

**ASSESSING PROFITABILITY OF RICE CULTIVATION:
A CASE OF SIRAJGANJ DISTRICT**

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A CASE OF SIRAJGANJ DISTRICT**

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CERTIFICATE

This is to certify that the research work entitled, **“ASSESSING PROFITABILITY OF RICE CULTIVATION: A CASE OF SIRAJGANJ DISTRICT”** conducted by **SAMIA MAHBUB** bearing Registration No. **11-04644 (July-December/2018)** under my supervision and guidance in the partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (M. S.) IN DEVELOPMENT AND POVERTY STUDIES** in the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh. No part of this thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information received during this study has been duly acknowledged by her.

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Dedicated To
My Beloved Parents
Md. Mahbub-ul-Alam
&
Raihana Begum

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ABBREVIATIONS

IMF	International Monetary Fund
GDP	Gross Domestic Product
BCR	Benefit Cost Ratio
SPSS	Statistical Package for Social Sciences
DAE	Department of Agricultural Extension
SAAO	Sub-Assistant Agriculture Officer
AEO	Agricultural Extension Officer
CIG	Common Interest Group
NGO	Non-Governmental Organization

ASSESSING PROFITABILITY OF RICE CULTIVATION: A CASE OF SIRAJGANJ DISTRICT

SAMIA MAHBUB

ABSTRACT

Bangladesh agriculture is dominated by rice cultivation as it is the staple food in the country. The purpose of the study was to assess the profitability of rice cultivation in some selected areas of Sirajganj district which was conducted at three villages of Shahjadpur upazila under the district. Out of approximate 912 population (The Population and Housing Census 2011 and SAAO) of the villages who were involved in rice farming activities, 91 farmers were randomly selected which constituted the sample. A well-structured Questionnaire was used to collect data from the respondents. Correlation co-efficient method was administered and nine independent variables namely: age, education, family size, farm size, time spent in farming, annual income, training on rice cultivation, use of information source and organizational involvement were considered to run the analysis. The findings of the study revealed that 90.11 percent of the respondents had profitability where 9.89 percent had no profitability in rice farming. The value of Benefit Cost Ratio (BCR) was 1.39 which mean the production of revenue from rice is economically satisfactory. Among the nine selected characteristics of the farmers correlated with profitability of rice farming only four variables namely: education, farm size, time spent in farming and use of information source had significant positive relationship with profitability. On the other hand, age, family size, annual income, training on rice cultivation and organizational involvement had no significant relationship with profitability of rice cultivation.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Bangladesh is primarily an agrarian economy. It is the 30th largest economy in the world as measured by purchasing power parity (Wikipedia, Economy of Bangladesh). It has made significant strides in its economic sector since its independence in 1971. Agriculture was the single largest producing sector of the economy since it comprised about 30 percent of the country's GDP and employed around 60 percent of the total labor force. At present the contribution of agriculture sector is 13.6 percent to the country's GDP (Economic review, 2018). The performance of this sector has an overwhelming impact on major macroeconomic objectives like employment generation, poverty alleviation, human resources development and food security. Most of the people of country have direct or indirect involvement with the agriculture where 15,089,000 families out of total 17,600,804 families involve with the agriculture. Agriculture was the first contributor to GDP (71%) in 1971 while the contribution of agriculture sector to GDP was only 17.3% in 2013. In terms of employment, agriculture still remains the largest source of income but the relative contribution of agriculture to GDP has fallen over time due to expansion of the industrial and service sector in Bangladesh. However, about 85% of the population is directly or indirectly attached to agriculture, though 47.3 % of the total population has direct employment in agricultural sector whereas 52.7% of the total population involved in non-agricultural employment. The land distribution of Bangladesh are as followed: total cultivable land 36962000 acres, forest land 6368000 acres and waste area 9638000 acres. Among this cultivable area, some areas are used three to four times in years with cropping intensity 190% for cultivation of different types of major crops (DAE, 2018).

A plurality of Bangladeshis earn their living from agriculture. The main crops are rice, jute, and tea which have dominated agricultural exports for decades, although the rice is grown almost entirely for domestic consumption, while jute and tea are the main export earners.

Rice is one of the major staple food of the world, ranking third after wheat and maize on global production level and second in terms of area under cultivation (Adeoye, 2003). It is a major

source of food for about half of the world's population supplying basic energy needs of the people. Rice is the staple food of about 160 million people of Bangladesh. It provides nearly 48% of rural employment, about two-third of total calorie supply and about one-half of the total protein intake of an average person in the country. Rice sector contributes one-half of the agricultural GDP and one-sixth of the national income in Bangladesh.

Almost all of the 13 million farm families of the country grow rice. Rice is grown on about 10.5 million hectares which has remained almost stable over the past three decades. About 75% of the total cropped area and over 80% of the total irrigated area is planted to rice. Thus, rice plays a vital role in the livelihood of the people of Bangladesh.

Total rice production in Bangladesh was about 10.59 million tons in the year 1971 when the country's population was only about 70.88 millions. Rice production increased every year in the 1980s (through 1987) except FY 1981, but the annual increases have generally been modest, barely keeping pace with the population. Rice production exceeded 15 million tons for the first time in FY 1986 (Wikipedia, Rice Production in Bangladesh). In the mid-1980s, Bangladesh was the fourth largest rice producer in the world, but its productivity was low compared with other Asian countries, such as Malaysia and Indonesia. It is currently the world's sixth-largest producer. However, the country is now producing about 34.9 million metric tons rice to feed her 160 million people. High yield varieties of seed, application of fertilizer, and irrigation have increased yields, although these inputs also raise the cost of production and chiefly benefit the richer cultivators.

The present study sets out to assess the profitability of rice farming by describing various socio-economic characteristics of the rice farmers. The results of the study will be useful to the farmers in taking decisions in respect of rice production. The researchers will find the information useful for conducting future investigations. The result of the study will also provide important clues to the policy makers in respects of production for domestic consumption. Moreover, to ensure the contribution of agriculture sector to the economic development of the country profitability analysis is must. Therefore, there is a need to conduct a study on assessing profitability of rice cultivation.

1.2 Statement of the problem

Rice is our main crop. The government of Bangladesh have taken initiatives for gaining self-sufficiency in rice production. Bangladesh has almost attained self-sufficiency in rice. However, sustaining this level in the coming years may be difficult considering that the country's population continues to rise ominously and rice production growth has to be achieved with fewer resources (e.g., land and water). Although the government provides various facilities to the farmers who are engaged in rice cultivation, several constraints are observed in the production of rice that hinders making profit in rice farming. With rapidly growing population, per capita availability of water has been declining. On the other hand, conflicts among competing users of scarce water resources have become more common.

Loss of paddy due to floods and other natural disasters has also become a common phenomenon, seriously disrupting the entire economy. Besides these, marketing is another problem faced by the rice farmers. Less improved marketing channel for agricultural products, from where farmers are getting benefitted, is one of the major barriers in achieving the millennium development goal. Matin et al. (2008) stated that if the farmers sell their agricultural products direct to the ultimate consumers then they will get more benefits, but it would not be possible because intermediaries were engaged to transfer of agricultural products from the farmers' field to distant consumers. High rate of illiteracy, lack of financial support, inadequate transport facility, lack of rural electrification and ignorance of government responsibility etc. have caused problems in accessing agricultural information properly. Due to low income, necessary steps cannot be made for improving the marketing channel for agricultural products. (Sultana, 2012).

Counting these adverse situations, farmers can lose interest in rice production that may lead to the chance of rice import from other countries which will increase the cost and hinder self-sufficiency in rice production. The main purpose of this study is to identify problems regarding cultivation of rice to assess the profitability of rice cultivation.

1.3 Key research questions

The present study was attempted to provide information regarding the following key research questions:

1. What are the characteristics of the rice farmers?
2. Is rice farming profitable? If yes, then what extent rice cultivation is profitable?
3. What are the factors that significantly influence rice farmers' profitability?

1.4 Specific objectives of the study

The following specific objectives were formulated in order to give proper direction to the study:

1. To describe the selected socio-economic characteristics of the farmers.
2. To determine the level of profitability of rice cultivation.
3. To identify the factors that significantly influence profitability of rice cultivation.

1.5 Justification of the study

Bangladesh agriculture, dominated by rice production, is already operating at its land frontier and has very little or no scope to increase the supply of land to meet the growing demand for food required for its ever-increasing population. The expansion in crop area, which was a major source of production growth till the 1980s, has been exhausted and the area under rice started to decline thereafter (Husain et al., 2001). The observed growth in rice production has been largely attributed to conversion of traditional rice to modern varieties rather than to increase in yields of modern rice varieties. The principal solution to increasing food production lies in raising the productivity of land by closing the existing yield gaps and developing varieties with higher yield potential. The United Nations projects that farmers will have to generate large marketable surplus to feed the growing urban population by 2020 (Husain et al., 2001). This implies that Bangladeshi farmers not only need to be more efficient in their production activities but also to be more responsive to market indicators, so that the scarce resources are utilized efficiently to increase productivity as well as profitability. The present study sets out to analyze the profitability of rice farming and also profit efficiency of the modern rice farmers. The results will be useful to the farmers in taking decisions in respect of rice production. The researchers will

find the information useful for conducting future investigations. The result of the study will also provide important clues to the policy makers in respects of production for domestic consumption.

1.6 Scope of the study

The present study was designed to have an understanding of profitability of rice cultivation and the characteristics that influence profitability. The findings of the study will fit to the areas of Bangladesh where physical, socio-economic, cultural and geographic condition do not differ much from those of the study area. The findings may also be useful to the field workers of various nation building departments to improve methodologies of action to conform economically profitable rice production to the rural farmer. Lastly, the researcher believes that the findings and recommendations of this study will prompt limit the expense of rice cultivation and at the same time diminish the danger of natural harms.

1.7 Assumption of the study

An assumption has been defined as “the supposition that an apparent fact or principle is true in light of the available evidence” (Goode, 1945). An assumption that is taken as a fact or conviction to be valid without verification. So the following assumptions were in mind of the researcher while carrying out this study:

- i. The respondents included in the sample were capable of delivering proper responses to the questions of the interview schedule.
- ii. Views and opinions outfitted by the respondents were the representative views and opinions of the entire population of the study.
- iii. The information collected from the respondents were reliable and they truly expressed their opinions on the profitability of rice cultivation.
- iv. The data collected by the researcher were free from bias.
- v. The information sought by the researcher revealed the true circumstances to satisfy the objectives of the study.
- vi. The findings of the study will have general application to other parts of the country with similar personal, socio-economic and cultural conditions of the study area.

1.8 Limitation of the study

The study was undertaken with a view to have an understanding on profitability of rice production. But considering the time and fund, the study was conducted with the following limitations:

1. The study was confined in 3 villages from 3 unions of 291 villages from 13 unions of Shahjdpur upazila under Sirajganj district.
2. There were many other characteristics of the farmers but in the study only 9 of them were selected for investigation.
3. Farmers didn't record their production so it was tough to collect accurate data. The researcher had to depend on the data furnished by the selected respondents during interview with them. There occurred various response and non-response error.
4. Major information and facts supplied by the respondents were applicable to the situation prevailing in the locale during the year 2018.
5. In view of time and resource constraints, conducting a comprehensive study in full depth and width has not been possible.

CHAPTER 2

REVIEW OF LITERATURE

Review of literature provides the direction to the researcher for carrying research activities. The main purpose of this chapter is to review the past research works having relevance to the present study. This chapter deals with a brief review of previous research studies relating to the concept of assessing profitability of rice cultivation in some selected areas in Sirajganj district. The researcher took attempt to gather information related to the present study. Only a few studies have so far conducted related to profitability analysis of rice in Bangladesh. Again, some of these studies may not thoroughly relevant to the present study, but their findings, methodology of analysis and suggestions have a great influence on the present study.

This Chapter is divided into two major sections. The first section deals with profitability of rice and other crop cultivation and the second section deals with relationship between farmers' characteristics and profitability.

2.1 Profitability of rice and other crop cultivation

Hossain (1980) studied on food grain production in Bangladesh where he found a significant regional variation in the performance of food grain production. He also found that concentration of land in the hand of large farmers and high incidence of share tenancy were major socio-economic constraints to the achievement of a high growth rate in food grain production.

Chowdhury et al. (1992) examined the feasibility of rice export as a dual trade with the import of wheat. They indicated that the need for such a trade arises from the likely surplus of rice that might be generated in the future due to higher growth of production of rice than its consumption. It was also shown that dual trade would be profitable.

Das (1992) performed a study on profitability of potato cultivation and found that the average yield of potato was 4720 kg per hectare and the average gross return amounted to TK. 33040 per hectare and he calculated the per hectare net return above full costs at TK. 11085.90.

Saha (1999) analyzed comparative profitability of different varieties of onion in selected area of Pabna district. All the varieties studied were found profitable but Faridpuri variety was found

more profitable than other varieties. It was also found that variation in net returns was greatly influenced by the use of human labour, tillage, seed, fertilizer, insecticides and irrigation water.

Rahman (2003) performed a study on profit efficiency among Bangladeshi rice farmers. The results of the study showed that there were high levels of inefficiency in modern rice cultivation. The mean level of profit efficiency was 77% suggesting that an estimated 23% of the profit was lost due to a combination of both technical and allocative inefficiency in modern rice production. The efficiency differences were explained largely by infrastructure, soil fertility, experience, extension services, tenancy and share of non-agricultural income.

Islam (2003) performed a study on profitability and technical efficiency of wheat production in some selected areas of Dinajpur district in Bangladesh. The study revealed that total costs of wheat per ha was the highest for small farms and lowest for large farms and net return of wheat production was highest for medium farmers followed by large and small farmers whereas the benefit cost was highest for large farmers followed by medium and small farmers. So the large farms were most profitable compared to others.

Salam and Rahmadani (2003) performed a study on the profitability of rice farming in Polmas district, South Sulawesi in Indonesia. The result of the study showed that rice farming system of the District was privately and socially very profitable.

Nargis et al. (2009) analyzed profitability of MV Boro rice production under shallow tubewell irrigation system. The major findings of the study were that about one third of total cost shared by irrigation charge. Cost of irrigation was the second highest which is essential for MV Boro paddy production and the yield of MV Boro paddy was quite satisfactory in the study areas.

Ozkan et al. (2009) analyzed the productive efficiency in agricultural production. He examined that effective production by using appropriate input-output structure is something more than receiving accounting profits. He also found that the process of transformation of inputs to outputs has crucial importance in interpretation of success of a production system.

Mondal (2010) performed a study on challenges and opportunities in crop agriculture of Bangladesh. In the study he explained about different types of challenges and reverse situations faced by the agriculture workers of Bangladesh and also showed the opportunities and possibilities to overcome problems regarding crop agriculture.

Takele (2010) examined the profitability and marketing chain of rice in Fogera Woreda, South Gondar zone of Amhara Regional State. Findings based on the results of the study was to promote rice market participation in a sustainable way, some policy implications were suggested to be addressed.

Haque et al. (2011) performed a study on profitability of onion cultivation in some selected areas of Bangladesh and found that cultivation of onion is profitable. They also found that profit obtained from onion cultivation was higher than that of other Competitive crops such as groundnut, mustard and cabbage.

Ibrahim et al. (2011) examined the profitability of rice processing and marketing in Kano State. They found that Kano State has great potentials for rice processing and marketing.

Sultana (2012) analyzed the problems and prospects of rice marketing in Bangladesh. She showed in her study that rice marketing in Bangladesh is marred by a wide range of problems including packaging, transporting, storage, distribution and pricing. The study suggested measures that could benefit both the farmers and the end users.

Dhali (2013) conducted a study on profitability of mixed cropping in some selected areas of Madaripur district of Bangladesh. Findings from the study showed that the profitability of mixed cropping was Tk 9150.37 at Tk 120740.90 of total costs and the correlation co-efficient showed that land, labor, seed and fertilizers were positively correlated with profitability of mixed cropping. The study also showed the problems faced by the farmers in practicing mixed cropping and recommended some policies to overcome the problems.

Fatah and Taubadel (2014) analyzed profitability and competitiveness of rice farming in Malaysia. The study investigated whether the rice sector was competitive under the existing set of policies and whether production was truly competitive in the sense that it would generate profits in the absence of government policies. The results also showed that the net effect of government policies in Malaysia was to support rice production.

Hasan et al. (2014) conducted a study on profitability of important summer vegetable in Keraniganj upazila of Bangladesh and found that cultivation of summer vegetable was profitable. They also found that profit obtained from summer vegetable cultivation was higher than that of other competitive crops like bottle gourd and cucumber.

Hoque and Haque (2014) performed a study on socio-economic factors influencing profitability of rice seed production in selected areas of Bangladesh. The results of the study showed that old aged farmers having primary level of education dominated in government's quality seed production project, which was not a good sign for adoption of any new practices. Hence, future project activities might encourage on involving younger to middle aged educated beneficiary in project activities.

Kabir et al. (2015) performed an investigation on rice vision for Bangladesh: 2050 and beyond. The result of his investigation showed that clean rice surplus in Bangladesh might be targeted as at least 2.6 MT in 2050 based on requirement-production scenario and this target could be achieved through three major interventions - accelerating genetic gain, minimizing yield gap and curtailing adoption lag.

Mottaleb and Mohanty (2015) performed a study on farm size and profitability of rice farming under rising input costs. His study demonstrated that rising input prices and agricultural wage rates had been reducing the overall profitability of rice farming worldwide and losses in profitability were larger for small farmers than for large farmers.

Nwike and ugwumba (2015) investigated the profitability of rice production in Aguata Agricultural Zone of Anambra State Nigeria. They determined the enterprise profitability, ascertained the determinants of maximum variable profit and identified the constraints to rice production.

Bapari (2016) analyzed the determinants, costs and benefits and resources allocation of both conventional and high yielding rice cultivation over the Rajbari district of Bangladesh. He found from the study that the HYV rice is more suitable and profitable than the CYV rice in the Rajbari district.

Noonari et al. (2016) investigated rice profitability and marketing chain in Taluka Pano Akil district Sukkur Sindh in Pakistan. The investigation results showed that on an average per acre spent a total cost of production of rice farmers Rs.44310.00, this included Rs.15200.00, Rs.2350.00, Rs.2900.00, Rs.9860.00, Rs.7400.00 and Rs.6600.00 on fixed cost, land preparation, seed and sowing, farm inputs, harvesting and threshing marketing costs respectively on capital inputs. Rice farmers on an average per acre gross income Rs.108400.00 and total expenditure is

Rs.68310.00 in taluka Pano Akil district Sukkur Sindh area therefore they availed input output ratio of 1: 1.58 from rice growing in the study area.

Rahman et al. (2016) conducted a study on profitability analysis of brinjal production and factors affecting the production in Jamalpur district and found that production of brinjal is profitable.

Okam et al. (2016) performed a comparative analysis of profitability of rice production with the involvement of men and women farmers in Ebonyi State, Nigeria. The study established that if male and female educated farmers are engaged in the production of rice and with proper access to credit, more profit will be realized, hence, the enterprise can serve as a means of employment for the populace as well as improving level of living of both male and female farmers.

Islam et al. (2017) conducted a study on Profitability and productivity of rice production to assess the profitability, constraints and factors affecting rice production in coastal area of Shamnagar upazila in Satkhaira district of Bangladesh. The study found that the small farmers (Tk. 10292.89) got higher net returns than the medium (Tk. 6894.39) and large (Tk. 4798.70) farmers per hectare, respectively. It is also found that the coefficient of seed, fertilizer, power tiller, irrigation cost and human labor have significantly impact on gross return. Lack of saline tolerable good quality seeds, high price of inputs, low price of outputs and natural calamity were the major problems for rice farming in the study area though rice farming was a profitable enterprise.

Khan et al. (2017) analyzed financial profitability and resource use efficiency of boro rice cultivation in Bogra district of Bangladesh. They found from the study that boro rice cultivation in Bogra district was a profitable venture. All of the factors namely human labour, seed, urea, insecticide and irrigation were very important for the cultivation.

Bwala and John (2018) worked on profitability of rice production among small scale farmers in Bida agricultural zone of Niger state. Their findings revealed that the variable cost per hectare for rice production to be \$126,100 per production cycle, while total revenue of \$227,500 was realized by the respondents. The results also revealed that rice production in Bida agricultural zone of Niger State is profitable.

Saha et al. (2018) conducted an investigation on comparative profitability of boro rice production using alternate wetting and drying and conventional irrigation in some selected areas of

Mymensingh region. The key finding of the investigation was that AWD (alternate wetting and drying) farmers gained more profit than conventional farmers on Boro rice production. Per hectare gross return and gross cost was higher and lower respectively in AWD farmers than conventional farmers from boro rice production. The results indicated that application of AWD method was more profitable than conventional practices in Boro rice production.

The above review indicates that only a few studies were conducted on analyzing the profitability of rice farming. The result of these studies varies widely in different reasons. The present study aims to do in depth analysis on it.

2.2 Relationship between farmers' characteristics and profitability

2.2.1 Relationship between age and profitability

Gupta et al. (2004) performed a study on Is environmentally friendly agriculture less profitable for farmers? Evidence on Integrated Pest Management in Bangladesh and found that age had positive significant effect on profitability.

Hoque and Haque (2014) performed a study on socio-economic factors influencing profitability of rice seed production in selected areas of Bangladesh and found that age had positive significant effect on profitability.

Mwangi et al. (2015) performed a study on factors influencing profitability of diversified cash crop farming among smallholder tea farmers in Gatanga district, Kenya and found that age had no significant effect on profitability.

Venance et al. (2016) attained a study on factors influencing on-farm common bean profitability; the case of smallholder bean farmers in babati district, Tanzania and found that age had positive significant effect on profitability.

2.2.2 Relationship between education and profitability

Gupta et al. (2004) performed a study on Is environmentally friendly agriculture less profitable for farmers? Evidence on Integrated Pest Management in Bangladesh and found that education had positive significant effect on profitability.

Khan (2004) performed a study on productivity and resource use efficiency of boro rice cultivation in some selected haor areas of Kishoreganj district and found that level of education significantly affected the return of Boro rice.

Hoque and Haque (2014) conducted a study on socio-economic factors influencing profitability of rice seed production in selected areas of Bangladesh and found that education had no significant effect on profitability.

Mwangi et al. (2015) attained a study on factors influencing profitability of diversified cash crop farming among smallholder tea farmers in Gatanga district, Kenya and found that education had no significant effect on profitability.

2.2.3 Relationship between family size and profitability

Khan (2004) attained a study on productivity and resource use efficiency of Boro rice cultivation in some selected Haor Areas of Kishoreganj District and found that family size significantly affected the return of Boro rice.

Hoque and Haque (2014) performed a study on socio-economic factors influencing profitability of rice seed production in selected areas of Bangladesh and found that family size had no significant effect on profitability.

Venance et al. (2016) conducted a study on factors influencing on-farm common bean profitability; the case of smallholder bean farmers in babati district, Tanzania and found that household size had no significant effect on profitability.

2.2.4 Relationship between farm size and profitability

Gupta et al. (2004) performed a study on Is environmentally friendly agriculture less profitable for farmers? Evidence on Integrated Pest Management in Bangladesh and found that farm size had no significant effect on profitability.

Hoque and Haque (2014) performed a study on socio-economic factors influencing profitability of rice seed production in selected areas of Bangladesh and found that farm size had positive significant effect on profitability.

Mwangi et al. (2015) performed a study on factors influencing profitability of diversified cash crop farming among smallholder tea farmers in Gatanga district, Kenya and found that farm size had no significant effect on profitability.

Venance et al. (2016) conducted a study on factors influencing on-farm common bean profitability; the case of smallholder bean farmers in babati district, Tanzania and found that land size had no significant effect on profitability.

2.2.5 Relationship between time spend and profitability

There was no available literature review about time spend in rice cultivation and profitability.

2.2.6 Relationship between income and profitability

Hoque and Haque (2014) conducted a study on Socio-economic factors influencing profitability of rice seed production in selected areas of Bangladesh and found that income had no significant effect on profitability.

Mwangi et al. (2015) attained a study on factors influencing profitability of diversified cash crop farming among smallholder tea farmers in Gatanga district, Kenya and found that income had no significant effect on profitability.

Venance et al. (2016) attained a study on factors influencing on-farm common bean profitability; the case of smallholder bean farmers in babati district, Tanzania and found that income had no significant effect on profitability.

2.2.7 Relationship between training and profitability

Gupta et al. (2004) attained a study on is environmentally friendly agriculture less profitable for farmers? Evidence on integrated pest management in Bangladesh and found that training had positive significant effect on profitability.

Hoque and Haque (2014) conducted a study on socio-economic factors influencing profitability of rice seed production in selected areas of Bangladesh and found that training had no significant effect on profitability.

2.2.8 Relationship between information source and profitability

Mwangi et al. (2015) performed a study on factors influencing profitability of diversified cash crop farming among smallholder tea farmers in Gatanga district, Kenya and found that information source had no significant effect on profitability.

Venance et al. (2016) conducted a study on factors influencing on-farm common bean profitability; the case of smallholder bean farmers in Babati district, Tanzania and found that access to source of information had no significant effect on profitability.

2.2.9 Relationship between organizational involvement and profitability

There was no available literature review about organizational involvement and profitability.

CHAPTER 3

METHODOLOGY

Methodology is a vital and integral part of any study. The reliability of a particular study finding depends, all things considered, on the fitting system used in the study. Improper methodology very often leads to misleading result. So, careful considerations are needed by an author to follow a scientific and logical methodology for carrying out the study. In this research a scientific and logical methodology has been taken by the researcher. There are different techniques for accumulation of essential information and data. Selection of a particular method for collecting primary data depends on many considerations; such as the nature of the study and its objectives, time constraints, availability of funds etc. The present study was based on field survey method where primary data were collected from the respondents through direct interviews. The survey method was chosen because it is less expensive and its coverage are much wider and it doesn't require profoundly prepared individual and advanced hardware. The design of the survey for the present study included some necessary steps, which are presented in the following section.

3.1 Selection of study area

The selection of the study area is an important step, which largely depends upon objectives set for the study. The area in which survey is to be made depends on the particular purpose of the survey and the possible cooperation from the farmers. The aim of the present study is to analyze the profitability of rice farming in some selected areas of Sirajganj district. Three unions of Shahjadpur upazila under Sirajganj district were selected as the study area. These areas are Narnia, Porjana and Beltail. Shahjadpur upazila was selected for this research because the main crops of this area are rice and mustard.

Shahjadpur upazila is the largest upazila of Sirajganj district in respect of both area and population. The upazila occupies an area of 324.15 sq. km. It lies between 24°04' and 24°25' north latitudes and between 89°31' and 89°31' east longitudes. The upazila is bounded on the north by Ullahpara upazila and Belkuchi upazila, east by Nagarpur upazila of Tangail district and

Chowhali upazila, south by Bera Upazila of Pabna district and Daulatpur upazila of Manikganj district and west by Faridpur upazila and Santhia upazila of Pabna district.

The map of Shahjadpur upazila under Sirajganj district showing the study area is presented in fig. 3.1 and 3.2.

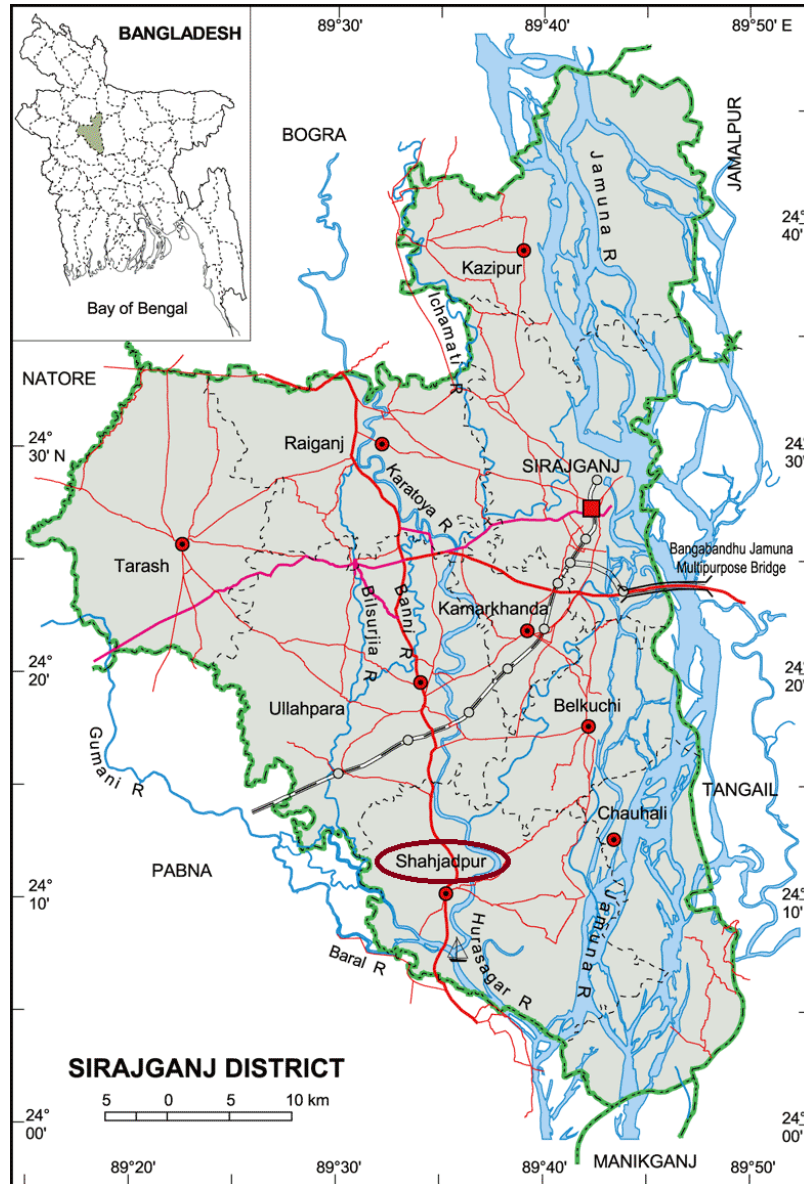


Figure 3.1: Map of Sirajganj district showing Shahjadpur upazila

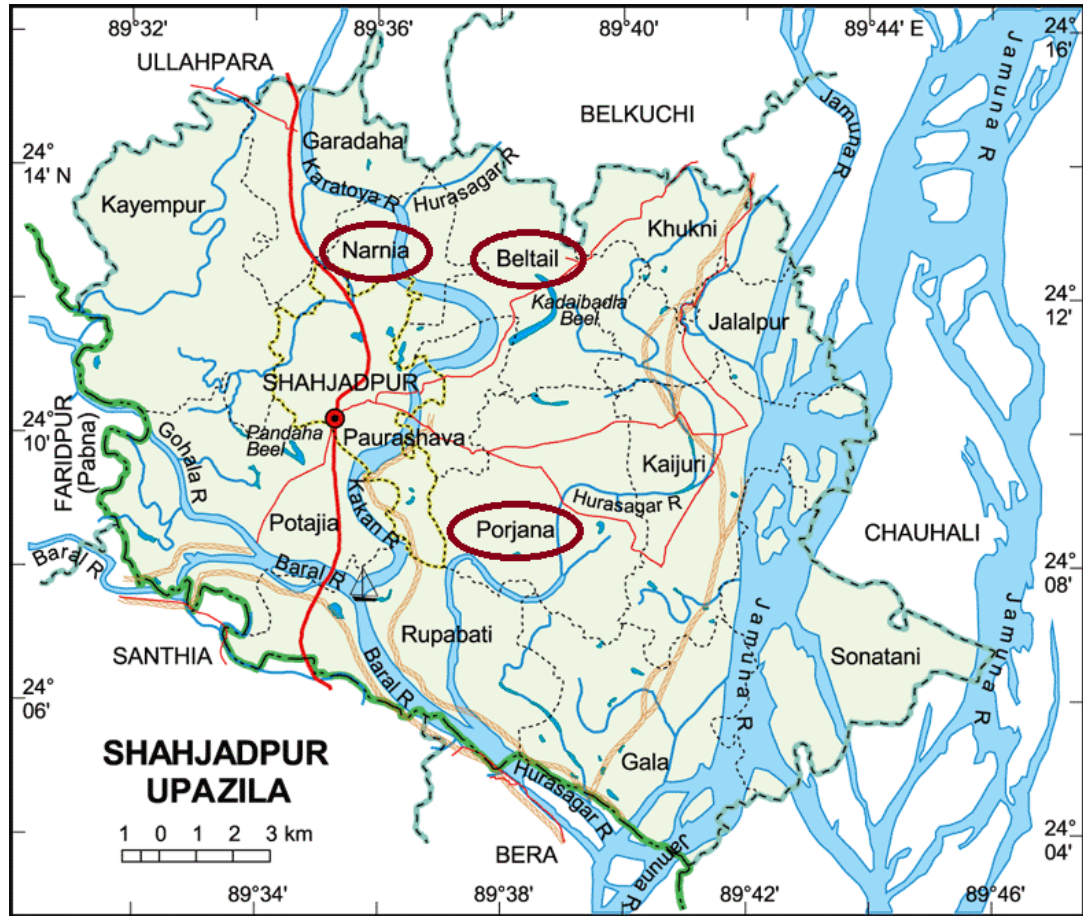


Figure 3.2: Map of Shahjadpur upazila showing Narnia, Beltail and Porjana union

3.1.1 The main reasons for selecting study area

The main reasons for selecting study area were as follows:

- Availability of information about rice cultivation.
- Easy accessibility and good communication facilities in this area.
- Very few study of this type was conducted previously in the study area.

The researcher was familiar with the locale of the study area and the anticipated cooperation from respondent was high which indicated the likelihood of obtaining a reasonably accurate set of data.

3.2 Population and sample

Considering research issue, time and budget the study was conducted in selected villages of Narnia union, Porjana union and Beltail unaon of Shahjadpur upazila under Sirajganj district. The rice farmers of selected three villages under these three unions were constituted as the population of the study. There were approximate 912 rice farmers (SAAO) in the selected villages which was constituted as the population of the study.

Out of the 912 rice farmers a sample of 91 (10% of 912) were selected proportionately and randomly as the sample for the study. The distribution of the rice farmers constituting the population and sample are shown in table 3.1.

Table 3.1 Distribution of rice farmers constituting the population and sample

Name of villages	No. of farmers	
	Population	Sample
Agunkali	363	49
Boromaharajpur	331	23
Narnia	218	19
Total	912	91

Population source: SAAO

3.3 Preparation of survey schedule

The survey schedule was designed in accordance with the objectives of the research in order to collect valid and reliable data from the farmers. Data were collected through personal interview with the farmers for which necessary schedule was to prepare. Information about farmers' land, input cost, income and other consequential matters were collected. Simple and direct questions and different scales were used to obtain information. Both open and closed form questions were designed to obtain information relating to qualitative variable which was finally be measured by adding score. Questions were asked systematically and explanations were made whenever it is

necessary. The respondents were interviewed at their leisure time so that they can give accurate data in a cool mind.

3.4 Data collection procedure

It is not possible to make a field survey covering field. For this reason, sampling was done to select representative to minimize time and cost of the study. For the selection of samples for a study some points need to be taken into consideration. Administration of field research, processing and analyzing of data should be manageable within limits imposed by physical, human and financial resources. Considering all this aspects about 91 samples were randomly selected .The data were collected by the researcher herself through personal interviewing using a prepared interview schedule. The researcher made all possible attempts to establish communication with the respondent so that they could feel ease and be comfortable in delivering response to the questions in the schedule. The purpose of the study was explained carefully to the respondents and their answers were recorded sincerely.

3.5 Data collection period

Data were collected by the researcher herself through personal interviews with the respondents. Data collection took place during the period from April, 2019- June, 2019. The collected data were compiled, tabulated and analyzed. Qualitative data were converted into quantitative form by means of suitable scoring whenever needed.

3.6 Variables of the study

In a research work, the selection of variables constitute an important task. In this connection, the researcher looked into literature to widen her understanding about the nature and scope of the variables involved in the research studies. A variable is any characteristics, which can assume varying or different values in successive individual cases. An organized piece of research usually contains at least two important variables viz., dependent variable and independent variable. An independent variable is that factor observed phenomenon. A dependent variable, on the other hand, is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variables. The dependent variable is often called the “criteria” or “predictive variable” whereas the independent variables are called “treatment”, “experimental” or “antecedent” variable. Profitability of rice farming was considered as the dependent variable

of the study. The researcher selected nine characteristics of the respondent as the independent variables. The characteristics include age, educational qualification, family size, farm size, time spent in farming, annual income, training on rice cultivation, use of information source and organizational involvement.

3.7 Measurement of variable

In order to conduct the research in accordance with the objectives, it was important to measure the selected variables. This section comprises procedures for measurement of both dependent and independent variables of the study. The procedures of measuring the variables are described below.

3.7.1 Measurement of causal variables

The selected characteristics of the respondents constituted the independent variables of the study. Nine independent variables were selected to carry out the research work. The procedures of measurement of selected variables were as follows:

3.7.1.1 Age

Age of a respondent referred to the span of his/her life and is operationally measured by the number of years from his/her birth to the time of interviewing.

The age of a respondent is one of the important factors pertaining to his personality make up which plays an important role in adoption behavior. Age of the respondents was measured in terms of actual years from their birth to interview time. This variable appears in item number (I.a.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.2 Educational qualification

Education of a respondent defined as on what extent he/she achieved formal education from different educational institutions. Is he/she literate or illiterate? If literate then what extent he/she literate was also considered as educational background for study.

Educational qualification was measured as the ability of a respondent to read and write or formal education (school/college) completed up to a certain standard. It was expressed in terms of years of schooling. A score of one (1) was assigned for each year of schooling completed. For

example, if the respondent passed the SSC examination his education score was given as 10, if passed the final examination of class eights his education score was given as 8, if the respondent did not know reading and writing then the score was given as '0' (zero). A score of 0.5 (half) was given to the respondent who could sign only. This variable appears in item number (I.b.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.3 Family size

Family size of a respondent defined as the total number of members in his/her family including him/her, children and other dependents who live and eat together in a family unit.

Family size of a respondent was measured in terms of number of members (dependents) in his family (including himself) during interview. The actual number provided by the respondents made the scoring. This variable appears in item number (I.c.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.4 Farm size

Farm size referred to the total area on which a respondent's family carries on farming operations, the area being estimated in terms of full benefit to the respondent's family.

Farm land is the most important capital of a farmer and size of farm has great influence on many personal characteristics of a farmer. Farm size of the respondent was measured by the land area possessed by him. Farm size was computed by using the following formula which is also used by Sarker, (2007); Hoque, (2008); Mozumdar, (2010); Dilzahan, (2015), Afrin (2015) and Tarek et al., (2019):

$$\text{Farm size} = c_1 + \frac{1}{2} (c_2 + c_3) + c_4 + c_5$$

c_1 = Own land under own cultivation

c_2 = Own land given to others on barga

c_3 = Land taken from others on barga

c_4 = Land taken from others on lease

c_5 = Own pond and garden

The unit of measurement was hectares. This variable appears in item number (II.a.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.5 Time spent in farming

Time spent in farming referred to the duration or period of time when farmer was engaged in different activities of field works related to farming.

Time spent in farming by the rice farmers was measured by total hours per week. This variable appears in item number (II.b.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.6 Annual income

Annual income referred to the total annual earnings of all the family members of a respondent from agriculture, livestock and fisheries and other accessible sources such as business, service, daily working etc.

Annual income of a respondent was measured on the basis of total yearly earning from agriculture and non-agriculture sources (service, business, day labor etc.) by the respondent himself and other family members. The value of all the agricultural products encompassing crops, vegetables, fruits, livestock, poultry, fisheries etc. was taken into consideration. For calculation, a score of one (1) was assigned for each one thousand taka of income. This variable appears in item number (II.c.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.7 Training on rice cultivation

Training on rice cultivation referred to the institutional training program that works for the development of the farmers' ability to use modern technology and other skillful activities to improve the production system.

Training on rice cultivation was ascertained by the total number of days a respondent obtained training in his whole life on rice cultivation from different organizations. In a measuring score of one (1) was assigned for each days of training. This variable appears in item number (II.d.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.8 Use of information source

Information source referred to a respondent's exposure to or contact with different communication media, source and personalities being used for dissemination of new technologies.

Use of information source by a respondent was measured on the basis of the extent of his contact with selected 7 media in a scale ranging from- regularly, occasionally, rarely and no association. The responses were scored as 3, 2, 1 and 0 respectively. The use of information source score of the respondents ranged from 0 to 15, where, 0 indicates no association and 15 indicates highest association. This variable appears in item number (III.a.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.1.9 Organizational involvement

Organizational involvement of a respondent referred to his/her participation in different organizations as general member, executive committee member or executive officer within a specified period of time.

Organizational involvement of a respondent was measured by computing an organizational participation score according to his nature of involvement in five (5) selected different organizations up to the time of interview. The nature of involvement were no participation, general member, executive committee member and executive officer. The score for the nature of participation was 0, 1, 2 and 3 respectively. Organizational involvement score of a respondent was determined by adding the scores obtained from each of the five types of participation. The score ranged from 0 to 5, where, 0 indicates no participation and 5 indicates highest participation. This variable appears in item number (III.b.) in the interview schedule (questionnaire) as presented in Appendix-I.

3.7.2 Measurement of focus variable

Profitability of rice farming was considered as the focus variable of the study. Profitability or benefit of a project or study can be measured in various ways among which such common methods are Benefit Cost Ratio (BCR), Net Present Value (NPV) and Internal Rate of Return (IRR). In this study, considering respondent's type, complexity and time, profitability was

measured by Benefit Cost Ratio (BCR). The method is also applied by Tarek et al., (2019), Hoque and Haque (2014), Chowdhury et al., (2012). To calculate BCR, farmers were asked about their output of rice cultivation and total cost of rice cultivation. The cost of rice cultivation includes hired labour, ploughing, levelling, seed, fertilizer, pesticide, harvesting and others costs. Cost per unit of these items were collected from the respondents and average of total cost of 91 respondents was calculated through descriptive analysis.

The following formula was used for computing BCR:

$$\text{BCR} = \frac{\text{Gross return}}{\text{Total input cost}}$$

If, $\text{BCR} > 1$, then profit

$\text{BCR} < 1$, then loss

$\text{BCR} = 1$, then there is no profit no loss.

3.8 Statement of hypothesis

A hypothesis is a proposition which can be put to a test to determine its validity. It may be seen contrary to or accordance with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test. The following null hypothesis was formulated to test the contribution of 9 independent variables with profitability of rice cultivation:

“There is no relationship between the selected 9 characteristics of the respondents and profitability of rice farming.”

3.9 data processing and analysis

3.9.1 Compilation of data

After completing field survey, data from all the interview schedules were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. In this process, all responses in the interview schedule were given numerical coded values. Local units were converted into standard units and qualitative data were converted into quantitative data by assigning suitable scores whenever necessary. The responses of the questions in the interview schedule were transferred to a master sheet to facilitate tabulation.

3.9.2 Categorization of data

The respondents were classified into different categories for clear or simple understanding of various attributes of the respondents. The categories were developed by the researcher considering nature of data and general consideration prevailing in the social system.

3.9.3 Statistical technique

Both descriptive and statistical tools were used in this study. The descriptive measures such as range, means, standard deviation, number and percentage distribution were used to describe the variables. According to the objectives of the study, the collected data were analyzed and interpreted. Data were analyzed by using software named SPSS (Statistical Package for Social Sciences), version 22. Pearson's Product Moment Correlation Coefficient (r) was used in order to explore the relationships between the concerned variables. Five percent (0.05) level of probability was the basis for rejecting any null hypothesis throughout the study. The SPSS computer package was used to perform all these process.

CHAPTER 4

SOCIO-ECONOMIC CHARACTERISTICS OF THE FARMERS

The findings obtained from the study and interpretation of results are presented in this chapter. These are conveniently presented in three sections according to the objectives of the study. The first section deals with the selected characteristics of the respondents producing rice, the second section deals with the profitability of rice farming and the third section deals with the relationship between independent variables and the profitability of rice farming.

4.1 Selected characteristics of the respondents

The salient features of the selected characteristics of the respondents are presented in table 4.1 and described in the following sub-sections:

Table 4.1 Selected characteristics of the rice farmers

Sl. No	Characteristics	Units of measurement	Ranges (observed)	Mean	S.D.
1	Age	Years	28 - 76	52.33	10.657
2	Education	Year of schooling	0 - 15	8.379	3.209
3	Family size	No. of members	3 - 10	5.67	1.542
4	Farm size	Hectare	.11 - 2.70	.802	.581
5	Time spent in farming	Hours per week	20 - 56	37.59	5.663
6	Annual income	'000' Taka	82 - 398	143.461	47.745
7	Training on rice cultivation	No. of days	0 - 15	4.55	3.478
8	Use of information source	Score	0 - 15	6.18	3.258
9	Organizational involvement	Score	0 - 9	1.20	1.408

4.1.1 Age

The age of the farmers in the study area ranged from 28 to 76 with a mean 52.33 and standard deviation 10.657. Based on the observed distribution of age, rice farmers were classified into three categories such as young aged, middle aged and old aged farmer. The distribution of farmers along with their frequency and percentage are shown in table 4.2

Table 4.2 Distribution of farmers according to their age

Categories	Respondent		Mean	S.D.
	Frequency	Percent (%)		
Young aged (up to 35)	15	16.48	52.33	10.657
Middle aged (36-50)	54	59.34		
Old aged (>50)	22	24.18		
Total	91	100		

Table 4.2 showed that the highest proportion 59.34 percent of the rice farmers fell in the "middle aged" category, while 16.48 percent of them fell in the "young aged" category and 24.18 percent in the "old aged" category. The findings indicate that the middle aged farmers were highly involved in rice farming.

Considering the age range of a majority of the farmers, their productivity is at its peak and hence is of great value to rice cultivation. Yakubu, (2002) concurred with this finding based on his assertion that farmers who are between the ages of 30-49 years are more willing and able to take risk with the expectation of a larger profit than the older farmers.

4.1.2 Education

The level of education of the rice farmers ranged from 0 to 15. The average education level was 8.379 with standard deviation 3.209. On the basis of level of education, respondents were

classified into five categories such as illiterate or can sign only, primary level, secondary level, higher secondary level and above higher secondary level. The distribution of farmers along with their frequency and percentage are shown in table 4.3

Table 4.3 Distribution of farmers according to their education

Categories	Respondent		Mean	S.D.
	Frequency	Percent (%)		
Illiterate/can sign only (0-0.5)	13	14.29	8.379	3.209
Primary level (1-5)	47	51.65		
Secondary level (6-10)	19	20.88		
Higher secondary level (11-12)	9	9.89		
Above higher secondary (>12)	3	3.29		
Total	91	100		

Table 4.3 showed that, the majority proportion (51.65) of the respondents had primary level education where 14.29 percent had no education or could sign only, 20.88 percent completed secondary level education, 9.89 percent completed higher secondary level and 3.29 percent achieved above higher secondary degree.

Education is known to facilitate farmers' understanding and capability of using of improved crop production practices. The result revealed that only 14.29 percent of the farmers were illiterate or could sign only and the rest 85.71 percent had a form of education. Compared to the current national literacy rate (72.9 percent) of Bangladesh, the literacy rate of the study area is a bit high because of having a moderate infrastructure, availability of educational tools and materials and more consciousness about education. It is therefore, expected that the rice farmers are knowledgeable and apt to learn.

4.1.3 Family size

The family size of the respondents ranged from 3 to 10 with an average 5.67 and standard deviation 1.542. Based on family size, the respondents were classified into three categories such as small, medium and large family. The distribution of farmers along with their frequency and percentage are shown in table 4.4

Table 4.4 Distribution of farmers according to their family size

Categories	Respondent		Mean	S.D.
	Frequency	Percent (%)		
Small (≤ 4)	22	24.18	5.67	1.542
Medium (5-6)	43	47.25		
Large (>6)	26	28.57		
Total	91	100		

Table 4.4 shows that the highest proportion (47.25 percent) of the respondents had medium family as compared to small (24.18 percent) and large family (28.57 percent). Family size is an important source of family labour. The study revealed that majority of the respondents had family size ranging between 5-6 persons in the family (47.25%) and more than 6 persons in the family (28.57%). This implies that the farmers in the study area might have advantages as regards availability of unpaid family labour since majority of the family had members that can participate in farm work. The availability of this unpaid labour reduces the cost of farm labour.

4.1.4. Farm size

The farm size of the respondents ranged from 0.11 to 2.70 hectare with an average of .802 hectare and standard deviation .581. The respondents were classified into three categories as marginal, small and medium on the basis of their farm holdings as suggested by DAE (2018). The distribution of farmers along with their frequency and percentage are shown in table 4.5

Table 4.5 Distribution of farmers according to their farm size

Categories (ha)	Respondent		Mean	S.D.
	Frequency	Percent (%)		
Marginal (0.02-0.2)	4	4.40	.802	.581
Small (0.21-1.0)	70	76.92		
Medium (1-3)	17	18.68		
Total	91	100		

Table 4.5 shows that the highest proportion (76.92 percent) of the respondents belonged to small farm category while 4.40 percent of the respondents had marginal farm size and 18.68 percent had medium farm size. Thus, the overwhelming majority 95.6 percent of the farmers were the owners of small to medium farms. Majority of the farmers were under small farmer's category which is consistent with national scenario.

4.1.5 Time spent in farming

Time spent by the respondents in farming ranged from 20 to 56 hours per week with an average of 37.59 and standard deviation 5.663. The respondents were classified into three categories such as low, medium and high on the basis of time spent in farming as suggested by DAE (2018). The distribution of farmers along with their frequency and percentage are shown in table 4.6

Table 4.6 Distribution of respondents according to their time spent in farming

Categories (hours/week)	Respondent		Mean	S.D.
	Frequency	Percent (%)		
Low (Mean-1sd. i.e. < 32)	9	9.89	37.59	5.663
Medium (Mean±1sd. i.e. 32-40)	69	75.82		
High (Mean+1sd. i.e. >40)	13	14.29		
Total	91	100		

Table 4.6 shows that the largest proportion (79.12 percent) of respondents had medium time spent in farming while 9.89 percent and 10.99 percent had low and high time spent respectively.

Time spent in rice cultivation is helpful to increase knowledge, improve skill and change attitude of the farmers. It also helps to build confidence of the farmers for making proper decisions at the time of need. Generally, time spent in rice farming helps to cope up any problematic situation as well as increase skill.

4.1.6 Annual income

Annual income of the rice farmers ranged from 82 to 398 thousand taka with an average 143.461 and standard deviation 47.745. Based on annual income respondents were classified into three categories as low, medium and high income. The distribution of farmers along with their frequency and percentage are shown in table 4.7

Table 4.7 Distribution of farmers according to their annual income

Categories (000 taka)	Respondent		Mean	S.D.
	frequency	Percent (%)		
Low income (Mean-1sd. i.e. <96)	8	8.79	143.461	47.745
Medium income (Mean±1sd. i.e. 96-190)	68	74.73		
High income (Mean+1sd. i.e. >190)	15	16.48		
Total	91	100		

Table 4.7 showed that the highest proportion (74.73 percent) of the respondents had medium level of income while 8.79 percent had low level and 16.48 percent had high level of income.

From the findings it may be said that farmers of medium level income were mostly involved in rice farming.

Hoque and Haque (2014) and Rakib, T. M. (2017) also had similar findings from annual income where mean value of annual income were 203.29 and 320.94 respectively.

The farmers in the study area were not only engaged in agriculture but also earned from other sources such as service, business etc. Higher annual income of the farmers allowed them to invest more in rice production.

4.1.7 Training on rice cultivation

Training on rice cultivation done by the rice farmers ranged from 0 to 15 days with an average 4.55 and standard deviation 3.48. Based on number of days of training respondents were classified into four categories as no training, low training, medium training and high training. The distribution of farmers along with their frequency and percentage are shown in table 4.8

Table 4.8 Distribution of farmers based on participation in training program

Categories	Respondent		Mean	S.D.
	frequency	Percent (%)		
No training (0 days)	61	67.04	4.55	3.48
Low training (1-5 days)	20	21.98		
Medium training (6-10 days)	5	5.49		
High training (above 10 days)	5	5.49		
Total	91	100		

Table 4.8 shows that the highest proportion (67.04 percent) of the respondents had no training while 21.98 percent, 5.49 percent and 5.49 percent of the respondents had poor, medium and high training respectively. Most of the farmers involved in rice farming came from farm family and experienced farming activities a lot from their family. Hence participation in training program had less impact on their production work.

4.1.8 Use of information source

The score of use of information source by the rice farmers ranged from 0 to 15 with an average 6.18 and standard deviation 3.258. Based on use of information source respondents were classified into four categories such as no contact, low contact, medium contact and high contact with selected seven media as suggested by DAE (2018). The distribution of farmers along with their frequency and percentage are shown in table 4.9

Table 4.9 Distribution of farmers according to their use of information source

Categories	Respondent		Mean	S.D.
	frequency	Percent (%)		
No contact	2	2.20	6.18	3.258
Low contact (mean-1sd. i.e. <3)	8	8.79		
Medium contact (mean±1sd. i.e. 3-9)	70	76.92		
High contact (mean+1sd. i.e. >9)	11	12.09		
Total	91	100		

Table 4.9 showed that the highest proportion (76.92) of the respondents had medium contact with different information source while 2.20 percent, 8.79 percent and 12.09 percent of respondents had no contact, low and high contact respectively. Data contained in table 4.9

indicated that most of the farmers in the study area had more or less contact with different information source which helped them to gather knowledge about rice cultivation and to know updated information regarding agricultural production, market prices, government facilities etc.

4.1.9 Organizational involvement

The score of organizational involvement of the rice farmers ranged from 0 to 9 with an average 1.20 and standard deviation 1.408. Based on involvement with different organization respondents were classified into four categories. The distribution of farmers along with their frequency and percentage are shown in table 4.10

Table 4.10 Distribution of farmers according to their involvement with different organizations

Categories (score)	Respondent		Mean	S.D.
	frequency	Percent (%)		
No involvement (0)	32	35.16	1.20	1.408
Low involvement (1-3)	54	59.34		
Medium involvement (4-6)	3	3.30		
High involvement (above 6)	2	2.20		
Total	91	100		

Table 4.10 showed that the highest proportion (59.34 percent) of the respondents had low organizational involvement while 35.16 percent had no involvement, 3.30 percent had medium involvement and 2.20 percent had high organizational involvement.

CHAPTER 5

DETERMINATION OF LEVEL OF PROFITABILITY OF RICE FARMER

The purpose of this chapter is to assess the level of profitability of rice farmer. Profitability is a major criterion to make decision for producing any crop at farm level. Profitability of rice farmer was the focus variable of the study. The score of profitability ranged from 0.29 to 1.83 with a mean value 1.39 and standard deviation 0.348.

For the study, the researcher chose 91 samples from three villages of Shahjadpur upazila of Sirajganj district to measure the profitability of rice farming. Profitability of rice production was measured by computing BCR (Benefit Cost Ratio) following Chowdhury et al. (2012) and Hoque and Haque (2014).

Where,

$$\text{BCR} = \frac{\text{Gross return}}{\text{Total input cost}}$$

Total input cost

Per hectare total cultivation cost of rice was estimated as the sum total of farming operation cost and different input cost, post-harvest operation and related costs. The item of costs the researcher considered in the study was hired labor, ploughing, levelling, seed, fertilizer, pesticide, harvesting and others.

Gross return

Gross return was defined by sum of the market price of rice and the price of straw per hectare area in the year (2018) under study:

Where,

Gross return = Total market price of rice + Price of straw.

It is widely used in Economics. If $BCR > 1$, then the production of revenue from rice is economically satisfactory; if $BCR < 1$, then the revenue from rice is not economically satisfactory and if $BCR = 1$, then there is economic breakeven point of rice production which is similar to other crop cultivation. Therefore,

If, $BCR > 1$, then profit

$BCR < 1$, then loss

$BCR = 1$, then there is no profit no loss.

The cost of rice production and its return mainly depends on the rate of inputs used (seed, fertilizers, pesticides, irrigation etc), number of labor and their wage rate, management practices, marketing facilities of the rice etc. Total cost and gross return of rice cultivation are presented in Table 5.1.

Table 5.1 Cost and return (Tk/ha) of rice cultivation of rice farmers

Item of cost	Mean [Average amount(Tk/ha)]	Std. Deviation
Hired labors	8056.70	6384.79
Ploughing	4240.33	3270.91
Levelling	2614.32	2492.46
Seed	4052.73	3485.95
Fertilizer & Pesticide	8101.25	6715.09
Irrigation	3957.20	4521.15
Harvesting	17775.47	18189.01
Others	14807.64	13110.27
Total cost of cultivation (on variable cost basis)	64640.37	56315.40
Gross return (total price of the produce i.e. crop yield + straw)	90114.51	87738.49
BCR	1.39	0.348

Table 5.1 showed that total cost of rice production was 64640.37 Tk. per hectare and gross return was 90114.51 Tk. per hectare. The benefit cost ratio calculated from the gross return and total cost on variable cost basis is 1.39. BCR (1.39) is greater than 1 which indicated that most of the farmers in the study area made profit in rice cultivation.

Profitability of rice cultivation was the dependent variable of the study. The observed minimum and maximum value of profitability ranged from 0.29 to 1.83. Based on profitability of rice farming respondents were classified into two categories as not profitable and profitable. This categorization was done on the basis of received ranges of profitability through descriptive analysis. The distribution of farmers according to their profitability along with frequency and percentage are shown in table 5.2

Table 5.2 Distribution of farmers according to profitability of rice farming

(Profitability range: 0.29 to 1.83)

Categories	Respondent		Mean	S.D.
	frequency	Percent (%)		
Not profitable (< 1.00)	9	9.89	1.39	.348
Profitable (>1.00)	82	90.11		
Total	91	100		

Table 5.2 showed that the highest proportion (90.11 percent) of the respondents made profit in rice cultivation while 9.89 percent had no profitability. The observed value of table 5.2 indicated that most of the farmers were profitable in rice cultivation.

Among the respondents in the study area 9.89% farmers met loss in rice production. There were several reasons for no profit of rice growers such as soil infertility of owned land, due to lack of credit there were problems in collecting seed in time, irrigation problem etc.

The rests of the respondents which is 90.11% made profit. Major causes of profit inefficiency across the study area were low levels of education and limited access to extension services. Farmers with no education experienced the highest loss of profit per hectare as compared to those with education. Access to extension services enhances profitability. Another factor for reducing efficiency was limited access to credit of the farmers. Other reasons for profit

inefficiency were found as like seed collection problem in proper time, insufficient operational activities due to having less credit, late harvesting due to lack of labor, not having enough knowledge about market price, government policies and facilities for rice farmers.

CHAPTER 6

FACTORS INFLUENCING PROFITABILITY OF RICE FARMER

The purpose of this chapter is to identify the factors that significantly influence profitability of rice cultivation. To find out the factors influencing profitability, execution of the relationship of nine selected characteristics of the rice farmers with profitability of rice cultivation was done. Coefficient of correlation was figured so as to explore the relationship between the selected characteristics of the rice farmers and profitability of rice cultivation.

In order to determine the relationship of each of nine selected characteristics of the rice farmers (age, education, family size, farm size, time spent in farming, annual income, training on rice cultivation, use of information source and organizational involvement) with profitability of rice cultivation, Pearson's Product Moment Correlation was used. Co-efficient of correlation (r) has been used to test the null hypothesis concerning the relationship between the concerned variables. Five percent level of significance was used as the basis for rejection of any null hypothesis.

6.1 The Contribution of the selected characteristics of the respondents on profitability

The summary of the results of Correlation Co-efficient indicating the relationship between each of the selected characteristics of the rice farmers and profitability of rice cultivation figured out the significantly contributing variables which is shown in table 6.1. For clarity of understanding Appendix-II may be seen.

Table 6.1 Results of Correlation Co-efficient showing relationship between each of the selected characteristics of the rice farmers and profitability of rice cultivation

(n = 91 with df = 89)

Dependent variable	Independent variable	Computed “r” value	Tabulated “r” value	
			At 0.05% level	At 0.01% level
Profitability of rice cultivation	Age	.006	.1735	.2435
	Level of education	.292**		
	Family size	.144		
	Farm size	.282**		
	Time spent in farming	.270**		
	Annual income	.204		
	Training on rice cultivation	.029		
	Use of information source	.286**		
	Organizational involvement	-.151		

^{NS} Not significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

Table 6.1 showed that level of education, farm size, time spent in farming and use of information source had positive significant contribution to the profitability of rice cultivation which were significant at the 1% level of significance. Coefficients of other selected variables didn't have any contribution on the profitability of rice cultivation.

6.1.1 Contribution of level of education of the rice farmers to the profitability of rice cultivation

Contribution of level of education of the rice farmers to the profitability of rice cultivation was determined by testing the following null hypothesis:

“There is no contribution of level of education of the rice farmers to the profitability of rice cultivation.”

The calculated value of the co-efficient of correlation (r) between the concerned variables was found to be (.292) as shown in table 6.1. The following observations were made regarding the relationship between the two variables under consideration.

- a) The computed value of ‘ r ’ (.292) was found to be larger than the tabulated value (.2435) with 89 degrees of freedom at 0.01 level of probability.
- b) The null hypothesis could be rejected.
- c) The relationship between the concerned variables was significant.

Based on the above findings, the researcher concluded that level of education of the rice farmers had significant relationship with profitability of rice cultivation. The direction between education and profitability was positive. The findings indicated that if education level of the rice farmers increased then profitability of rice cultivation would also increase. So education significantly contributed to profitability of rice cultivation and played an important role to gain more profitability.

6.1.2 Contribution of farm size to the profitability of rice cultivation

Contribution of farm size to the profitability of rice cultivation was determined by testing the following null hypothesis:

“There is no contribution of farm size to the profitability of rice cultivation.”

The computed value of the co-efficient of correlation (r) between the concerned variables was (.282) as shown in table 6.1. The following observations were made regarding the relationship between the two variables on basis of the Co-efficient of correlation (r).

- a) The computed value of 'r' (.282) was larger than the tabulated value `r' (.2435) with 89 degrees of freedom at 0.01 levels of probability.
- b) The null hypothesis could be rejected.
- c) The relationship between the concerned variables was significant.

The findings demonstrated that farm size had significant relationship with profitability of rice cultivation. The direction between farm size and profitability was positive which indicated that if farm size increased then profitability of rice cultivation would also increase. So farm size was an important factor for profitability of rice cultivation.

6.1.3 Contribution of time spent in farming to the profitability of rice cultivation

Contribution of time spent in farming to the profitability of rice cultivation was determined by testing the following null hypothesis:

“There is no contribution of time spent in farming to the profitability of rice cultivation.”

The calculated value of the co-efficient of correlation (r) between the concerned variables was found to be (.270) as shown in table 6.1. The following observations were made regarding the relationship between the two variables under consideration.

- a) The computed value of 'r' (.270) was found to be larger than the tabulated value (.2435) with 89 degrees of freedom at 0.01 level of probability.
- b) The null hypothesis could be rejected.
- c) The relationship between the concerned variables was significant.

Based on the above findings, the researcher concluded that time spent in farming had significant relationship with profitability of rice farming. The direction of the concerned variables was positive which indicated that if time spent in farming increased then profitability of rice cultivation would also increase. Spending more times in farming activities increase the farmers' capability of understanding new techniques of production and ability to work with more energy that can cause more profit. So time spent in farming was an important factor that significantly influenced profitability of rice cultivation.

6.1.4 Contribution of use of information source to the profitability of rice cultivation

Contribution of use of information source to the profitability of rice cultivation was determined by testing the following null hypothesis:

“There is no contribution of use of information source to the profitability of rice cultivation.”

The calculated value of the co-efficient of correlation (r) between the concerned variables was found to be (.286) as shown in table 6.1. The following observations were made regarding the relationship between the two variables under consideration.

- a) The computed value of ' r ' (.286) was found to be larger than the tabulated value (.2435) with 89 degrees of freedom at 0.01 level of probability.
- b) The null hypothesis could be rejected.
- c) The relationship between the concerned variables was significant.

Based on the above findings, the researcher concluded that use of information source had significant relationship with profitability of rice cultivation. The relationship of the variables was positive which indicated that if use of information source increased then profitability of rice cultivation would also increase.

Use of convenient and dependable information source can enrich farmers' knowledge and skills about different farming techniques. A good information source also delivers time to time information about various facilities provided by the Government to the farmers, market information about agricultural products and many more. So use of information source was an important factor that significantly influenced profitability of rice cultivation.

CHAPTER 7

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter is based on the summary, conclusion and recommendations. Summary is based on the discussions made in the previous chapters, the conclusions are drawn from major findings of this study and recommendations to help rice farmers, policy maker and the Government and for further information for future researchers.

7.1 Summary

7.1.1 Individual characteristics of the farmers

This study was conducted to assess the profitability of rice cultivation in three unions of Shahjadpur upazila of Sirajganj district. A total of 91 rice farmers were sampled for this study.

In this study, the age of the farmers ranged from 28 to 76. The highest proportion (59.34 percent) of the respondents was middle aged while 24.18 percent was old aged and 16.48 percent was young aged.

