# ADOPTION OF WHEAT CULTIVATION BY THE FARMERS OF SELECTED VILLAGES OF KAZIPUR UPAZILLA UNDER SIRAJGANJ DISTRICT

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## BY

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# CERTIFICATE

This is to certify that the thesis entitled **"Adoption of Wheat Cultivation by the Farmers of Selected Villages of Kazipur Upazilla under Sirajganj District"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka-1207, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension and Information System**, embodies the result of a piece of bona fide research work carried out by **Mst. Rukhsana Afroz**, Registration No. **06-2075** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

**Dated: Jan-June, 2013**
**Dhaka, Bangladesh**

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# DEDICATED
# TO
# MY BELOVED PARENTS

# ACKNOWLEDGEMENTS

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# ABSTRACT

The purpose of the study was to determine and describe the extent of adoption of wheat cultivation by the farmers. Attempts were also made to describe some of the selected characteristics of the farmers and to explore the relationships between the selected characteristics and their adoption of wheat cultivation. The study was conducted at six villages namely; Bawaikhola and Khukshia from Gandhail Union, Singrabari and Khudbandi from Kazipur Union and Natuarpara and Panagari from Natuarpara Union of Kazipur Upazila under Sirajganj District. Data were collected from 126 farmers who were randomly selected as the sample of the study by using random sampling method. The researcher herself collected data through personal contact with a well structured pretested interview schedule during the period from 01 to 31 March, 2013. The findings revealed that highest 40.48 percent of the respondents had low adoption of wheat cultivation, while 34.92 percent had medium adoption and the rest 24.60 percent had high adoption of wheat cultivation. Pearson's Product Moment Correlation co-efficient (r) was computed to explore the relationships between the selected characteristics and their adoption of selected wheat varieties. The correlation analysis indicated that Education, Extension media contact, Cosmopoliteness, Knowledge about wheat cultivation, Attitude towards wheat cultivation and Innovativeness had significant positive relationships with the adoption of wheat cultivation. Age, Farm size and Annual family income had non-significant positive relationships with the adoption of wheat cultivation. On the other hand, Input cost had non-significant negative relationships with the adoption of wheat cultivation.

# CHAPTER 1

# INTRODUCTION

## 1.1 General Background

Bangladesh is an agricultural country. Most of her inhabitants directly or indirectly involved in agricultural activities for their livelihood. Agriculture has a great contribution (19.29%) to the Gross Domestic Product (GDP) of the country (BBS, 2012). Still agriculture plays a vital role and is known as the most important sector of the country's economy. Bangladesh by birth possesses very fertile land in which diversified crops grow very easily. Various types of crops are produced in this country.

Wheat (*Triticum aestivum*) is one of the most important cereal crops of the world. It ranks first both in the context of per hectare cultivation and production. It is cultivated in most parts of the world and about one third of the total population of the world live on it (Hunshell and Malik, 1983). The nutritional value of 100 g winter wheat derived from Wikipedia is depicted in Table 1.1 as follows:

Table 1.1. Nutritional value of wheat per 100 g (3.5 oz)

| Nutrient | Value | Nutrient | Value |
|---|---|---|---|
| Energy | 1,368 kJ (327 kcal) | Folate (vit. $B_9$) | 38 µg (10%) |
| Carbohydrates | 71.18 g | Vitamin E | 1.01 mg (7%) |
| Sugars | 0.41 | Vitamin K | 1.9 µg (2%) |
| Dietary fiber | 12.2 g | Calcium | 29 mg (3%) |
| Fat | 1.54 g | Iron | 3.19 mg (25%) |
| Protein | 12.61 g | Magnesium | 126 mg (35%) |
| Thiamine (vit. $B_1$) | 0.383 mg (33%) | Manganese | 3.985 mg (190%) |
| Riboflavin (vit. $B_2$) | 0.115 mg (10%) | Phosphorus | 288 mg (41%) |
| Niacin (vit. $B_3$) | 5.464 mg (36%) | Potassium | 363 mg (8%) |
| Pantothenic acid ($B_5$) | 0.954 mg (19%) | Sodium | 2 mg (0%) |
| Vitamin $B_6$ | 0.3 mg (23%) | Zinc | 2.65 mg (28%) |

Wheat can be a good supplement of rice and can play the most vital role to feed the teeming millions. Starting with an area of 0.126 million hectares, and production of 0.103 million metric tons in 1971, the area and production increased to 0.83 million hectares and 1.84 million metric tons respectively in 2000 (Hasan, 2006). The yield also increased from 0.86 t/ha to 2.21 t/ha during the period. This increased area, production and yield of wheat spurred mainly because of the introduction and adoption of high yielding wheat varieties and modern farming technologies. After reaching its highest area (0.88 million hectares) and production (1.91 million tons) in 1999; the area and production was found to be decreasing during next seven years. In 2006, the area decreased to 0.48 million hectares and production to 0.74 million metric tons. The yield was also reduced to 1.6 t/ha (BBS, 2007). On the contrary, farm level expected yield of high yielding wheat varieties was found to be 3.5-5.1 t/ha (Hasan, 2006). In the last year the yield rate was 2.78 metric ton per hectare (BBS, 2011-12).

There is ample scope for wheat cultivation in Bangladesh as it is cultivated in Rabi season having minimum competition with rice for land. Wheat grows in winter season as Rabi crop along with other crops like pulses, oil seeds, vegetable etc. It has been seen that from the last few years different natural calamities or disasters as well as cost of production make the rice production uncertain. In this situation the cultivation of wheat can be given priority as a solution to food crisis.

In Rabi season farmers of north-western part of the country keep fallow their land due to lack of irrigation facilities which could be easily brought under wheat cultivation.

Though the adoption rate in the past years of wheat cultivation is in declining trend (as shown in Figure 1.1), to keep pace with the increasing food requirement the regain of adoption of wheat cultivation is crucial. So, study on adoption of wheat cultivation by the farmers is time demanding.
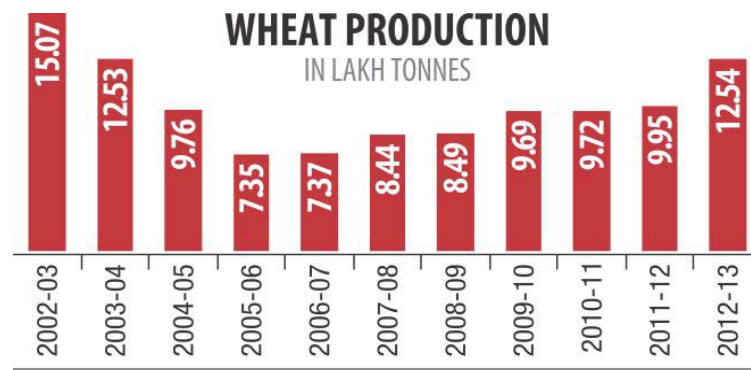


Figure 1.1 Wheat Productions in Bangladesh (BBS, 2013)

## 1.2 Statement of the Problem

Wheat is the second most important cereal crop in Bangladesh next to rice. The policy makers of agricultural extension programs recognized the importance of increasing the cultivation of this crop. As a high value crop, wheat has much potentiality for widespread cultivation. But unfortunately the adoption rate of wheat cultivation is decreasing from past few years which was previously at increasing trend. Before undertaking any massive program for its increased cultivation in Bangladesh, it is first necessary to know the existing situation of adoption status of the wheat growers in the most potential areas of Bangladesh. The Kazipur Upazila of Sirajganj District is mostly well known for cultivation of wheat. Technology generation and its adoption are very much of paramount importance for successful wheat cultivation.

To expand the cultivation of this crop in other parts of the country, the adoption status of wheat cultivation of the present wheat growers in this region would be significant contributor to design appropriate programs for its widespread cultivation. Considering the above facts in view and to generate the way of increasing wheat cultivation strategies, it is necessary to know the extent of adoption of wheat cultivation by the farmers. This made the researcher interested to undertake a research study entitled **"Adoption of Wheat Cultivation by the Farmers of Selected Villages of Kazipur Upazila under Sirajganj District".** In light of above discussions and the background information, the present study has been undertaken with the following research questions:

1. At what extent the farmers of Kazipur Upazila adopted wheat cultivation?
2. What are the characteristics of the wheat farmers that are to be selected for studying the adoption of wheat cultivation?
3. Are there any relationships between the adoption of wheat cultivation by the farmers and their selected characteristics?

**1.3 Justification of the Study**

The annual requirement of wheat is increasing day by day in our country as the food products of wheat viz.; bread, bakery items and fast food items are becoming popular. The amount of wheat import is also increasing which were 30 lakh tons in the year of 2012-13 and 26 lakh tons in the year of 2011-12 (BBS, 2012-13). So, a huge amount of local currency has to spend for importing wheat. This could be minimized by increasing the rate of adoption of wheat and rate of its production as well.

The benefits of the wheat cultivation should be disseminated along with its cluster of technologies among the farmers in a convincing and attractive manner so that the farmers response quickly to adopt wheat cultivation. On an average about 2.4 to 2.8 million hectares of land remain uncultivated during winter season (BBS, 2008). A substantial portion of that can be brought under wheat cultivation as it needs less water, faces less problem due to weed and insect. To increase wheat production necessary information related to wheat production would be the key factor for the farmers in adoption of wheat cultivation (Islam, 1996). Now considerable efforts are being made through research and extension delivery system to increase wheat production in our country. But the actual increase in production will depend on the adoption of wheat by the growers. So, one has to know the adoption behaviour of the growers. In this judgement this piece of research work has under taken.

**1.4 Specific Objectives of the Study**

Considering the research questions and justification of the study the following specific objectives were formulated for giving proper direction to the study:

1) To determine the extent of adoption of wheat cultivation by the farmers.

2) To determine and describe some selected characteristics of wheat farmers. The selected characteristics are:

   ➢ Age
   ➢ Education
   ➢ Farm size
   ➢ Annual family income
   ➢ Input cost
   ➢ Extension media contact
   ➢ Cosmopoliteness
   ➢ Knowledge about wheat cultivation
   ➢ Attitude towards wheat cultivation

> ➤ Innovativeness

3) To explore the relationships between the adoption of wheat cultivation and selected characteristics of farmers.

## 1.5 Scope of the Study

The main focus of the study was to determine the adoption rate of wheat by its growers. The findings of the study would be specifically applicable to Sirajganj district. However, the findings would also have implications for other areas of the country having relevance to the environmental and socio-cultural context of the study area. The investigator believes that the findings of the study would reveal the phenomenon related to diffusion of innovation. These would be of special interest to the policy makers and planners in formulating and redesigning the extension programs especially for wheat cultivation. The findings are expected to be helpful to the field workers of different nation building departments and organizations to develop appropriate extension strategies for increasing the wheat production that will be supportive to meet the huge national demand.

## 1.6 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of available evidence (Goode and Hatt, 1952). The researcher had the following assumptions in his mind while undertaking this study:

1. The respondents selected for the study were capable to provide proper responses to the questions included in the instrument.

2. The responses furnished by the respondents were reliable. They expressed the truth about their convictions and awareness.

3. Views and opinions furnished by the respondents included in the sample were the representative views and opinions of the whole population of the study area.

4. The researcher who acted as interviewer was well adjusted to the social and cultural environment of the study area. Hence the respondents furnished their correct opinions without hesitation.

**5.** The environmental conditions of the farmers were deemed more or less similar throughout the study area.

6. The nature of problems gave a representative feature in the context of the other rural areas of Bangladesh.

## 1.7 Limitations of the Study

Considering the time, money and other necessary resources available to make the study manageable and meaningful, it was necessary to consider the following limitations:

1. The study was confined to six villages namely; Bawaikhola, Khukshia, Singrabari, Khudbandi, Natoarpara and Panagari of Kazipur Upazila under Sirajganj district.

2. There were many farmers in the study area, but only the farmers who were involved in wheat cultivation were considered for this study.

3. Characteristics of the farmers were many and varied but only ten characteristics were selected for investigation in this study.

5. During data collection the researcher had to depend on data furnished by the respondents. As none of the farmers kept records of their farming activities, they furnished information to the different questions by recall.

6. Conceptually, extents of adoption of the farmers were determined from their statements.

7. Adoption of the farmer could be measured in various ways. However in this study these were measured by using some specific point rating scale.

8. The present study highlights a new dimension of research in the field of agricultural extension in Bangladesh and so the researcher could not provide sufficient evidence in equipping his study report with relevant literature reviews.

## 1.8 Definition of Key Terms

Certain terms have been used in this research which are defined and interpreted as follows for clarity of understanding.

### Adoption

Innovation-decision is a psychological process through which an individual of a social system engages in mental activities just from first hearing about an innovation to its final adoption. The entire process consists of five stages viz.; knowledge, persuasion, decision, implementation and confirmation (Bhuiyan, 2012). Simply, adoption is an implementation of a decision to use of an innovation. According to Rogers (1995), "Adoption is a decision to make full use of an innovation as the best course of action available". When an individual takes up a new idea as the best course of action and practices it, the phenomenon is known as adoption (Ray, 1991). In this study adoption means a decision to cultivate wheat by the wheat farmers.

### Innovation

An innovation is an idea or practice perceived as new by the individual. It is the newness of the idea to an individual that determines his reaction to it.

### Farmers/Growers

The persons who were involved in farming activities are called farmers. They participated in different farm and community level activities like crops, livestock, fisheries, other farming activities etc.

**Respondents**

People who have answered the questions by an interviewer for a social survey are known as respondents. They are the people from whom a social research worker usually gets most data required for his research. In this study the respondents are the wheat growers of Kazipur Upazila.

**Variable**

A general indication in statistical research of characteristic that occurs in a number of individuals, objects, groups etc. and that can take on various values, for example the age of an individual.

**Assumption**

An assumption is "The supposition that an apparent fact or principle is true in the light of the available evidence" (Goode and Hatt, 1952).

**Hypothesis**

Defined by Goode and Hatt (1952), a proposition this can be put to "a test to determine its validity". It may be true or false, it may seem contrary to or in accord with common sense. However, it leads to an empirical test.

**Null hypothesis**

The hypothesis which we pick for statistical test is null hypothesis (Ho). In this study the null hypothesis is stated that there is no relationship between the concerned variables.

**Age**

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

**Education**

Empirically it was defined to the development of desirable changes in knowledge, skill and attitudes in an individual through reading, writing, walking, observation and other selected activities. It was measured on the basis of classes a wheat grower has passed from a formal educational institution.

**Farm size**

The term related to the hectare of land owned by a farmers on which he carried his farming and family business, the area being estimated in terms of full benefit to the farmers. A farmer was considered to have full benefit from cultivated area either owned by himself or obtained or, lease from others and half benefit from the area which was either cultivated by borga or given to others for cultivation on borga basis.

**Annual family income**

Annual family income of a respondent referred to the total earning by him and other members of his family from agricultural (field crop, fish, livestock, poultry, fruits and vegetables and timbers, etc.) and other sources (service, business, etc.) during a year. Annual family income of the respondent also included the cost of maintaining his family. It was expressed in Taka.

**Input cost**

It means the total cost of available necessary agricultural inputs like: seed, fertilizer, labor, pesticides, irrigation facilities, seedbed etc. in need of time for the particular crop cultivation.

**Extension media contact**

Extension media contact referred to the channel through which various information are diffused among the farmers who become informed about different aspects of agricultural activities.

**Cosmopoliteness**

Cosmopoliteness of a respondent is referred to the degree of external orientation of an individual to his own social system.

**Knowledge about wheat cultivation**

It is the extent of basic understanding of the farmers in different aspects of wheat cultivation like soil, seed, fertilizer, insects and diseases, high yielding variety etc. It includes the basic understanding of the use of different inputs and practices for wheat cultivation.

**Attitude towards wheat cultivation**

The term attitude towards wheat cultivation of an individual was used to refer to his feelings, belief and action tendencies towards the various aspects of wheat cultivation i.e. Knowledge + beliefs + action = attitude.

**Innovativeness**

Innovativeness is the degree to which an individual is relatively earlier in adopting innovations, new ideas, practices and things than the other members of a social system (Rogers, 1995). This was comprehended by the quickness of accepting innovations by an individual in relation to others and was measured on the basis of time dimension.

# CHAPTER 2
# REVIEW OF LITERATURE

The present study was conducted to assess the adoption of wheat cultivation by the farmers of Sirajganj District. The purpose of this chapter is to review the past studies and findings related to the present study. The reviews were conveniently presented based on the major objectives of the study. The researcher, therefore, made exhaustive effort to review the previous research works directly or indirectly related to the present study conducted by different researchers of home and abroad. This chapter comprises of four sections. The first section dealt with concept of diffusion, adoption and innovation-decision process. The second section reviewed the literature of findings researches on adoption. Third section dealt with relationship between selected characteristics of the farmers with their adoption of wheat cultivation. And the final section dealt with the conceptual framework of the study.

## 2.1 Concept of Diffusion, Adoption and Innovation-Decision Process

The concept of diffusion was first studied by the French sociologist Gabriel Tarde (1890) and by German and Austrian anthropologists such as Friedrich Ratzel and Leo Frobenius. Its basic epidemiological or internal-influence form was formulated by H. Earl Pemberton, who provided examples of institutional diffusion such as postage stamps and standardized school ethic codes (Wikipedia).

In 1962 Everett Rogers, a professor of rural sociology published his work: "Diffusion of Innovations". In this seminal piece, Rogers synthesized research from over 508 diffusion studies and produced a theory applied to the adoption of innovations among individuals and organizations.

Rogers's work asserts that 4 main elements influence the spread of a new idea: the innovation, communication channels, time, and a social system. These elements work in conjunction with one another: diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Rogers adds that central to this theory is process.

## Difference between Diffusion and Adoption

Adoption is an individual process detailing the series of stages one undergoes from first hearing about a product to finally adopting it. The diffusion process, however, signifies a group of phenomena, which suggests how an innovation spreads among consumers. Overall, the diffusion process essentially encompasses the adoption process of several individuals over time.

### Adoption process

Rogers and Shoemaker (1971) stated the adoption process as – the traditional view of the innovation decision process, called "adoption process" was postulated by a committee of rural sociologists in 1955 as consisting of five stages:

 I.   **Awareness stage:** The individual learns of the existence of the new idea but lacks details information about it.

 II.  **Interest stage:** The individual develops interest in the innovation and seeks additional information about it.

 III. **Evaluation stage:** The individual makes mental application of the new idea to his present and anticipated future situation and decides whether or not try it.

 IV.  **Trail stage:** The individual actually applies the new idea on a small scale in order to determine its utility in its own situation.

V. **Adoption stage:** Te individual uses the new idea continuously on a full scale.

**Innovation-Decision process**

Diffusion of an innovation occurs through a five–step process. This process is a type of decision-making. In later edition of the "Diffusion of Innovations" Rogers (1995) changed the terminology of the five stages to: knowledge, persuasion, decision, implementation, and confirmation. And the descriptions of five stages of the adoption process are as follows:

i. **Knowledge Stage**

In this stage the individual is first exposed to an innovation but lacks information about the innovation. During this stage of the process the individual has not been inspired to find more information about the innovation.

ii. **Persuasion Stage**

In this stage the individual is interested in the innovation and actively seeks information/detail about the innovation.

iii. **Decision Stage**

In this stage the individual takes the concept of the change and weighs the advantages/disadvantages of using the innovation and decides whether to adopt or reject the innovation. Due to the individualistic nature of this stage Rogers notes that it is the most difficult stage to acquire empirical.

iv. **Implementation Stage**

In this stage the individual employs the innovation to a varying degree depending on the situation. During this stage the individual determines the usefulness of the innovation and may search for further information about it.

### v. Confirmation Stage

In this stage the individual finalizes his/her decision to continue using the innovation. This stage is both intrapersonal (may cause cognitive dissonance) and interpersonal, confirmation the group has made the right decision.

## 2.2 Review of Literature on General Context of Adoption

Haque (2003) found that the majority (47 percent) of the maize growers had medium adoption of modern maize cultivation technologies while 28 percent had high adoption and 25 percent low adoption.

Rahman (2003) found that ninety seven percent of the pineapple growers adopted 2-4 intercrops viz, Zinger, turmeric, sweet ground and aroid in pineapple cultivation.

Salam (2003) found that an overwhelming majority (94 percent) of the respondents were found having high constraints in adopting environmentally friendly farming practices while 6 percent had medium constraints. No farmer was found having low constraint.

Hasan (2003) found that majority (60 percent) of the farmers had adoption while 33 percent had low adoption and 7 percent had high adoption, recommended potato cultivation practices.

Rahman (2003) revealed that about half (47 percent) of the growers had medium adoption, 44 percent had low and 9 percent had high adoption of year-round homestead fruit cultivation practices.

Zegeye *et al.* (2002) studied the determinants of adoption of improved maize technologies in major maize growing region of Ethiopia. He found that the rate of adoption of improved maize varieties and chemical fertilizer, factors affecting the adoption of improved maize varieties and the determinant factors affecting adoption of chemical fertilizers are also highlighted.

Gebre (2002) conducted a study on Maize technology adoption in Ethiopia. This study presents the results of the Sasakawa-Global 2000 Agriculture program in Ethiopia and its influence on agricultural research and maize production in the region. The Sasakawa-Global 2000 is an international non-government organization initiated in 1986 because of the 1984-85 famine in Ethiopia, with the aim of empowering Africa to produce its own food through the adoption improved agricultural technologies.

Alexander and Goodhue (2002) conducted the study on pricing of innovation. They evaluate the producer's returns to planting patented seed innovation, using a calibrated optimization model of a south-central maize producer's adoption decision in Iowa, USA. Their results suggest that patented seed innovations do not increase the market power of biotechnology firm in the relevant market of production system.

Swinkeles *et al.* (2002) studied assessing the adoption potential of hedgerow intercropping for improving soil fertility, in western Kenya. They conducted that, the average cost of hedgerow intercropping was 10.5% (SD = 5.5) when based on returns to land and 17.5% (SD = 6.5) based on returns to labour. Fifth planted additional hedges and only 14% did so to improve soil fertility. It thus appears that the potential for its adoption as a soil fertility practices.

Hedgerow intercropping appears to have greater adopter potential if its aim is to provide feed for an intensive dairy operation or for curbing soil erosion.

Sardar (2002) studied on "adoption of IPM practices by the farmers under PETRRA Project of RDRS. He observed that majority (45.9 percent) of the farmers had medium, 38.3 percent had low and 15.8 percent had high adoption of IPM practices.

Haider *et al* (2001) observed that one-third (37 percent) of the farmers fell in low adopter category compared to 32.5 percent falling in optimum adopter 23.5 percent above optimum adopter and only 7 percent had non-adopter on Nitrogenous fertilizer. In respect of extent of phosphoric fertilizer two thirds (68 percent) of the farmers had non adopter category compared to 23 percent having above optimum adopter, 5 percent optimum adopter and only 4 percent had below optimum adopter of phosphoric (P) fertilizer. In respect of extent of potassic fertilizer three quarters categories compared to 10 percent falling bellow optimum adopter, 8 percent optimum adopter and only 3 percent above optimum adopter of potassic (K) fertilizer.

Mostafa (1999) studied the adoption of recommended mango cultivate practices by the mango growers of Nawabganj Sadar thana. He found that at half (49 percent) of the mango growers had "low adoption" 31 percent "very low" adoption and 20 percent had "medium" adoption of fertilizers.

Muttaleb *et al.* (1998) found that over all adoption of plant protection practices was medium. Among the plant protection practices high adoption were observed in fungicides, insecticide and soil treatment and low adoption were found that treatment and low adoption were found in suburbanization of cut tuber hand picking of cutworm and rouging of diseased plant.

Islam (1996) carried out a study on farmer's use of indigenous technical knowledge (ITK) in the context of sustainable agricultural development. He found the extent use of ITK by individual farmers that, the highest proportion (42.73 percent) of the respondents belonged to the lower user category as compared to 41.82 percent in the moderate user category and 15.45 percent in the higher user category, respectively.

Hasan (1996) found in his study that the highest proportion (44 percent) of the respondents perceived the existence of medium adoption, compared to 26 percent low adoption and 3 percent high adoption in respect of selected agricultural technologies.

Nikhade *et al.* (1995) found that the adoption gap about the use of recommended technology of cotton among cotton growers was found to be about 30 percent which was quite high.

Juliana *et al.* (1991) undertook a study on adoption of integrated management practices in five villages of vasusdevanallar block in Tirunelvi district, Tamilnaru, India. They found that about 50 percent of marginal farmers, 47.50 percent of small farmers and 52.50 percent of big farmers had medium adoption and 42.50 percent of big farmers, 22.50 percent of small farmers and percent of the marginal farmers had high level of adoption. In both adopts level of big farmers' participation was higher in comparison to other categories of farmers.

Gogoi and Gogoi (1989) conducted a study on adoption of recommended pi protection practices in rice in Zorhat district of Assam state in India.

The study revealed that among the respondents, 50 percent had low level of 35.36 percent medium level of adoption and 13.64 percent had high adoption of recommended plant protection practices.

Rahman (1986) conducted a research study on the extent of adoption of four improved practices, which were use of fertilizers, line sowing, irrigation and use of insecticides in transplanted aman rice cultivation in two village of Mymensingh district. It revealed that 22 percent of the farmers adopted all the four practices compared to 49 percent adopted three practices, 22 percent adopted two practices, 5 percent adopted one practices and only 2 percent adopted of the four practices.

Sobhan (1975) studied on the extent of adoption often winter vegetables namely tomato, radish, lettuce and potato in Boilar union of Mymensingh district. Over all winter vegetable adoption scores of the farmers could range from 0 to 140. Over all adoption scores indicated that 27 percent of the farmers did not adopted winter vegetables cultivation while 28 percent had low adoption and 55 percent high adoption.

Mohammad (1974) studied the extent of adoption of insect control measures by the farmers in Khamar union of Rajshahi district. He found that among the respondent farmers, 25 percent did not adopt insect control measure; 28 percent had high level of adoption; 32 percent had medium level of adoption and 25 percent had low level of adoption.

Karim (1973) conducted a study on the adoption of fertilizers by transplanting aman growers in former Keyotkhali union of Mymensingh district. He studied the adoption of three fertilizers urea, Triple super phosphate (TSP) and muriate of potash (MP).

He found that 4 percent of the respondent growers had high adoption of fertilizers while 9 percent had medium adoption and 41 percent low adoption. Remaining forty six percent (46 percent) of the respondent growers did not use any of the three fertilizers.

Hossain (1971) carried out a research study on the adoption of four improved practices in Gouripur of Mymensingh district. The practices were (i) plant protection measure, (ii) recommended variety of paddy, (iii) line transplanting d (iv) recommended dose of fertilizers. It revealed that among the responded farmers 57.40 percent adoption plant protection measure, 35.51 percent adoption recommended variety of paddy, 25.36 percent adoption line transplanting and 11.52 percent adoption recommended dose of fertilizers.

## 2.3 Review of past studies on the relationship between selected characteristics of the wheat farmers with their adoption of wheat cultivation

### 2.3.1 Age and adoption of wheat cultivation

Ahmed (2006) found that the age of the farmers had no significant negative relationship with their adoption of selected wheat varieties.

Mahmud (2006) found that the age of the farmers had no significant positive correlation with their adoption of modern wheat cultivation technologies.

Sardar (2002) found that the age of the farmers had positive significant negative correlation with their adoption of IPM practices.

Aurangozeb (2002) observed that there was significant negative relationship between age and adoption of integrated homestead farming technologies.

Sarker (1997) observed that there was no significant relationship between ages of the farmers with their adoption of improved potato cultivation practices.

Islam (1993) observed that there was no relationship between the ages of potato growers with their adoption of improved practices in potato cultivation. Similar results were observed by Karim and Mahaboob (1986), Rahman (1986), Singh (1991), Kher (1992), Pathak *et al.* (1992)

Kashem (1991) observed that there was positive and significant relationship between the ages of the marginal farmers with their adoption of jute technologies. Similar results were found by Ali *et al.* (1986), Singh and Rajendra (1990), Okoro *et al. (*1992), Narwal *et al.* (1991) and Hossain *et al. (*1991)

**2.3.2 Education and adoption of wheat cultivation**

Ahmed (2006) found that the education of the farmers had no significant positive relationship with their adoption of selected wheat varieties.

Mahmud (2006) found that the education of the farmers had significant positive correlation with their adoption of modern wheat cultivation technologies.

Hossain (2003) concluded that education of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation practices.

Sardar (2002) found that the education of the farmers had significant positive relationship with their adoption of IPM practices.

Aurangozeb (2002) studied on the extent of adoption of integrated homestead farming technologies by the rural women in RDRS. He observed that there was positive relationship between education and adoption of integrated homestead farming technologies.

Sarker (1997) conducted a study to determine the relationship between selected characteristics of potato cultivation practices in five villages of Comilla District. He found that education of potato growers had significant relationship with their adoption of improved potato cultivation practices. Similar results were found by Kashem(1991).

Bavalatti and Soundaarswamy (1990) observed no significant relationship between education of the farmers and their adoption of dry land farming practices.

Kaur (1988) found that education influenced the opinion of the women about adoption of vegetable gardening animal husbandry etc.

### 2.3.3 Farm size and adoption of wheat cultivation

Ahmed (2006) found that the farm size of the farmers had no significant positive relationship with their adoption of selected wheat varieties.

Mahmud (2006) found that the farm size of the farmers had no significant positive correlation with their adoption of modern wheat cultivation technologies.

Hossain (2006) found that farm size of the farmers had no significant positive relationship with their adoption of selected high yielding varieties of rice.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Alok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that farm size of the farmers had significant and positive relationship with their adoption of Alok 6201 hybrid rice.

Alam (1997) studied the use of improved farm practices in rice cultivation by the farmers. The findings of the study showed that the farm size had a significant relationship with their use of improved farm practices in rice cultivation.

Hossain (1983) found that size of the farm of transplanted aman farmers in Bhabakhali union of Mymensingh district had a negative relationship with their adoption of HYV T-aman rice.

**2.3.4 Annual family income and adoption of wheat cultivation**

Ahmed (2006) found that the annual family income of the farmers had no significant positive relationship with their adoption of selected wheat varieties.

Mahmud (2006) found that the annual income of the farmers had no significant negative correlation with their adoption of modern wheat cultivation technologies.

Hossain (2003) revealed that family income of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation practices.

Sarker (1997) found that family income of potato growers had a positive relation with their adoption of improved potato cultivation practice, Similar results were observed by Hossain (1999), Rahman (1986), Kashem (1991), Pal (1995), Islam (1993), and Khan (1993).

Singh (1991) in a study found that income of the farmers was significantly associated with the level of adoption of plant protection measures.

### 2.3.5 Input cost and adoption of wheat cultivation

The researcher could not find any literature involving relationship between input cost and adoption of wheat cultivation.

### 2.3.6 Extension media contact and adoption of wheat cultivation

Mahmud (2006) found that the extension media contact of the farmers had significant positive correlation with their adoption of modern wheat cultivation technologies.

Haque (2003) concluded that extension contact of the farmers had significant positive relationship with their adoption of modern maize cultivation technologies.

Sardar (2002) concluded that the extension contact had positively significant, relationship with their adoption of IPM practices.

Aurangozeb (2002) observed that there was significant relationship between contact with extension media and adoption of integrated homestead farming technologies.

Osunloogun *et al.* (1996) studied adoption of improved Agricultural practices by co-operative farmers in Nigeria. The findings of the study indicated a positive relationship between extension contact and adoption improved practices.

Bezbora (1980) studied adoption of improved agricultural technology by the farmers of Assam. The study indicated a positive relationship between extension contact and adoption of improved cultivation practices.

### 2.3.7 Cosmopoliteness and adoption of wheat cultivation

Ahmed (2006) found that the cosmopoliteness of the farmers had significant positive relationship with their adoption of selected wheat varieties.

Mahmud (2006) found that the cosmopoliteness of the farmers had significant positive correlation with their adoption of modern wheat cultivation technologies.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was a significant relationship between cosmopoliteness and adoption of integrated homestead farming technologies.

Hossain (2001) found a positive significant relationship between cosmopolitness of the farmers and their adoption of pesticides. Pal (1995), Halim (1985), Khan (1993), Haque (1993) and Islam (1996) observed similar results.

Hussen (2001) conducted a study on farmers' knowledge and adoption of modern sugarcane cultivation practices. He found that cosmopoliteness of the growers had significant positive relationship with their adoption of modern sugarcane cultivation practices.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice Sadar upazila of Mymensingh district. He found that cosmopoliteness of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Chowdhury (1997) conducted a study on the adoption of selected BINA technologies by the farmers of Bona union in Mymensingh district. He found that there was no significant relationship between the cosmopoliteness of the farmers and their composite adoption of selected BINA technologies. Similar findings were

observed by Mannan (1972), Mohammad (1974), Sobhan (1975), Hossain (1991) and Islam (1996).

Pal (1995) conducted a research on the adoption of recommended sugarcane cultivation practices by the farmers. He observed that the cosmopoliteness of the farmers had significant positive relationship with their adoption of recommended sugarcane cultivation practices. Similar results were found by Halim (1985), Khan (1993), Haque (1993) and Islam (1996).

Haque(1993) observed in his study, a strong positive relationship between cosmopoliteness of sugarcane growers and their adoption of improved practices in sugarcane cultivation.

Islam (1993) found a significant relationship between cosmopoliteness of the farmers and their adoption of recommended dose of fertilizer and plant protection measures in potato cultivation.

Khan (1993) observed in his study on adoption of insecticide and related issues by the farmers, a positive relationship between cosmopoliteness of the farmers and their adoption of insecticides.

Hussain (1991) conducted a study on the adoption behaviour of contract growers in sadar upazilla of Jamalpur District; he found that there was no significant relationship between cosmopoliteness of the farmers and their overall adoption of improved farm practices. Similar findings were observed by Mannan (1972), Mohammad (1974), Sobhan (1975) and Islam (1996).

### 2.3.8 Knowledge about wheat cultivation and adoption of wheat cultivation

Ahmed (2006) found that the knowledge on wheat cultivation of the farmers had significant positive relationship with their adoption of selected wheat varieties.

Mahmud (2006) found that the knowledge on wheat cultivation of the farmers had significant positive correlation with their adoption of modern wheat cultivation technologies.

Sarder (2002) in his study revealed that agricultural knowledge of the farmers had positively significant with their adoption of IPM practices.

Koch (1985) conducted a study in the north-west organic free, state South Africa concerning perception of agriculture innovativeness, aspiration, knowledge and innovation adoption. He observed that there was a strong positive relationship between perception, knowledge and practice adoption. This finding is very much in agreement with that of Rogers and Shoemaker (1971).

Reddy *et al.* (1987) found significant association between knowledge and use of improved package of practices in paddy production by participant and non participant farmers.

### 2.3.9 Attitude toward wheat cultivation and adoption of wheat cultivation

Ahmed (2006) found that the attitude toward wheat cultivation of the farmers had significant positive relationship with their adoption of selected wheat varieties.

Islam (2002) revealed that the attitude towards technology of the farmers had a significant positive relationship with their adoption of modern agricultural technologies.

Podder (2000) conducted a study on the adoption of Mehersagar Banana by the farmers of Gazaria union under Sakhipur Thana of Tangail district. He found that there was no relationship between attitude towards technology of the growers and their adoption of modern agricultural technologies.

Hasan (1996) conducted a study on adoption of some selected agricultural technologies among the farmers as perceived by the frontline GO and NGO workers. He found that there was strong positive relationship between attitude towards development and perceived adoption of selected technologies.

Hossain (1981) conducted a study on relationships of selected characteristics of the Jute growers with their adoption of improved practices of Jute cultivation. He found that there is no relationship between attitude towards intensive Jute cultivations scheme of the Jute growers and their adoption of improved practices of jute cultivation.

### 2.3.10 Innovativeness and adoption of wheat cultivation

Ahmed (2006) found that the innovativeness of the farmers had significant positive relationship with their adoption of selected wheat varieties.

Rahman (2003) revealed that the highest proportion (63 percent) of the farmers had low innovativeness as compared to 22 percent medium innovativeness and 15 percent very low innovativeness.

Aurangozeb (2002) observed that there was significant relationship between innovativeness and adoption of integrated homestead farming technologies.

Islam (2002) conducted a research study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that innovativeness of farmers had significant and positive relationship with their adoption of modern agricultural technologies.

Hossain (1999) found a positive relationship between innovativeness of the farmers and their adoption of fertilizer and also observed no relationship with adoption of pesticides.

Rahman (1973) found a positive relationship between modernism and adoption of farm practices. He defined modernism as leading for new experience or opener to innovation. So, modernism as used by him is synonymous with the innovativeness of the present study.

## 2.4 The Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. Properly constructed hypothesis of any research contain at least two variables namely, "dependent variable" and "independent variable". Selection and measurement of those variables is an important task. A dependent variable is that which appears, disappears or varies as the researcher introduces, remove or varies the independent variables (Townsend, 1953). An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon.

This study concerned with dependent variable, adoption of wheat cultivation and the selected characteristics as independent variables, *i.e.* age, education, farm size, annual family income, input cost, cosmopoliteness, extension media contact,

knowledge on wheat cultivation, attitude towards wheat cultivation and innovativeness.

Based on these above discussion and the review of literature, the conceptual framework of this study has been formulated and shown in figure 2.

| Independent variables | Dependent variable |
|---|---|

❖ Age

❖ Education

❖ Farm size

❖ Annual family income

❖ Input cost

❖ Cosmopoliteness

❖ Extension media contact

❖ Knowledge about wheat cultivation

❖ Attitude towards wheat cultivation

❖ Innovativeness

Adoption of wheat cultivation
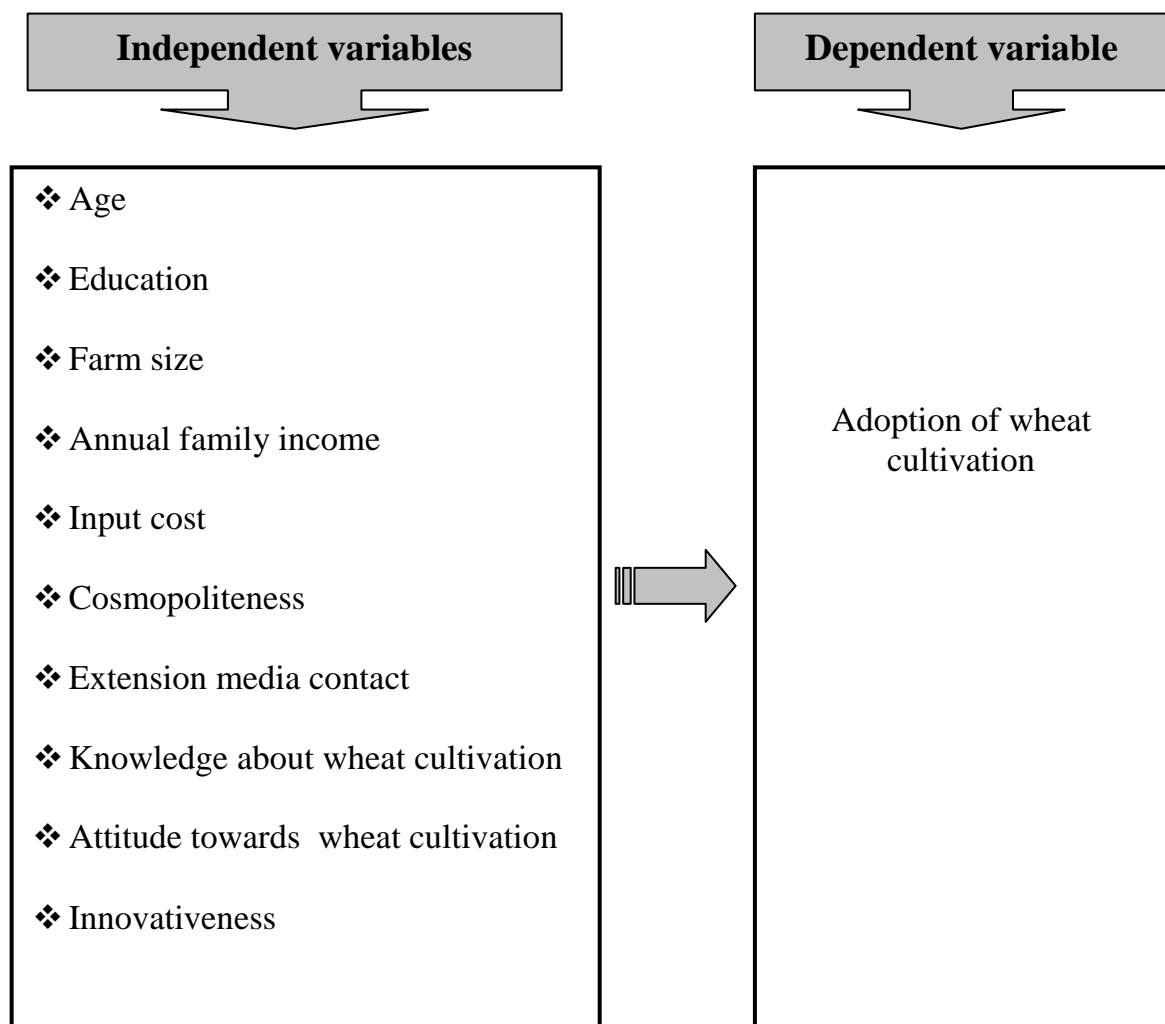
**Figure 2.1 Conceptual framework of the study**

# CHAPTER 3

# METHEDOLOGY

In any scientific research methodology plays an important role. Methodology should be such that enables the researcher to collect valid information and to analyze the same properly to arrive at correct decisions. The purpose of this chapter is to describe the methods and procedures followed in conducting the present study.

## 3.1 Locale of the Study

The study was conducted in Kazipur Upazila of Sirajganj District. The upazila was selected purposively as the study area. There were 12 unions from where farmers of 9 unions were regular in wheat cultivation. Among the 9 unions 3 unions were selected randomly and from each union two villages were also selected randomly for locale of this study. Thus, six villages namely, Bawaikhola and Khukshia from Gandhail union, Singrabari and Khudbandi from Kazipur union and Natuarpara and Panagari from Natuarpara union were selected as the locale of the study. This Upazilla is situated about 20 km north from the Sirajganj District Headquarter. A map of Sirajgonj District and a map of Kazipur Upazilla showing the study areas have been presented in Figures 3.1 and 3.2 respectively.
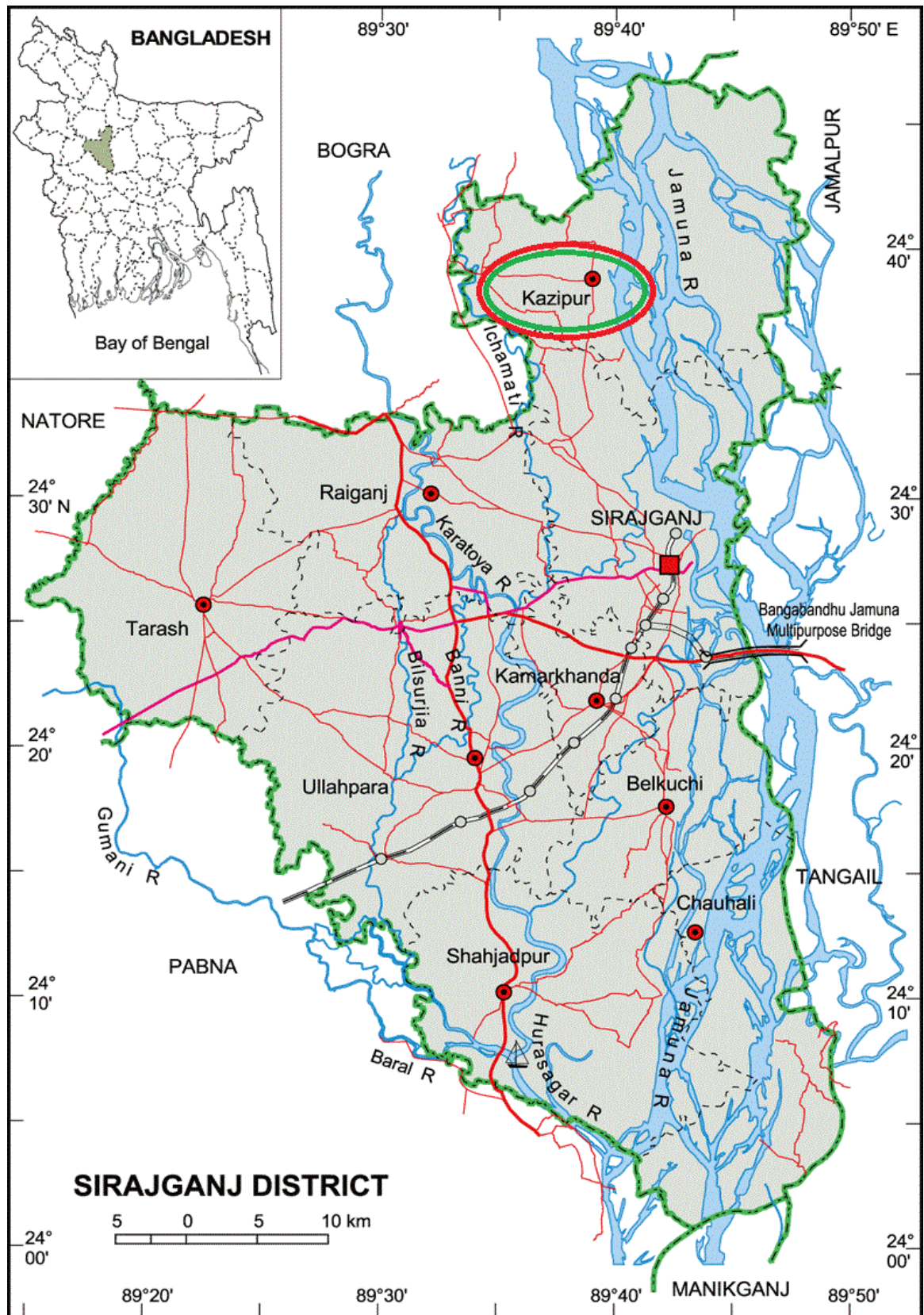
Figure 3.1 A Map of Sirajganj District Showing Kazipur Upazila
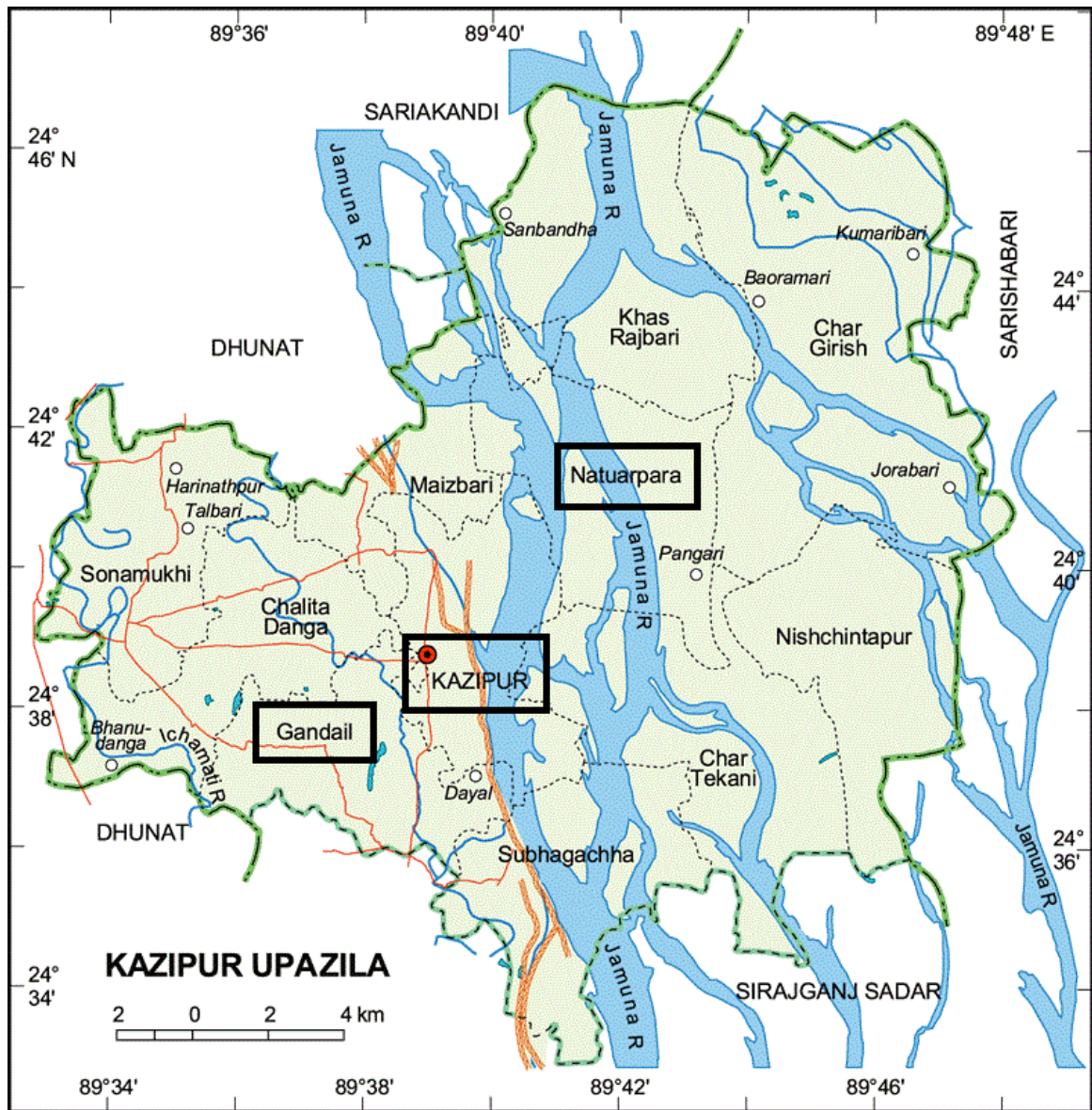
Figure 3.2 A Map of Kazipur Upazilla Showing the Study Areas

## 3.2 Population and Sampling Design

All the wheat farmers of six villages of three different unions in Kazipur Upazila under Sirajganj District constituted the population of the study. An up-to-date list of total 1804 farmers from the selected six villages was prepared with the help of Sub Assistant Agriculture Officer (SAAO) of the study area. About seven (7) percent of the populations were proportionately and randomly selected as the sample of the study by using random sampling method. Thus, 126 wheat farmers constituted the sample of the study. A reserve list of 12 respondents was also prepared for covering the positions in case of the absence of the selected respondents during interview. The distribution of the population and the sample size are presented in table 3.l

**Table 3.1 Distribution of the population sample and number of wheat farmers in the reserve list**

| Name of villages | Population size | Sample size | Reserve list size |
|---|---|---|---|
| Bawaikhola | 313 | 22 | 2 |
| Khukshia | 306 | 21 | 2 |
| Singrabari | 287 | 20 | 2 |
| Khudbandi | 304 | 21 | 2 |
| Natuarpara | 328 | 23 | 2 |
| Panagari | 266 | 19 | 2 |
| **Total** | 1804 | 126 | 12 |

### 3.3 The Research Design

A research design was constructed in the following way:

### 3.3.1 Instrument for data collection

An interview schedule was prepared for data collection from the wheat farmers of Kazipur Upazilla. It was prepared keeping the objectives of the study in mind. The schedule contained both open and closed form questions. Direct and simple questions were included in the schedule to collect data on the selected dependent and independent variables. A draft schedule was prepared and pre-tested before using the same for collection of data. For pre-test purpose twelve farmers taking at least two from each of the selected villages of the study area were interviewed by using the draft interview schedule. Based on the pre-test experience, necessary corrections, additions, alterations and rearrangement were made in the schedule. Then final draft was prepared and multiplied. Thus, the schedule was prepared for final use.

### 3.3.2 Collections of data

The researcher herself collected data with the help of an interview schedule from the sample respondents through face to face interview using the pre-scheduled leisure period of respondent from 01 to 31 March, 2013.

The researcher made all possible efforts to establish rapport with the respondents so that they could feel to respond to the questions contained in the schedule. Rapport was established with the farmers prior to interview and the objectives were clearly explained by using local language as far as possible. Interviews were conducted with the respondents in the home and tea shops during their off time. During the visit the objectives of the study were explained to most of the respondents.

Brief information regarding the nature and purpose of the study was given to the respondents before actual interview. Questions were asked systematically and explanations were made whenever it was necessary. The information was duly checked in order to minimize errors. Some data were recorded in local unit. These were subsequently converted to appropriate standard units. The respondents were interviewed at their off time so that they could give accurate information in a cool mind. The researcher in collecting data faced no serious problem. Excellent co-operation was obtained from the respondent during the data collection.

### 3.3.3 Data Coding and Tabulation

Data were coded into a coding sheet. Data collected thus from the respondents were compiled, tabulated, analyzed in accordance with the objectives of the study by using computer system. The qualitative data were converted into quantitative form by mean of suitable scoring techniques for the purpose of analysis.

### 3.3.4 Categorization of Data

For describing the independent and the dependent variables, the respondents were classified into several categories in respect of each of the variable. These categories were developed by considering the nature of distribution of the data and the general conditions prevailing in the social system.

### 3.4 Selection of Variables

The researcher employed adequate care in selecting the variables of the study. Considering personal, economic, social and psychological factors of the rural community, time and resources availability to researcher, reviewing relevant literature and discussing with relevant expert, the researcher selected the variables for the study.

A variable is any characteristic which can assume varying or different values in successive individual cases (Ezekiel and Fox, 1959). A well organized piece of research usually contains at least two elements, independent variables and a dependent variable.

### 3.4.1 Independent Variables

An independent variable is that factor which is maintained by the researcher in his/her attempt to ascertain its relationship to an observed phenomenon. The researcher selected 10 characteristics of the respondents as the independent variables. These were: Age, Education, Farm size, Annual family income, Input cost, Extension media contact, Cosmopoliteness, Knowledge on wheat cultivation, Attitude towards wheat cultivation and Innovativeness.

### 3.4.2 Dependent Variable

A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953). Adoption of wheat cultivation by wheat farmers was the main focus of this study and so it was considered as the dependent variables.

### 3.5 Measurements of the Variables

In order to conduct the study in accordance with the objectives it was necessary to measure the independent and the dependent variables. The procedure for measuring the variables described below.

### 3.5.1 Measurement of independent variables

Ten selected characteristics of the wheat farmers were considered as independent variables.

### 3.5.1.1 Age

Age of a farmer referred to the period of time from his birth to the time of interview. It was measured in terms of actual years on the basis of his statement. One was assigned for each year of his/her age.

### 3.5.1.2 Education

A respondent's educational score was measured on the basis of completed years of schooling. One was assigned for each completed year of schooling. If a respondent does not know reading and writing his/her score was zero (0). A score of 0.5 was assigned to a respondent who only could sign his/her name. Besides, the respondent got actual score of his/her every year of schooling i.e. 1 for class one, 2 for class two and so on.

### 3.5.1.3 Farm size

Farm size was measured as the size of the respondent's farm on which he/she continued his/her farming operations during the period of study. The area was being estimated in terms of full benefit to the growers. The data were first recorded in terms of local unit i.e; *bigha, katha or pakhi* and then were converted to hectare and the size was measured by using the following formula:

$$FS = A_1 + A_2 + 1/2(A_3 + A_4) + A_5 - A_6$$

Where,  FS = Farm size

$A_1$ = Homestead

$A_2$ = Own land under own cultivation

$A_3$ = Land taken from others on borga

$A_4$ = Land given to others on borga

$A_5$ = Land taken from others on lease

$A_6$ = Land given to others on lease

### 3.5.1.4 Annual family income

The income of a farmer is an important indicator of how much he can invest in his wheat cultivation. Annual family income of a respondent was measured in taka on the basis of total yearly earnings from wheat cultivation and other sources in which the respondent as well as his family members were involved. The method of ascertaining income from farming involved different aspects. The aspects are: agriculture, poultry rearing, domestic animal, fish, job, business and others. In calculating the annual family income of the respondents, the total yield from all the sources making in the preceding year were converted into cash income according to the prevailing market price and added together to obtain total income of a respondent. Data obtained in response to item No. 5 of the interview schedule were used to determine the income of the respondents.

### 3.5.1.5 Input cost

Input cost is costs of different agricultural inputs in the locality when they are required. Here, input cost score was measured on the basis of the degree of costs of six different agricultural inputs. A three point scale was used to compute the input cost of a respondent. The scoring was done in the following manner:

| Extent of availability | Assigned score |
|---|---|
| Optimum cost | 1 |
| High cost | 2 |
| Very High cost | 3 |

Thus, the input cost score of a respondent was obtained by adding his/her scores for all the six items and it could range from '6' to 18 where '6' indicated lowest input cost and 18 indicated highest input cost.

### 3.5.1.6 Extension media contact

It was measured of the basis of a respondent extent of exposure to 14 selected information sources related to agricultural extension. A respondent was asked to choose one answer among five option of contact for each medium, namely: regularly, often, occasionally, rarely and not at all. Weight was assigned for all extension media in the following manner:

| Extent of contact | Weighting system |
|---|---|
| Regularly | 4 |
| Often | 3 |
| Occasionally | 2 |
| Rarely | 1 |
| Not at all | 0 |

The extension media contact score of a respondent was, therefore, determined by adding the total responses against 14 selected extension media. Thus, the extension media contact score could range from 0 to 56, where 0 indicating no extension media contact and 56 indicating highest contact.

### 3.5.1.7 Cosmopoliteness

Cosmopoliteness of a respondent was measured in terms of his/her nature of visits to the ten different places external to his own social system. The scale used for computing the cosmopoliteness score was presented below:

| Extent of visit | Assigned score |
|---|---|
| Not at all | 0 |
| Rarely | 1 |
| Occasionally | 2 |
| Often | 3 |
| Regularly | 4 |

The cosmopoliteness score of a respondent was determined by adding together the scores obtained from visit to each of the ten (10) types of places. The cosmopoliteness score of the respondents could range from 0 to 40, where, 0 indicating no cosmopoliteness and 40 indicating very high cosmopoliteness.

### 3.5.1.8 Knowledge about wheat cultivation

Wheat cultivation knowledge of a respondent was measured by asking him 20 questions related to different aspects of wheat cultivation e.g. pests, pesticides, fertilizer etc. It was measured assigning weightage 2 for each question. So, the total assigned scores for all the questions became 40. The score was given according to response at the time of interview.

Answering a question correctly an individual could obtain full score. While for wrong answer or no answer he obtained zero score. Partial score was assigned for partially correct answer. Thus, the agricultural knowledge score of a respondent could range from 0 to 40, where 0 indicates low knowledge and 40 indicates very high knowledge.

### 3.5.1.9 Attitude towards wheat cultivation

Attitude towards wheat cultivation was measured through a Likert scale. Twelve statements on various aspects of wheat cultivation were asked to the farmers. The number of positive and negative questions was equal. They were asked to indicate for each of the statements, whether "strongly agree", "agree", "no opinion, "disagree" and "strongly disagree" were assigned for with a corresponding score of 4, 3, 2 and 1 respectively. The attitude score of a wheat farmer was compared by summing the scores for his responses to all the items.

Hence, scores of attitude towards wheat farmers could range from 12 to 48; where '12' indicating highly negative attitude and '48' indicating highly favourable attitude towards wheat cultivation.

### 3.5.1.10 Innovativeness

Innovativeness is the degree to which an individual adopts an innovation relatively earlier than other members in a social system (Rogers, 1983). Here, innovativeness of a respondent was measured on the basis of the adoption of eight agricultural technologies by the respondents. A six point scale was used to compute the innovativeness. The score was assigned on the basis of time dimension which means how earlier a respondent used the technology continuously. The scoring was done in the following manner:

| Adoption period | Assigned score |
|---|---|
| Used after hearing within $1^{st}$ year | 5 |
| Used after hearing within $2^{nd}$ year | 4 |
| Used after hearing within $3^{rd}$ year | 3 |
| Used after hearing within $4^{th}$ year | 2 |
| Used after hearing within $5^{th}$ year | 1 |
| Do not use | 0 |

Thus, the innovativeness score of a respondent was obtained by adding his/her scores for all the ten items and it could range from '0' to 40 where '0' indicated no innovativeness and 40 indicated highest innovativeness.

### 3.5.2 Measurement of dependent variable

Dependent variable of this study was 'Adoption of Wheat Cultivation' by the farmers of selected villages under Kazipur Upazila in Sirajganj District.

It was measured on the basis of Adoption Quotient suggested by Bhuiyan (2012).

The ingredients of Adoption Quotient in this $$\frac{\Sigma l}{\Sigma L} \times \frac{t}{T} \times 100$$ study were:

(i) area proportion score and

(ii) adoption time proportion score on the basis of fixed adoption period.

Thus, the Adoption Quotient formula stands as,

Where,

$\Sigma$ = Summation

$l$ = Actual area used for wheat cultivation in a year

$L$ = Suitable area for wheat cultivation in a year

$t$ = Years of wheat cultivation within fixed adoption period $\frac{2}{4} \times \frac{1}{5} \times 10 = 10\%$

$T$ = Fixed adoption period score '5' (2008-2012)

For example, assume that a farmer of Kazipur Upazila had four bigha suitable lands for wheat cultivation. He allotted two bigha for its adoption and cultivated for one year. His Adoption Quotient score would be,

$$100 = 10\%$$

If he does not allot any land for wheat cultivation his Adoption Quotient score would be zero (0). On the other hand, if he allots all the suitable lands for wheat cultivation and he is practicing wheat cultivation for five years his adoption score would be 100%. So, the adoption score could range from '0' to 100, where (0) indicated no adoption and 100 indicated highest adoption.

**3.6 Hypothesis of the Study**

The following research hypotheses were put forward to test the relationships between different characteristics considered. Each of ten selected characteristics were (age, education, farm size, annual family income, input cost, extension media contact, cosmopoliteness, knowledge on wheat cultivation, attitude towards wheat cultivation and innovativeness) of the respondents.

As defined by Goode and Halt (1952) "A hypothesis is a proposition, which can be put to a test to determine its validity. It may seen contrary to, or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test".

According to Kerlinger (1973) a hypothesis is a conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form and they are related, either generally or specifically from variables to variables. In broad sense hypotheses are divided into two categories: (a) Research hypothesis and (b) Null hypothesis. In studying relationships between variables an investigator first formulates research hypothesis which states anticipated relationships between the variables. However, for statistical test it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between the concerned variables.

The following null hypothesis would be formulated to explore the relationship of the selected characteristics of the farmers with their adoption of wheat cultivation:
**"There is no relationship between the selected characteristics of the wheat farmers and their adoption of wheat cultivation".**

## 3.7 Data processing and statistical analysis

The computer software SPSS (Statistical Package for Social Sciences, version 11.5) was used to analyze the data. The following statistical treatments were used to describe, represent and explanation of the relationships and contributions of the variables included in the study. Data were presented mostly in the tabular form. Various statistical measures like number, percentage distribution, range, mean, standard deviation, correlation coefficient etc. were used to describe and interpret the data.

In order to explore the relationships between adoption of wheat cultivation and the selected characteristics of the wheat farmers, the Pearson Product Moment Correlation was computed. Correlation matrix was also computed to determine the interrelation ships among the variables. Five percent (0.05) level of significance was used as the basis of rejecting any null hypothesis. If the computed value of co-efficient of correlation 'r' was equal to or greater table value at designed level of significance for the relevant degrees of freedom, the null hypothesis was rejected and it was concluded that there was significant relationship between the concerned variables. However, when the computed value of co-efficient of correlation was found to be smaller than the tabulated value at the designated level of significant for the relevant degrees of freedom, it was concluded that the null hypothesis could not be rejected and hence there was no relationship the concerned variables.

# CHAPTER 4

# RESULTS AND DISCUSSION

In this Chapter, the findings are presented in four sections in accordance with the objectives of the study. The first section deals with the selected characteristics of the farmers. The second section has dealt with their adoption of wheat cultivation. And the last section has dealt with relationships between the selected characteristics of the farmers and their adoption of wheat cultivation.

## 4.1 Characteristics of the farmers

The findings relating to the selected characteristics of the farmers namely; age, education, farm size, annual family income, input cost, extension media contact, cosmopoliteness, knowledge on wheat cultivation, attitude towards wheat cultivation and innovativeness are presented and discussed as follows:

## 4.1.1 Age

The age of the wheat farmers ranged from 20 to 66 years with a mean and standard deviation of 36.60 and 9.62 respectively. Considering the age, the farmers were classified into three categories namely 'young', 'middle' and 'old' aged. The distribution of the respondents' based on their age categories are presented in Table 4.1.

**Table 4.1 Distribution of the farmers according to their age**

| Categories (Scores) | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Young aged (below 35 years) | 57 | 45.23 | | |
| Middle aged (35-50 years) | 60 | 47.62 | 36.60 | 9.62 |
| Old aged (above 50 years) | 9 | 7.15 | | |
| Total | 126 | 100 | | |

Table 4.1 indicated that the middle aged wheat farmers comprised the highest proportion (47.62 percent) followed by young aged category (45.23 percent) and the lowest proportion were made by the old aged category (7.15 percent). Data also indicates that the young and middle aged wheat farmers constituted about 92.85 percent of the respondents. It seemed, young and middle aged person were more adopter in wheat cultivation. Because young and middle aged people are more energetic, courageous and want to take risk.

### 4.1.2 Education

The educational scores of the respondent farmers ranged from 0 to 16 score with a mean and standard deviation of 4.27 and 4.63 respectively. Based on their educational scores, the farmers were classified into five categories such as 'illiterate' (0), 'can sign only' (0.5), 'primary education' (1 to 5), 'secondary education' (6 to 10) and 'above secondary education' (above 10). The distribution of the farmers according to their education has been presented in Table 4.2.

**Table 4.2 Distribution of the farmers according to their education**

| Categories (Scores) | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Illiterate (0) | 19 | 15.08 | | |
| Can sign only (0.5) | 39 | 30.95 | | |
| Primary education (1-5) | 27 | 21.43 | 4.27 | 4.63 |
| Secondary education (6-10) | 27 | 21.43 | | |
| Above secondary education (above 10) | 14 | 11.11 | | |
| Total | 126 | 100 | | |

Table 4.2 shows that farmers under 'primary education category constituted the highest proportion (30.95 percent) compared to 21.43 percent can sign only

category, 21.43 percent secondary level and 15.08 percent illiterate level category. On the other hand the lowest 11.11 percent belonged to above secondary level category. From the table it is evident that literacy percentage of the study area is 84.92% which is very much higher than the national literacy percentage. This is because of many NGOs having been working in the study area and they encouraged the farmers to learn the sign of their names. It is needed for their participation in the NGOs' activities.

