels.

f) Since efficient transportation system tends to improve marketing efficiency, so transportation and communication system should be developed and any forms of illegal activities like collection of subscription by the road and transportation authority itself and/or others (local mastans), hijacking/robbery of truck that are loaded with rice should be controlled in an efficient manner by the government.

So, it will not be an efficient decision to reduce subsidy from energy sector by the government instead it could be increased by reducing the subsidies from the other sectors or sub-sectors that are comparatively less important than energy sector.

REFERENCES

Ali, M.W. (2001). An investigation into the yield gap of MV Boro rice between the research station and fish cultivation.

Asadullah, M., Rahman, S. (2006). Farm Productivity and Efficiency in Rural Bangladesh: The Role of Education Revisited. *Applied Economics.* 41.

Asodiya, P.S.K., Patel, K.S., Asodiya, P.S. and Parmar, V.K. (2014). Input use, cost's structure, return and resource use efficiency analysis of wheat crop in south Gujarat, India. *Int. J. Agric. Ext.,* **2**(1): 5-12.

Bangladesh Economic Review, (2019), Financial Advisory Subdivision, Finance Division, Ministry of Finance, Government of the People's Republic of Bangladesh, Dhaka.

Bangladesh Rice Knowledge Bank, Retrieved from Bangladesh Rice Research Institute: www.knowledgebank-brri.org. Bangladesh, Retrieved on May 22, (2021), from Bangladesh-Wikipedia, the free Encyclopedia: http://en.wikipedia.org/wiki/Bangladesh
Bangladesh.

Bangladesh-Wikipedia: http://en.wikipedia.org/wiki/Rice. Retrieved on May 22, (2022)

Baset, M. A. (2003). Returns to Investment in Potato Research and Extension in Bangladesh. Ph. D. Thesis, BAU, Mymensingh.

Baulch, B. Das, J. Jaim, W.M.H. Farid, N. and Zohir, S. (1997), "The Spatial Integration and Pricing Efficiency of the Private Sector Grain Trade in Bangladesh: Phase II Report"

BBS (2021), Yearbook of Agricultural Statistics of Bangladesh. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of the Peoples Republic of Bangladesh, Dhaka.

BBS. (2022). Year book of Agricultural statistics of Bd. August, 2022, 32th edition.

BER (2020). Bangladesh Economic Review, Department of Finance, Ministry of Finance, Government of the People's Republic of Bangladesh, Dhaka.

BER, (2021). Bangladesh Economic Review 2021. Economic Adviser's Wing, Finance Division, Ministry of Finance.

Chowdhury, M. S. A. (1997). Adoption of Selected BINA Technologies by the Farmers of Boyra Union in Mymensingh District. M. S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

DAE. (2022). Annual report (unpublished) by Department of Agricultural Extension, Khamarbari, Dhaka.

Ghatak, S. and Ingersent, K. (1984). Agriculture and Economic Development, Harvester Press Limited, London.

Gofran, M. (2005). Impact of Micro Credit Based Activities on the Livelihood of Rural Farmers in Bangladesh Through Development Project Undertaken by Department of Agricultural Extension. An unpublished Ph.D. Thesis Department of Agricultural Extension and Rural Development, BSMRAU, Salna, Gazipur.

Haider, M. R., Halim, A. and Kashem, M. A. (2001). Adoption of Improved Package of practices for Trans-planting Aman Rice Cultivation. *Bangladesh J Nuc Agril,* Vol. (16 & 17): 77-84.

Haile B.T. (2015). Determinants of technical, allocative and economic efficiencies among onion producing farmers in irrigated agriculture: Empirical evidence from Kobo district, Amhara region, Ethiopia. *African J. of Agricultural Research.* **10**(20): p. 2180-2189,

Haque, J.T. (2016). Agrarian Transition and Livelihoods of the Rural Poor (Draft version). www.unnayan.org.

Hayami, Y., and V.W. Ruttan (1985). Agricultural Development: An International Perspective. Baltimore: Johns Hopkins University Press.

Hossain S., Hashimoto M., Choudhury E.K., Alam N., (2003). Dietary mushroom (*Pleurotus ostreatus*) ameliorates atherogenic lipid in hypercholesterolemic rats. *Clin Exp Pharmacol Physiol.,* **30**: 470–475

Hossain, M.A. (1983). Relationship of Farmers Characteristics with Their Adoption of HYV as T. Aman and other Related Aspects in Bhabakhali Union of Mymensingh District. M. Sc. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

Hossain, M.M. (2003). Farmers knowledge and Adoption of Modern HYV Cultivation Practices. M. S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

Hossain, M., Manik L. Bose and Mustafi, A.A.B. (2006). Adoption and productivity impact of modern rice varieties in Bangladesh. The Developing Economies, 44, (2), 149-166. Informatics Division, Ministry of Planning, Government of the Peoples Republic of Bangladesh, Dhaka.

Household Income and Expenditure Survey (HIES) 2019-2020 (BBS). BMJ Open. 11. 51434. 10.1136/bmjopen-2021-051434.

Islam, T. K. Acharjee, G.V. Halsema, F. Ludwig, P. Hellegers. (2017). Declining trends of water requirements of dry season Boro rice in the north-west Bangladesh Agric. *Water Manage.,* 180, p. 148-159.

Karim, A.S.M.Z. and Mahaboob, S. F. (2006). Farmers Characteristics and other Factors Associated with Adoption of HYV Wheat in Kushtia Union of Mymensingh District. *Bangladesh J Ext. Edu..* **1** (1): 17-24.