The education level of the rice farmers ranged from 0 to 15. Primary education constituted the highest proportion (51.65 percent), where 14.29 percent had no education or can sign only, 20.88 percent completed secondary level education, 9.89 percent completed higher secondary level and 3.29 percent achieved above higher secondary degree.

The family size of the respondents ranged from 3 to 10. The highest proportion (47.25 percent) of the respondents had medium family as compared to small (24.18 percent) and large family (28.57 percent).

The farm size of the respondents ranged from 0.11 to 2.70 hectare. The highest proportion (76.92 percent) of the respondents belonged to small farm category while 4.40 percent of the respondents had marginal farm size and 18.68 percent had medium farm size.

Time spent in farming by the respondents ranged from 20 to 56 hours per week. The largest proportion (75.82 percent) of respondents had medium time spent in farming while 9.89 percent and 14.29 percent had low and high time spent respectively.

Annual income of the rice farmers ranged from 82 to 398 thousand taka. The highest proportion (74.73) of the respondents had medium level of income while 8.79 percent had low level and 16.48 percent had high level of income.

Training on rice cultivation done by the rice farmers ranged from 0 to 15 days. The highest proportion (67.04 percent) of the respondents had no training while 21.98 percent, 5.49 percent and 5.49 percent of the respondents had poor, medium and high training respectively.

The score of use of information source by the rice farmers ranged from 0 to 15. The highest proportion (76.92) of the respondents had medium contact with different information source while 2.20 percent, 8.79 percent and 12.09 percent of respondents had no contact, low and high contact respectively.

The score of organizational involvement of the rice farmers ranged from 0 to 9. The highest proportion (59.34 percent) of the respondents had low organizational involvement while 35.16 percent had no involvement, 3.30 percent had medium and 2.20 percent had high organizational involvement.

7.1.2 Level of profitability of rice farmer

Profitability of rice farmer was the focus variable of the study. The score of profitability ranged from 0.29 to 1.83 with a mean value 1.39 and standard deviation .348. The highest proportion (90.11 percent) of the respondents had profitability in rice cultivation while 9.89 percent of the respondents had no profitability.

7.1.3 Factors significantly influencing profitability of rice farmer

From the relationship of the 9 characteristics of rice farmers with their profitability of rice farming, the researcher found out that the factors level of education, farm size, time spent in farming and use of information source had positive significant influence on profitability of rice cultivation.

7.2 Conclusion

The researcher had drawn the following conclusions on the basis of the findings of the study and their logical interpretations:

1. The findings of the study revealed that the majority (90.11 percent) of the respondents had profitability in rice farming. Therefore it may be concluded that, rice cultivation is suitable and profitable in the study area.
2. The correlation analysis of the study showed that the level of education of the rice farmers had a positive significant contribution to the profitability of rice cultivation. The findings indicated that the more respondents having education, had more concern about the rice profit making activities.
3. Farm size had positive significant influence on profitability of rice cultivation which indicated that increasing farm size could make more profit in rice farming.
4. Time spent in farming had a positive significant role to the profitability of rice farming. This indicated that spending more time in farming activities could increase the profit level of the rice farmers.
5. Use of information source had a positive significant role to the profitability of rice cultivation. This indicated that higher uses of information sources could help to achieve more knowledge about farming activities that would be helpful to earn more profit.

7.3 Recommendations

The study provides the following recommendations for improvements in the rice industry:

7.3.1 Recommendations for policy implications

1. Most of the farmers involved in rice cultivation are medium to old aged who practice traditional system of cultivation. As agriculture is a key driver of the growth of Bangladesh economy more involvement of young aged farmers should be needed in farming activities to bring about new technologies in agricultural production. Young adults can be actively involved in farming activities and are more willing and able to take risk with the expectation of a larger profit. So the government along with other related

organizations should come forward to encourage the youth of the country to take the helm of agriculture.

2. The farmers who cannot read or write should be provided with non-formal education (adult education) so they can at least read newspapers, leaflets, bulletins and other printing materials to know updated information regarding their concern. Because education facilitates farmers' understanding and use of improved crop production practice. It also influences farmers' adoption of agricultural innovation and improve decision making on various aspects of farming.
3. The farmers should be provided with proper training for making them aware about different strategies of cultivation. The DAE and NGO who work with environmental friendly farming practice should take initiative to provide appropriate training for skill development of farmers.
4. The farmers were dependent on the information sources of the Agricultural Extension officer (AEO), neighboring farmers and other media. However, the information sources sometimes cannot provide appropriate technical support due to complexity of the system as a whole. Measures may be therefore, taken to establish better linkages among research organizations and farmers.
5. In order to increase organizational involvement of farmers, different cultural activities like agriculture fair, food program, monetary facility etc. should be organized.

7.3.2 Recommendations for further study

1. The present study was conducted in some selected villages of Shahjadpur upazila under Sirajganj district. It is recommended that similar studies should be conducted in other areas of Bangladesh which will be helpful for understanding the profitability of rice cultivation.
2. The study investigated the contribution of nine characteristics of the rice farmers to the profitability. Besides these nine characteristics, it is recommended that other characteristics of the rice farmers should be included for conducting further study.
3. The study was conducted to analyze the profitability of rice cultivation. Further research should be taken related to other issues like inter cropping, vegetable and other crop cultivation.

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APPENDIX-I: AN ENGLISH VERSION OF THE INTERVIEW SCHEDULE

Department of Development and Poverty Studies

Sher-e-Bangla Agricultural University, Dhaka- 1207

A Questionnaire for research study on

Assessing Profitability of Rice Cultivation: A Case of Sirajganj District

From Respondent's Perspective

Respondent no _____

Name of the Respondent _____

Village _____ Union _____

Upazila _____ District _____

I. Socio-demographic Characteristics

Please answer the following items

Sl. No.	Query	Answer
I.a.	Age (in years)	
I.b.	Educational Qualification	(a) Do not know reading and writing (b) Do not know reading and writing but can sign only (d) Studied up to _____ class
I.c.	Family size (total members)	

II. Economic Characteristics

II.a. Farm size

Please give answer of the following items

Types of Land	Area of Land	
	Local Unit	Hectare
Own land under own cultivation		
Own land given to others' on barga		
Land taken from others' on barga		
Land taken from others' on lease		
Own pond & garden		
Total		

II.b. Time Spent in farming

How many hours do you spent in farming?

Ans. _____ hours/week.

II.c. Annual income

Please mention your income from various sources

Agriculture Source	Total Income (TK)
Rice	
Wheat	
Jute	
Maize	
Pulse	
Vegetables	
Fruits	
Livestock	
Poultry	

Fisheries	
Non-agriculture Source	
Services	
Business	
Day Labour	
Others	
Total	

II.d. Training on rice cultivation

Have you received any training on rice cultivation?

- a) Yes b) No

If yes, then give information on the following items

Name of Training	Duration (days)

III. Psychological Characteristics

III. a. Use of information source

Sl. No.	Information sources	Extent of use of information sources			
		Regularly	Occasionally	Rarely	No association
1.	Sub-Assistant Agriculture Officer (SAAO)	4-5 times per month	2-3 times per month	1 time per month	0 time

2.	Ideal farmer	5-7 times per month	3-4 times per month	1-2 times per month	0 time
3.	Neighbor	7-9 times per month	4-6 times per month	1-3 times per month	0 time
4.	Agricultural Extension Officer (AEO)	4-5 times per season	2-3 times per season	1 time per season	0 time
5.	Radio	5-7 times per month	3-4 times per month	1-2 times per month	0 time
6.	Television	4-5 times per month	2-3 times per month	1 time per month	0 time
7.	Leaflet/Bulletin/Newspaper	5-7 times per season	3-4 times per season	1-2 times per season	0 time

III.b. Organizational involvement

Please give your status on organizational involvement

Sl. No.	Name of the organization	Nature and duration of participation (year)			
		No participation (0)	General member (1) & duration	Executive committee member (2) & duration	Executive officer (3) & duration
1.	Farmers Co- operative Association				
2.	IPM Club				
3.	CIG				
4.	Union parishad				
5.	NGOs				

IV. Profitability of Rice Farming

Please give answer on the following items

Item of cost	Cost per unit	Total cost
Labors		
Ploughing		
Levelling		
Seed		
Fertilizer		
Pesticide		
Harvesting		
Others		
Total Cost		

How much output you got from rice and rice by product?

Item	Amount	Price per unit	Total price
Rice			
Rice by product			
Total			

So, Profitability = Benefit / Cost

Thank you for your kind co-operation

Date:

Signature of Interviewer

**Appendix-II: Correlation matrix among the variables of the study
(N=91)**

Variable	X ₁	X ₂	X ₂	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	Y
X ₁	1									
X ₂	-.107	1								
X ₃	.399**	-.209*	1							
X ₄	-.046	.155	.031	1						
X ₅	-.127	.393**	-.192	.202	1					
X ₆	-.021	.180	.070	.229*	-.072	1				
X ₇	-.144	-.032	-.045	.046	.250*	.244*	1			
X ₈	-.252*	.336**	-.106	.173	.407**	.030	.290**	1		
X ₉	.015	-.113	-.031	.047	.023	.066	.198	.009	1	
Y	.006	.292**	.144	.282**	.270**	.204	.029	.286**	-.151	1

*. Correlation is significant at 0.05 level of probability

**. Correlation is significant at 0.01 level of probability

X ₁ = Age	X ₆ = Annual income
X ₂ = Educational qualification	X ₇ = Training on rice cultivation
X ₃ = Family size	X ₈ = Use of information source
X ₄ = Farm size	X ₉ = Organizational involvement
X ₅ = Time spent in farming	Y = Profitability of rice farming