**4.1.3 Farm size**

The farm size of the respondents' ranged from 0.02 ha to 2.16 ha with a mean and standard deviation of 0.55 and 0.41 respectively. Based on their farm size, the respondents were classified into three categories following the categorization of DAE (1999). These categories were, marginal land holder (0.02 - 0.2 ha), small land holder (0.21 - 1.0 ha), medium land holder (1.01 to 3.0 ha) large land holder (> 3.0 ha). The distribution of the farmers according to their farm size has been presented in Table 4.3.

**Table 4.3 Distribution of the farmers according to their farm size**

| Categories | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Marginal (0.02 - 0.2 ha) | 24 | 19.05 | | |
| Small (0.21 - 1.0 ha) | 89 | 70.63 | | |
| Medium (1.01-3.0 ha) | 13 | 10.32 | 0.55 | 0.41 |
| Large (> 3.0 ha) | 0 | 0 | | |
| Total | 126 | 100 | | |

Table 4.3 indicated that the small land holder constituted the highest proportion (70.63 percent) of the farmers followed by 19.05 percent with marginal land holder, 10.32 percent with medium land holder and the zero (0) percent was large land holder.

The findings of the study revealed that overwhelming proportion (89.68 percent) of the farmers were marginal to small land holder. This is the common picture of the farm size status among the farmers throughout the country.

**4.1.4 Annual family income**

Annual family income of the respondents ranged from 48 to 386 thousand taka with a mean and standard deviation of 144.65 and 85.32 respectively. On the basis of their annual family income, the farmers were classified into three categories, viz. low, medium and high family income. The distribution of the farmers according to the annual family income categories has been presented in Table 4.4.

**Table 4.4 Distribution of the farmers according to their annual family income**

| Categories | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low income (< 160,000) | 90 | 71.43 | | |
| Medium income (161,000-273,000) | 28 | 22.22 | 144.65 | 85.32 |
| High income (>273,000) | 8 | 6.35 | | |
| Total | 126 | 100 | | |

Data in table 4.4 revealed that the farmers having low annual family income constitute the highest proportion (71.43 percent) followed by medium income (22.22 percent) and high annual family income (8.63 percent). It means that overwhelming majority (93.65 percent) of the wheat farmers had low to medium annual family income. Farm size is very much related with the income. As farm sizes of the farmers in the study area are small, so naturally the income is low.

**4.1.5 Input cost**

Input cost of the respondents ranged from 6 to 18 with a mean and standard deviation of 11.64 and 3.41 respectively.

On the basis of input cost, the farmers were classified into three categories, viz. low input cost, medium input cost and high input cost. The distribution of the farmers according to the input cost categories has been presented in Table 4.5.

**Table 4.5 Distribution of the farmers according to their input cost**

| Categories | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low input cost (≤8) | 28 | 22.22 | | |
| Medium input cost (9-14) | 67 | 53.18 | 11.64 | 3.41 |
| High input cost (> 14 ) | 31 | 24.60 | | |
| Total | 126 | 100 | | |

Data in table 4.5 revealed that the farmers having medium input cost constitute the highest proportion (53.18 percent) followed by high input cost (24.60 percent) and low input cost (22.22 percent). Table 4.5 showed majorities (77.78 percent) of the farmers had medium to high input cost. High input cost is hindrance for adoption of innovation.

**4.1.6 Extension media contact**

The extension media contact score of the respondent farmers ranged from 8 to 43 against the possible range of zero '0' to 56 score with a mean and standard deviation of 18.90 and 6.94 respectively. Based on their extension media contact score, the respondents were classified into three categories. These categories were low, medium and high extension media contact. The distribution of the respondents according to their extension media contact has been presented in Table 4.6.

**Table 4.6 Distribution of the farmers according to their extension media contact**

| Categories (Scores) | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low contact (≤ 19) | 83 | 65.87 | 18.90 | 6.94 |
| Medium contact (20-32) | 63 | 28.57 | | |
| High contact (> 32) | 7 | 5.56 | | |
| Total | 126 | 100 | | |

Table 4.6 indicated that the farmers having low extension media contact category constituted the highest proportion (65.87 percent) followed by medium contact (28.57 percent) and high contact category (5.56 percent). Table 4.6 showed that the overwhelming majorities (94.44 percent) of the farmers had low to medium extension media contact of the study area. This shows that extension work in the study area is not highly satisfactory. So, it needs vigorous extension works in the study area.

### 4.1.7 Cosmopoliteness

The minimum cosmopoliteness score of the respondents was 5 and the maximum score was 22 against the possible range of '0' to 40. However, the average was 13.26 and the standard deviation was 3.93. Based on their cosmopoliteness scores, the respondents were classified into three categories: low cosmopoliteness, medium cosmopoliteness and high cosmopoliteness. The distribution of the respondents according to their cosmopoliteness is shown in Table 4.7.

**Table 4.7 Distribution of the farmers according to their cosmopoliteness**

| Categories (Scores) | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low cosmopoliteness ($\leq$ 9) | 28 | 22.22 | 13.26 | 3.93 |
| Medium cosmopoliteness (10-17) | 82 | 65.08 | | |
| High cosmopoliteness ($\geq$ 18) | 16 | 12.70 | | |
| Total | 126 | 100 | | |

Data contained in Table 4.7 indicated that the highest proportion (65.08 percent) of the wheat farmers had medium cosmopoliteness as compared to 22.22 percent of low cosmopoliteness and 12.70 percent had high cosmopoliteness. The findings revealed that majority (87.30 percent) of the farmers had in low to medium cosmopoliteness in the study area. From the picture this could be said that farmers of the study area are more or less cosmopolite than the localite.

**4.1.8 Knowledge about wheat cultivation**

Knowledge about wheat cultivation score of the respondents was found to range from 7 to 33 against a possible range from zero (0) to 40. The average score was 21.19 with a standard deviation of 6.09. Based on the score of farmers' knowledge about wheat cultivation the respondents were classified into three categories as 'low knowledge level'$\leq$(15), 'medium knowledge level' (16 -24) and 'high knowledge level' $\nleq$ 2 5). The distribution of the respondents according to their knowledge about wheat cultivation has been presented in Table 4.8.

**Table 4.8 Distribution of the farmers according to their knowledge about wheat cultivation**

| Categories (Scores) | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low knowledge level ($\leq 15$) | 23 | 18.25 | | |
| Medium knowledge level (16-24) | 63 | 50 | 21.19 | 6.09 |
| High knowledge level ($\geq 25$) | 40 | 31.75 | | |
| Total | 126 | 100 | | |

Findings shown in Table 4.8 indicated that the highest proportion (50 percent) of the respondents had medium knowledge about wheat cultivation, while 18.25 percent and 31.75 percent of the respondents had high and low knowledge about wheat cultivation respectively. The findings revealed that majority (81.75 percent) of the farmers had medium to high knowledge about wheat cultivation. It indicates that the adoption rate of wheat cultivation in the study area is significantly strong.

**4.1.9 Attitude towards wheat cultivation**

Attitude towards wheat cultivation of the respondents ranged from 12 to 36 with a mean and standard deviation of 23.14 and 5.80 respectively. On the basis of their attitude towards wheat cultivation, the farmers were classified into three categories, viz. low attitude, medium attitude and high attitude towards wheat cultivation. The distribution of the farmers according to the attitude towards wheat cultivation categories has been presented in Table 4.9.

**Table 4.9 Distribution of the farmers according to their attitude towards wheat cultivation**

| Categories | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low attitude ($\leq 20$) | 52 | 41.27 | | |
| Medium attitude (21-29) | 51 | 40.48 | 23.14 | 5.80 |
| High attitude ($\geq 30$) | 23 | 18.25 | | |
| Total | 126 | 100 | | |

Data in Table 4.9 revealed that the farmers having low attitude towards wheat cultivation constituted the highest proportion (41.27 percent) followed by medium attitude towards wheat cultivation (40.48 percent) and high attitude towards wheat cultivation (18.25 percent). Table 4.9 showed majorities (81.75 percent) of the farmers had low to medium attitude towards wheat cultivation. This indicates that, there had not much favourable attitude of the farmers towards wheat cultivation.

### 4.1.10 Innovativeness

Innovativeness of the respondents ranged from 7 to 32 with a mean and standard deviation of 14.79 and 5.07 respectively. On the basis of their innovativeness, the farmers were classified into three categories, viz. low innovativeness, medium innovativeness and high innovativeness. The distribution of the farmers according to the innovativeness categories has been presented in Table 4.10.

**Table 4.10 Distribution of the farmers according to their innovativeness**

| Categories | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low innovativeness (≤ 15) | 83 | 65.87 | | |
| Medium innovativeness (16-23) | 33 | 26.19 | 14.79 | 5.07 |
| High innovativeness (> 23) | 10 | 7.94 | | |
| Total | 126 | 100 | | |

Data in table 4.10 revealed that the farmers having low innovativeness constitute the highest proportion (65.87 percent) followed by medium innovativeness (26.19 percent) and high innovativeness (7.94 percent). The findings revealed that, majorities (92.06 percent) of the farmers were low to medium innovative. So farmers of the study area were found to be less adoptive for the technologies.

## 4.2 Adoption of wheat cultivation

Adoption of wheat cultivation score was found to range from 11.01 to 91.67. The average score was 45.89 with a standard deviation of 22.00. Based on the scores of adoption of wheat cultivation, the farmers were classified into three categories as 'low adoption' ($\leq$ 38), 'medium adoption' (39-64) and 'high adoption' (> 64). The distribution of the respondents according to their adoption of wheat cultivation has been presented in Table 4.11.

**Table 4.11 Distribution of the farmers according to their adoption of wheat cultivation**

| Categories (Scores) | Respondents | | Mean | Standard deviation |
|---|---|---|---|---|
| | Number | Percent | | |
| Low adoption ($\leq$ 38) | 51 | 40.48 | | |
| Medium adoption (39-64) | 44 | 34.92 | 45.89 | 22.00 |
| High adoption (> 64) | 31 | 24.60 | | |
| Total | 126 | 100 | | |

Findings shown in table 4.11 revealed that the highest proportion (40.48 percent) of the respondents had low adoption of wheat cultivation, while 34.92 percent had medium adoption and the rest 24.60 percent had high adoption of wheat cultivation. Table 4.11 showed that majority (75.40 percent) of the farmers had low to medium adoption of wheat cultivation. So, it is revealed that among the farmers of the study area the adoption scenario is moderate. Farmers always want to ensure their food security first then the return from their cultivation. In that case rice is first choice as it is their staple food. Few years ago some high yielding varieties of rice became famous for their yield as well their return. But with the time passing the cost of production of rice is increasing which lead the famers of the study area switch to adopt wheat cultivation.

Wheat cultivation cost is lower than rice cultivation in respect of labour, irrigation and fertilizers. So, from this study it was found that the area coverage was gradually increasing with wheat cultivation.

## 4.3 Relationship of adoption of wheat cultivation with selected characteristics of the wheat farmers

Pearson's Product Moment Correlation Co-efficient (r) was computed in order to find out the extent of relationship between adoption of wheat cultivation and selected characteristics of the wheat farmers. To reject or accept the null hypothesis at 0.05 and 0.01 level of probability was used. Results of correlation have been shown in Table 4.12. Correlation co-efficient among all the variables might be seen in the correlation matrix in appendix-B.

**Table 4.12 Pearson's product moment co-efficient of correlation showing relationships between adoption of wheat cultivation and the selected characteristics of the farmers**

<div align="right">

**N = 126**

</div>

| Dependent variable | Independent variables | Value of co-efficient of correlation (r) | Tabulated value at 124 df | |
|---|---|---|---|---|
| | | | 0.05 level | 0.01 level |
| Adoption of wheat cultivation | Age | 0.043$^{NS}$ | 0.174 | 0.228 |
| | Education | 0.205* | | |
| | Farm size | 0.127$^{NS}$ | | |
| | Annual family income | 0.134$^{NS}$ | | |
| | Input cost | -0.118$^{NS}$ | | |
| | Extension media contact | 0.298** | | |
| | Cosmopoliteness | 0.218* | | |
| | Knowledge about wheat cultivation | 0.254** | | |
| | Attitude towards wheat cultivation | 0.381** | | |
| | Innovativeness | 0.244** | | |

** Significant at the 0.01 level
 * Significant at the 0.05 level
$^{NS}$ Not significant

## 4.3.1 Relationship between adoption of wheat cultivation and their age

Relationship between age and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between age and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.043. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

❖ The relationship showed a positive trend between the concerned variables.

❖ The observed value of "r" (0.043) between the concerned variables was found to be smaller than the tabulated value (r = 0.174) with 124 degrees of freedom at 0.05 level of probability.

❖ The null hypothesis could not be rejected.

❖ The relationship between the concerned variables was statistically non significant at 0.05 level of probability.

Based on the above findings, it was concluded that age of the famers had no significant positive relationships with the adoption of wheat cultivation. That is young, middle aged or old famers of Kazipur Upazila had no distinction in respect of adoption of wheat cultivation.

**4.3.2 Relationship between adoption of wheat cultivation and their education**

Relationship between education and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between education and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.205. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

❖ The relationship showed a positive trend between the concerned variables.

❖ The observed value of "r" (0.205) between the concerned variables was found to be greater than the tabulated value (r = 0.172) with 124 degrees of freedom at 0.05 level of probability.

❖ The null hypothesis was rejected.

❖ The relationship between the concerned variables was statistically significant at 0.05 level of probability.

Based on the above findings, it was concluded that education of the famers had significant positive relationship with the adoption of wheat cultivation. It means that higher is the education, higher is the adoption. The respondent farmers of Kazipur Upazila had meaningful education (72.8%) ranged from primary to above higher secondary. They could understand the benefits of wheat cultivation in respects of its food value; protein, vitamin and minerals. So, reasonably education had significant relationship with adoption of wheat cultivation.

### 4.3.3 Relationship between adoption of wheat cultivation and their farm size

Relationship between farm size and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between farm size and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.127. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

❖ The relationship showed a positive trend between the concerned variables.

❖ The observed value of "r" (0.127) between the concerned variables was found to be smaller than the tabulated value (r = 0.174) with 124 degrees of freedom at 0.05 level of probability.

❖ The null hypothesis could not be rejected.

❖ The relationship between the concerned variables was statistically non significant at 0.05 level of probability.

Based on the above findings, it was concluded that farm size of the famers had no significant relationships with the adoption of wheat cultivation. In Bangladesh context there are a number of stratifications among farmers. Although farmers were varied in respect of land possession but they showed almost similar response about the adoption of wheat cultivation. Because they all wanted to reap same benefits out of wheat cultivation.

### 4.3.4 Relationship between adoption of wheat cultivation and their annual family income

Relationship between annual family income and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between annual family income and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.134. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of "r" (0.134) between the concerned variables was found to be smaller than the tabulated value (r = 0.174) with 124 degrees of freedom at 0.05 level of probability.
- ❖ The null hypothesis could not be rejected.
- ❖ The relationship between the concerned variables was statistically non significant at 0.05 level of probability.

Based on the above findings, it was concluded that annual family income of the famers had no significant relationships with the adoption of wheat cultivation.

### 4.3.5  Relationship between adoption of wheat cultivation and their input cost

Relationship between input cost and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between input cost and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be -0.118. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

- ❖ The relationship showed a negative trend between the concerned variables.
- ❖ The observed value of "r" (-0.118) between the concerned variables was found to be smaller than the tabulated value (r = 0.174) with 124 degrees of freedom at 0.05 level of probability.
- ❖ The null hypothesis could not be rejected.
- ❖ The relationship between the concerned variables was statistically non significant at 0.05 level of probability.

Based on the above findings, it was concluded that input cost had negative but insignificant relationships with the adoption of wheat cultivation.

### 4.3.6  Relationship between adoption of wheat cultivation and their extension media contact

Relationship between extension media contact and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between extension media contact and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.298.

The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

- ❖ The relationship showed a positive trend between the concerned variables.
- ❖ The observed value of "r" (0.298) between the concerned variables was found to be greater than the tabulated value (r = 0.228) with 124 degrees of freedom at 0.01 level of probability.
- ❖ The null hypothesis was rejected.
- ❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that extension media contact of the famers had highly significant positive relationships with the adoption of wheat cultivation. That is if the extension media contact is higher, the adoption of wheat cultivation would be also higher. The finding is quite logical because extension contact makes the farmers innovative and strengthens their basic knowledge. So, high media contact farmers are supposed to be highly eager to adopt wheat cultivation.

### 4.3.7 Relationship between adoption of wheat cultivation and their cosmopoliteness

Relationship between cosmopoliteness and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between cosmopoliteness and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.218. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

❖ The relationship showed a positive trend between the concerned variables.

❖ The observed value of "r" (0.218) between the concerned variables was found to be smaller than the tabulated value (r = 0.174) with 124 degrees of freedom at 0.05 level of probability.

❖ The null hypothesis was rejected.

❖ The relationship between the concerned variables was statistically significant at 0.05 level of probability.

Based on the above findings, it was concluded that cosmopoliteness of the famers had significant positive relationships with the adoption of wheat cultivation. Therefore, it could be said that higher is the cosmopoliteness, higher is the adoption of wheat cultivation. Cosmopoliteness makes the farmers dynamic, innovative and conscious about agricultural aspects. Because he learns many things through visit different areas and people. So, it helps the famers to adopt wheat cultivation.

### 4.3.8 Relationships between adoption of wheat cultivation and their knowledge about wheat cultivation

Relationship between knowledge about wheat cultivation and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between knowledge about wheat cultivation and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.254. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

❖ The relationship showed a positive trend between the concerned variables.

❖ The observed value of "r" (0.254) between the concerned variables was found to be greater than the tabulated value (r = 0.228) with 124 degrees of freedom at 0.01 level of probability.

❖ The null hypothesis was rejected.

❖ The relationship between the concerned variables was statistically highly significant at 0.01 level of probability.

Based on the above findings, it was concluded that knowledge about wheat cultivation had highly significant positive relationships with the adoption of wheat cultivation. So, it could be said that higher is the knowledge about wheat cultivation, higher is the adoption of wheat cultivation. Knowledge helps the farmers to take the right decision. It guides the farmers to take action for that which is best or profitable for them.

### 4.3.9 Relationships between adoption of wheat cultivation and their attitude towards wheat cultivation

Relationship between attitude towards wheat cultivation and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between attitude towards wheat cultivation and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.381. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

❖ The relationship showed a positive trend between the concerned variables.

❖ The observed value of "r" (0.381) between the concerned variables was found to be greater than the tabulated value (r = 0.228) with 124 degrees of freedom at 0.01 level of probability.

❖ The null hypothesis was rejected.

❖ The relationship between the concerned variables was statistically significant at 0.01 level of probability.

Based on the above findings, it was concluded that attitude towards wheat cultivation of the famers had highly significant positive relationships with the adoption of wheat cultivation by the wheat farmers. A positive attitude is the pre-condition to adopt an innovation. It could influence directly to adopt wheat cultivation. So, the more attitude towards wheat cultivation, the more adoption of wheat cultivation.

### 4.3.10 Relationships between adoption of wheat cultivation and their innovativeness

Relationship between innovativeness and adoption of wheat cultivation was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between innovativeness and adoption of wheat cultivation was presented in Table 4.12. The coefficient of correlation between the concerned variables was found to be 0.244. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

❖ The relationship showed a positive trend between the concerned variables.

❖ The observed value of "r" (0.244) between the concerned variables was found to be greater than the tabulated value (r = 0.228) with 124 degrees of freedom at 0.01 level of probability.

❖ The null hypothesis was rejected.

❖ The relationship between the concerned variables was statistically highly significant at 0.01 level of probability.

Based on the above findings, it was concluded that innovativeness had highly significant positive relationships with the adoption of wheat cultivation. Innovativeness is the trigger for adoption of new technologies. Therefore, it could be said that higher is the innovativeness, higher is the adoption of wheat cultivation. It seems that the farmers of the study area are moderate type of innovative.

# CHAPTER 5

# SUMMARY OF FINDINGS, CONCLUSIONS AND

# RECOMMENDATIONS

This chapter deals with the summary of findings, conclusions and recommendations of this study.

## 5.1 Summary of Findings

### 5.1.1 Characteristics of the farmers

**Age**

The middle aged wheat farmers comprised the highest proportion (47.62 percent) followed by young aged category (45.23 percent) and the lowest proportion were made by the old aged category (7.15 percent).

**Educational level**

Farmers under 'primary education category constituted the highest proportion (30.95 percent) compared to 21.43 percent can sign only category, 21.43 percent secondary level and 15.08 percent illiterate level category. On the other hand the lowest (11.11 percent) belonged to above secondary level category.

**Farm size**

The small land holder constituted the highest proportion (70.63 percent) of the farmers followed by 19.05 percent with marginal land holder and remaining 10.32 percent with medium land holder.

**Annual family income**

The farmers having low annual family income constitute the highest proportion (71.43 percent) followed by medium income (22.22 percent) and high annual family income (8.63 percent).

**Input cost**

The farmers having medium input cost constitute the highest proportion (53.18 percent) followed by high input cost (24.60 percent) and low input cost (22.22 percent).

**Extension media contact**

The farmers having low extension media contact category constituted the highest proportion (65.87 percent) followed by medium contact (28.57 percent) and high contact category (5.56 percent).

**Cosmopoliteness**

The highest proportion (65.08 percent) of the wheat farmers had medium cosmopoliteness as compared to 22.22 percent of low cosmopoliteness and 12.70 percent had high cosmopoliteness.

**Knowledge about wheat cultivation**

The highest proportion (50 percent) of the respondents had medium knowledge about wheat cultivation, while 18.25 percent and 31.75 percent of the respondents had high and low knowledge about wheat cultivation respectively.

**Attitude towards wheat cultivation**

The farmers having low attitude towards wheat cultivation constituted the highest proportion (41.27 percent) followed by medium attitude towards wheat cultivation (40.48 percent) and high attitude towards wheat cultivation (18.25 percent).

**Innovativeness**

The farmers having low innovativeness constitute the highest proportion (65.87 percent) followed by medium innovativeness (26.19 percent) and high innovativeness (7.94 percent).

### 5.1.2 Adoption of wheat cultivation

The highest proportion (40.48 percent) of the respondents had low adoption of wheat cultivation, while 34.92 percent had medium adoption and the rest 24.60 percent had high adoption of wheat cultivation.

### 5.1.3 Relationship between adoption of wheat cultivation and their selected characteristics

Education, extension media contact, cosmopoliteness, knowledge about wheat cultivation, attitude towards wheat cultivation and innovativeness had significant positive relationships with the adoption of wheat cultivation. Age, farm size and annual family income had non-significant positive relationships with the adoption of wheat cultivation. On the other hand, input cost had non-significant negative relationships with the adoption of wheat cultivation.

**5.2 Conclusions**

Conclusions drawn on the basis of the findings of this study and their logical interpretation in the light of the other relevant factors are furnished below:

1. In the study area farmers have been adopting wheat in various extents. There were 40.48% low adopters, 34.92% medium adopters and 24.60% high adopters. Therefore, it may be concluded that farmers of the study area all were adopters in variety of degrees.

2. Only 15.08 percent of the farmers were illiterate and the remainder could sign their names or school educated. This result has achieved because of different NGOs' activities and many educational institutes in the study area. There existed a positively significant relationship between farmers' education and their adoption of wheat cultivation. Therefore, it may be concluded that, high educated farmers adopted more wheat cultivation.

3. A great majority (94.44 percent) of the farmers had low to medium extension media contact, while there had a very strong positive significant relationship between extension media contact and adoption of wheat cultivation. Therefore, it may be concluded that, low extension media contact farmers adopted less wheat cultivation and with the increase of extension media contact of the farmers tends to increase their extent of adoption.

4. A major portion (87.30 percent) of the farmers had low to medium cosmopoliteness, while there had a positive significant relationship between cosmopoliteness and their adoption of wheat cultivation. Therefore, it may be concluded that, farmers having higher cosmopoliteness were adopted more wheat cultivation.

5. A great majority (81.75 percent) of the farmers had medium to high knowledge about wheat cultivation, while there had a very strong positive significant relationship between knowledge about wheat cultivation of the farmers and their adoption of wheat cultivation. Therefore, it may be concluded that, farmers had higher knowledge about wheat cultivation were adopted more wheat cultivation in the study area.

6. The majority (81.75 percent) of the farmers had low to medium attitude towards wheat cultivation, while there had a very strong positive significant relationship between attitude towards wheat cultivation and their adoption of wheat cultivation. Therefore, it may be concluded that, with the increase in attitude towards wheat cultivation of the farmers tends to increase their rate of adoption.

7. A great majority (92.06 percent) of the farmers had low to medium innovativeness, and there was a positive significant relationship between farmers' innovativeness and their adoption of wheat cultivation. Therefore, it may be concluded that, with the increase in innovativeness of the farmers tends to increase their extent of adoption.

## 5.3 Recommendations for policy implications

Recommendations based on the findings and conclusions of the study are presented below:

1. A majority (75.40 percent) of the farmers had low to medium adoption of wheat cultivation. All the sample farmers were more or less involved in wheat cultivation. But their extent of adoption was not satisfactory. Therefore, it may be recommended that necessary steps should be taken to increase the adoption of wheat cultivation in the study area.

2. Education of the farmers had significant positive relationship with their adoption of wheat cultivation. Therefore, it may be recommended that, adult education should be provided to the farmers so that they could increase their educational level which might be helpful to increase their adoption of wheat cultivation.

3. Extension media contact and attitude towards wheat cultivation of the farmers had significant positive relationships with their adoption of wheat cultivation. Therefore, it may be recommended that, extension service providers as well as other parties should increase their contact with farmers so that their attitude towards wheat cultivation and knowledge about wheat cultivation of farmers could increase. Because attitude towards wheat cultivation and knowledge about wheat cultivation are pre-conditions for adoption of wheat cultivation. So, government should take necessary steps to improve the above characteristics of the farmers.

4. Knowledge on wheat cultivation had significant positive relationship with their adoption of wheat cultivation. Therefore, it may be recommended that, there should be conducted more extension works for educating and training the farmers which will be supportive to adoption of wheat cultivation.

5. Innovativeness had significant positive relationship with their adoption of wheat cultivation. Therefore, it may be recommended that, DAE and different NGOs should conduct more training programs that would make the farmers more skilled to adopt various new convenient technologies on wheat cultivation.

**5.3.1 Recommendation for further study**

This study investigated adoption of wheat cultivation by the farmers of Kazipur Upazila under Sirajganj district. As a small and limited research has been conducted in the present study cannot provide much information related to this aspect. Further studies should be undertaken to cover more information in the relevant matters. So the following suggestions were put forward for further research:

1. It is difficult to determine the extent of adoption by the farmers on wheat cultivation. Measurement of adoption of the farmers is not free from questions. More reliable measurement of concerned variables is necessary for further study.

2. The present study was conducted only in six villages of Kazipur Upazila under Sirajganj district. Findings of the study need further verification through similar research in other parts of the country.

3. The study investigated the relationship of eleven characteristics of the wheat farmers with their adoption of wheat cultivation. So it is recommended that further study would be conducted with other dependent and independent variables.

4. Research should be undertaken on the effectiveness of agricultural extension services and other related organizations in helping farmers for adoption of innovations.

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http://en.wikipedia.org/wiki/Wheat

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**APPENDIX-A**

ENGLISH VERSION OF THE INTERVIEW SCHEDULE

DEPARTMENT OF AGRICULTURAL EXTENSION AND INFORMATION
SYSTEM
SHER-e-BANGLA AGRICULTURAL UNIVERSITY
DHAKA-1207

AN INTERVIEW SCHEDULE
ON
ADOPTION OF WHEAT CULTIVATION BY THE FARMERS OF SELECTED
VILLAGES UNDER KAZIPUR UPAZILLA IN SIRAJGANJ DISTRICT

Sl. No.            : …………………

Name of the respondent   : …………………………………………………….
Father's name           : …………………………………………………….
Village                : …………………………………………………….
Union                 : …………………………………………………….
Upazila               : …………………………………………………….
District               : …………………………………………………….

Please answer the following questions.

**1. Age**

How old are you?..........................................years

**2. Education**

Please mention your educational background.

a) Can not read and write (……………………..)

b) Can sign only (……………………………)

c) I studied up to class (…………………….)

### 3. Farm size

Please indicate the area about your farm size.

| Land Description | Local Unit | Hectare |
|---|---|---|
| Homestead | | |
| Own land under own cultivation | | |
| Land given to others on borga | | |
| Land taken from others on borga | | |
| Land taken from others on lease | | |
| Land given to others on lease | | |
| **Total** | | |

### 4. Annual Family Income

Please mention your annual income from different sources.

| Source of income | Area | Production | Income | Total amount in (TK) |
|---|---|---|---|---|
| **A.** Agriculture | | | | |
| 1. Wheat | | | | |
| 2. Paddy | | | | |
| 3. Potato | | | | |
| 4. Maize | | | | |
| 5. Pulse crops | | | | |
| 6. Jute | | | | |
| 7. Oil crops | | | | |
| 8. Banana | | | | |
| 9. Vegetables | | | | |
| 10. Fruits | | | | |
| 11. Spices | | | | |
| 12. Sugarcane | | | | |
| **B.** Livestock | | | | |
| **C.** Poultry | | | | |
| **D.** Fisheries | | | | |
| **E.** Service | | | | |
| **F.** Business | | | | |
| **G.** Day labor | | | | |
| **H.** Others | | | | |
| **Grand Total** | | | | |

## 5. Input Cost

Please state the degree of cost involvement in wheat cultivation. (Give tick mark in the right place.)

| Sl. No. | Cost Item | Degree of cost involvement in wheat cultivation | | |
|---|---|---|---|---|
| | | Very high cost | High cost | Optimum cost |
| 01 | Seed/ Seedling | | | |
| 02 | Labor | | | |
| 03 | Fertilizer | | | |
| 04 | Intercultural operation | | | |
| 05 | Harvest | | | |
| 06 | Storing | | | |

## 6. Extension Media Contact

Please indicate the nature of your extension media contact. (Give tick mark in the right place.)

| Sl. No. | Name of the media | Frequently | Often | Occasionally | Rarely | Not at all |
|---|---|---|---|---|---|---|
| 01 | Contact with SAAO | >3 times/ month | 3 times/ month | 2 times/ month | 1 time/ month | 0 time/ month |
| 02 | Contact with AEO /AAO | >6 times/ year | 5-6 times/ year | 3-4 times/ year | 1-2 time/ year | 0 time/ year |
| 03 | Contact with UAO | >6 times/ year | 5-6 times/ year | 3-4 times/ year | 1-2 time/ year | 0 time/ year |
| 04 | Contact with local leaders | >3 times/ month | 3 times/ month | 2times/ month | 1 time/ month | 0 time/ month |
| 05 | Contact with neighbor | >3 times/ month | 3 times/ month | 2 times/month | 1 time/ month | 0 time/ month |
| 06 | Contact with NGO officer | >6 times/ year | 5-6 times/ year | 3-4 times/year | 1 time/ year | 0 time/ year |
| 07 | Conducted result demonstration | >3 times in life | 3 times in life | 2 times in life | 1 time in life | 0 time in life |
| 08 | Participation in agricultural training | >3 times in life | 3 times in life | 2 times in life | 1 time in life | 0 time in life |

| Sl. No. | | >3 times in life | 3 times in life | 2 times in life | 1 time in life | 0 time in life |
|---|---|---|---|---|---|---|
| 09 | Attend method demonstration meeting | >3 times in life | 3 times in life | 2 times in life | 1 time in life | 0 time in life |
| 10 | Attend agricultural group meeting | >3 times/ year | 3 times/ year | 2 times/year | 1 time/ year | 0 time/ year |
| 11 | Visit agricultural exhibition | >3 times/ year | 3 times/ year | 2 times/year | 1 time/ year | 0 time/ year |
| 12 | Watching TV Programme i.Mati-O-Manush, ii.Shamol bangla | >6 times/ month | 5-6 times/ month | 3-4 times/ month | 1-2 time/ month | 0 time/ month |
| 13 | Listening krishi radio programme | >6 times/ month | 5-6 times/ month | 3-4 times/ month | 1-2 time/ month | 0 time/ month |
| 14 | Read Krishi kotha, krishi magazine etc | >6 times/ month | 5-6 times/ month | 3-4 times/ month | 1-2 time/ month | 0 time/ month |

## 7. Cosmopoliteness

Please mention the frequencies of visits in the following places. (Please tick mark in right space)

| Sl. No. | Name of visit | Frequency of visit | | | | |
|---|---|---|---|---|---|---|
| | | Regularly | Often | Occasionally | Rarely | Not at all |
| 01 | Neighbor villages | >6 times/ month | 5-6 times/ month | 3-4 times/ month | 1-2 time/ month | 0 time/ month |
| 02 | Others union | >6 times/ month | 5-6 times/ month | 3-4 times/ month | 1-2 time/ month | 0 time/ month |
| 03 | Upazila sadar | >6 times/ year | 5-6 times/ year | 3-4times/ year | 1-2 time/ year | 0 time/ year |
| 04 | Other upazila sadar | >6 times/ year | 5-6 times/ year | 3-4times/ year | 1-2 time/ year | 0 time/ year |
| 05 | Own district town | >6times/ year | 5-6 times/ year | 3-4times/ year | 1-2 time/ year | 0 time/ year |
| 06 | Other district town | >3 times/ year | 3 times/ year | 2 times/ year | 1time/ year | 0 time/ year |
| 07 | Regional agril. research institute | >3 times/ year | 3 times/ year | 2 times/ year | 1time/ year | 0 time/ year |

| 08 | Attend cultural programme originated at union/ upazila | >3 times/ year | 3 times/ year | 2 times/ year | 1time/ year | 0 time/ year |
|---|---|---|---|---|---|---|
| 09 | Attend field days at own villages and other villages | >3 times/ year | 3 times/ year | 2 times/ year | 1time/ year | 0 time/ year |
| 10 | Attend result demonstration meetings at block levels | >3 times/ year | 3 times/ year | 2 times/ year | 1time/ year | 0 time/ year |

## 8. Knowledge about wheat cultivation
Please answer the following questions

| Sl. No. | Questions | Score | |
|---|---|---|---|
| | | Weighted | Obtained |
| 01 | Mention the name of two varieties of wheat. | | |
| 02 | Mention cultivation time of wheat. | | |
| 03 | Mention fertilizer dose for wheat cultivation. | | |
| 04 | Mention irrigation schedule. | | |
| 05 | Mention the name of two diseases of wheat. | | |
| 06 | Mention the name of two insects of wheat. | | |
| 07 | State two methods of controlling rat from wheat field. | | |
| 08 | Mention three intercultural operations. | | |
| 09 | Mention benefit of irrigation in wheat cultivation. | | |
| 10 | Mention usefulness of wheat. | | |
| 11 | Mention two major functions of urea on wheat cultivation. | | |
| 12 | Mention two major functions of TSP on wheat cultivation. | | |
| 13 | Mention two major functions of MP on wheat cultivation. | | |
| 14 | How much cowdung is required for wheat cultivation per bigha? | | |
| 15 | Name three insecticides available in your local market | | |
| 16 | What is IPM? | | |
| 17 | How would you use IPM in field? | | |
| 18 | Name two predator insect | | |
| 19 | What are the characteristics of good seed? | | |
| 20 | Name the good seed company. | | |
| **Total** | | | |

## 9. Attitude towards wheat cultivation

Please indicate your agreement with the following statement.

| Sl. No. | Statement | Extent of agreement / disagreement | | | | |
|---|---|---|---|---|---|---|
| | | Strongly agree | Agree | Undecided | Disagree | Strongly disagree |
| 01 (+) | Less disease infestation in wheat cultivation. | | | | | |
| 02 (-) | Wheat cultivation is complex | | | | | |
| 03 (+) | I support wheat production because it contains a lot of protein. | | | | | |
| 04 (-) | Wheat threshing is difficult | | | | | |
| 05 (+) | Less irrigation is required for wheat cultivation. | | | | | |
| 06 (-) | I do not like bread so I avoid wheat cultivation. | | | | | |
| 07 (+) | Wheat can be grown under less or zero tillage, so I want to cultivate wheat. | | | | | |
| 08 (-) | Rodents attack wheat field frequently. | | | | | |
| 09 (+) | IPM is better to control insects from field than insecticides. | | | | | |
| 10 (-) | Farmers need training before using improved farm implements. | | | | | |
| 11 (+) | Wheat is cultivated to mitigate food crisis caused by flood. | | | | | |
| 12 (-) | HYV seeds sometimes unavailable in the market. | | | | | |

## 10. Innovativeness

Please give your information about the use of following wheat production technologies

| Sl. No. | Name of technology | Start to use after hearing within | | | | | Do not use |
|---|---|---|---|---|---|---|---|
| | | 1st year | 2nd year | 3rd year | 4th year | 5th year | |
| 01. | Use of modern wheat varities (Gourov, Sourav, Shatapdi, Balaka, Sonalika ) | | | | | | |
| 02. | Time of seed sowing (last week of October to last week of November) | | | | | | |
| 03. | Seed rate 16 kg/bigha | | | | | | |
| 04. | Use of bio-fertilizers | | | | | | |
| 05. | Split application of urea | | | | | | |
| 06. | Poison trap for rodent control | | | | | | |
| 07. | Use of polythene, jute bags, gunny bags, air tight earthen pot for seed preservation | | | | | | |
| 08. | Use of IPM for controlling insects and diseases | | | | | | |

## 11. Adoption of wheat cultivation

Mention wheat cultivation area for the last 5 years

| Year | Suitable area for wheat cultivation (hectare) | Actual area used for wheat cultivation (hectare) |
|---|---|---|
| 2008 | | |
| 2009 | | |
| 2010 | | |
| 2011 | | |
| 2012 | | |

**Thanks for your participation.**

**Dated……………….**                                        **Signature of respondent**

# Appendix-B. Correlation Matrix

| Characters | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | $X_7$ | $X_8$ | $X_9$ | $X_{10}$ | Y |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $X_1$ | 1 | | | | | | | | | | |
| $X_2$ | 0.067 | 1 | | | | | | | | | |
| $X_3$ | 0.042 | 0.298** | 1 | | | | | | | | |
| $X_4$ | -0.117 | 0.264** | 0.157 | 1 | | | | | | | |
| $X_5$ | -0.224* | -0.113 | -0.321** | -0.004 | 1 | | | | | | |
| $X_6$ | -0.002 | 0.209* | 0.225* | 0.060 | -0.057 | 1 | | | | | |
| $X_7$ | -0.180* | 0.030 | -0.281** | -0.055 | 0.627** | -0.014 | 1 | | | | |
| $X_8$ | 0.136 | 0.180* | 0.113 | 0.128 | -0.035 | 0.137 | 0.163 | 1 | | | |
| $X_9$ | -.130 | 0.126 | 0.190* | 0.290** | -0.090 | 0.140 | -0.013 | 0.096 | 1 | | |
| $X_{10}$ | 0.160 | 0.173 | 0.189* | 0.066 | -0.069 | 0.238** | 0.000 | 0.128 | .142 | 1 | |
| Y | 0.043 | 0.205* | 0.127 | 0.134 | -0.118 | 0.298** | 0.218* | 0.254** | 0.381** | 0.244** | 1 |

$X_1$: Age

$X_2$: Education

$X_3$: Farm size

$X_4$: Annual family income

$X_5$: Input cost

$X_6$: Extension media contact

$X_7$: Cosmopoliteness

$X_8$: Knowledge about wheat cultivation

$X_9$: Attitude towards wheat cultivation

$X_{10:}$ Innovativeness

Y:   Adoption of wheat cultivation