Kashem, M. A. (1987). Small Farmers Constraints to the Adoption of Modern Rice Technology. *The Bangladesh Developmental Studies.* XV (**4**): 118- 130. Maharashtra. Agric. Update., 4: 229-32.

Kumar, P. and Sharma, R.K. (2003), "Spatial Price Integration and Pricing Efficiency at the Farm Level: A Study of Boro rice in Haryana", *Indian J Agril Econ.,* **58**(2): 201-217.

Matin, M. A. (2004). Demand, Supply and Price Behavior of Wheat in Bangladesh. Ph. D. Thesis, BAU, Mymensingh.

Monke, E. and Petzel, T. (1984). "Market Integration: An Application to International Trade in Cotton." *American J Agril Econ.,* **66**(4): 401- 487.

Mote, T. S. and Wadnerkar, D. W. (2009). Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

Munda, G. (2007). Social multi-criteria evaluation. New York: Springer.

Nasreen, M. Khondoker, M.H. and Azad, M.A.K. (2013). Climate change and Livelihood in Bangladesh: Experience of people living in coastal region.

Podder, S. K. (1999). Adoption of Mehersagar Banana by the Farmers of Gazaria Union under Sakhipur Thana of Tangail District. M. S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

Prasad, J. and A. Prasad, (1995). Indian Agricultural marketing Emerging trends and Prospective, Mital publications, New Delhi, India.

Rahman, A.B. Siddique, M.A. Salam, M.A. Islamand M.S. Al-faisal (2014). Assessment of Technical Efficiency of Rice Farmers in a Selected Impoldered Area of Bangladesh, *European J Agril Sci.,* **10**: 102.

Rahman, M. H. (2003). Adoption of Year round Homestead Fruit Cultivation Practices in Selected Area of Meherpur District. M. S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

Rahman, M.A. Bashar, M.F. Kabir, M.I. Kaysar and K. Fatema, (2013). Estimating the Technical Efficiency of Maize Production in A Selected Area of Bangladesh. *International J Inno Res Dev.,* **2**(11), 449-456.

Rahman, R. (2000). Economics of BR-29 Boro rice production of Melandaha Upazila of Jamalpur district.

Razzaque, M. A. (1977). Relationship of Selected Characteristics of the Farmers with Adoption of High Yielding Varieties of Rice in Three Villages of Agricultural University Project Area. M. Sc. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh. S. Ag. Econ. Thesis, Bangladesh Agricultural University, Mymensingh. soybean

production technology among study on knowledge and adoption of the farmers in Hingoli district of West Bengal. *Env. Eco.,* **28**: 2104-06.

Statistics division. Ministry of Planning. Govt. of the People's republic of

Wahed, M.A. and Anjan, K.R. (2008). Food Consumption Data in Bangladesh, ICDDRB, Dhaka.

Zegeye, H. Teketay, D. Kelbessa, E. (2006). Diversity, regeneration status and socio-economic importance of the vegetation in the islands of Lake Ziway, south-central Ethiopia. Flora - Morphology, Distribution, *Functional Eco. Plants*. **201**: 483-498.

INTERVIEW SCHEDULE FOR FARMER

1. Identification:

Name:	Mobile:
Upazila:	Village:
Age:	Education:
Family size:	Occupation:

2. Identification of income:

Household income:	Farm income:

3. Cost of Boro rice Cultivation:

Cost Items	Amount
A. Gross Return	
Main product (Rice)	
By-product (Straw)	
Total return	
B. Gross Cost	
C. Variable Cost	
Seedlings	
Irrigation	
Power tiller	
Hired labor	
Urea	
TSP	
MoP	
Gypsum	
Total Fertilizers cost	
Manure	
Insecticides	
Total	
D. Fixed Cost	
Land use cost	
Family labor	
Interest on operating capital @ 9%	
Total Fixed cost	
E. Total costs	

4. After Production cost:

Cost Items Cost)	Cost (Tk/25 kg)
1. Drying, threshing	
2. Transportation cost	
3. Loading and unloading	
4. Market toll	
5. Personal expense	
6. Unofficial payment	

5. Problem about Boro rice production:

6. Probable Solutions to your problem:

7. Selling price (tk/25kg)/Season/yearly/monthly/week

8. To whom you sell your produce?

(Farias/Beparis/Millers/Wholesaler/Retailers)

Signature:

Date:

INTERVIEW SCHEDULE FOR INTERMEDIARIES

1. Identification:

Name:	Mobile:
Upazila:	Age:
Education:	Occupation:

2. From where do you buy Boro? Farmer/Faria/Wholesaler

3. Does the price vary for different sellers? Yes/No

4. Cost of Boro rice Purchase (Farias/Beparis/Millers/Wholessller/Retailers)

Cost heading	
Rent	
Loading and unloading	
Transportation	
Market tolls	
Cost of bags	
Personal expenses	
Sub-total (A)	
Transportation/Rent	
Loading and unloading	
Personal/Processing expenses	
Weighing/Electricity charges	
Others	
Sub total (B)	
Grand total (A+B)	

5. Marketing margin of Boro rice by Farias/Beparis/Millers/Wholessller/Retailers

Item	Price
Purchase price	
Sale price	
Marketing margin	
Total marketing cost	
Profit or net margin	

6. Are you involved in storing? Yes / No

7. What are the main problems of your business?

8. What are the solutions?

Signature:

Date: