ADOPTION OF SELECTED RICE VARIETIES AT FARM LEVEL

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CERTIFICATE

This is to certify that the thesis entitled **"Adoption of Selected Rice Varieties at Farm Level"** 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 bonafide research work carried out by **Aysha Khanam**, Registration No. **05-01563** 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.

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The Author

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ABSTRACT

The main purpose of the study was to determine and describe the extent of adoption of selected rice varieties. 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 selected rice varieties. The study was conducted at Dharmikpara and Sharifpara villages of Matuail union of Demra Thana under Dhaka District. Data were collected from 104 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 05 October to 15 November, 2012. The findings revealed that highest 50 percent of the respondents had high adoption of selected rice varieties, while 30.77 percent had medium adoption and rest 19.23 percent had low adoption of selected rice varieties. Pearson's Product Moment Correlation co-efficient (r) was computed to explore the relationships between the selected characteristics and their adoption of selected rice varieties. The correlation analysis indicated that level of education, organizational participation, innovativeness and rice cultivation knowledge had significant positive relationships with the adoption of selected rice varieties. Family size, farm size, annual family income and input availability had non-significant positive relationships with the adoption of selected rice varieties. On the other hand, age had non-significant negative relationship with the adoption of selected rice varieties at farm level.

CHAPTER 1

INTRODUCTION

1.1 General Background

Bangladesh is one of the most densely populated countries in the world with 149.77 million people living in a land area of 147,570 sq. km. Agriculture employs nearly 60% of its labor force and contributes one third of its gross national product (BBS, 2011). However, its agriculture suffers from various problems such as small, unviable and fragmented landholdings, frequent natural disasters, and limited technological progress and low productivity of resources. The principal crop and the staple food is rice, which occupies nearly 75% of its total cropped area in the country (BBS, 2011).

Rice production in Bangladesh remained nearly stagnant in 1950s at around 11 to 12 million MT (rough rice, or paddy). But the population growth rate accelerated from less than one percent per year to nearly three percent during the decade causing a concern for Bangladesh's ability to feed its growing population. The 1960s, however experienced a rapid growth of production due to increase in cropping intensity of rice, changes from direct seeding to transplanting method of cultivation, and introduction of modern agricultural inputs such chemical fertilizers and irrigation by power pumps, promoted by the government's "grow more food production programme" (Hossain, 1988). Rice production grew from 12.1 m MT in 1959-60 to 16.9 million MT in 1969-70; an increase of 40% over a decade, almost 50% of which came from expansion of cropped area. The potential of further growth of rice production through increase in cultivated land and rice cropping intensity however was almost fully exploited by the end of 1960s.

Although modern high-yielding varieties (HYV) of rice were adopted beginning in 1968, the rate of adoption remained low till 1975-76. The major sources of growth of food grain production in the 1970s were the expansion of area and the yield of wheat. The rapid diffusion of rice HYVs took place after mid-1980s with the liberalization of policies regarding the procurement and distribution of agricultural inputs, and reduction of import duties on agricultural equipment (Hossain and Akash, 1994). Rice area covered by modern varieties has now reached nearly 65% supported by an expansion of minor irrigation by tube-wells and pumps that now cover nearly 48% of the cropped area. Traditional varieties are grown only in the unfavorable ecosystems, the rainfed uplands *(Aus),* the deepwater areas (broadcast *Aman*) and the saline affected coastal areas. Rice production increased from 21.4 million MT in 1987-88 to nearly 34 million MT by 1999-2000, and the rice yield increased from 3.5 t/ha to 4.8 t/ha during this decade (DAE, 1999).

Table 1.1. Trends in rice yield for imply irrigated and rainfed districts, Bangladesh, 1967-08.

Ecosystem	Average yield (t/ha)				Growth rate (%/yr)		
	1966	1986	1997	2008	1966-86	1986-97	1997-08
Largely Irrigated	1.50	2.05	3.00	3.02	1.4	3.5	3.8
Rainfed	1.58	1.78	2.27	2.32	0.8	2.5	2.7

Source: Bangladesh Bureau of Statistics, 2009.

It can be seen from the table 1 that, the acceleration in the growth of rice yield since the late 1980s occurred both for the irrigated and the rainfed ecosystems. It may be noted that the expansion of cropped area (through increase in rice cropping intensity and replacement of land from non-rice crops), which was an

important source of production growth till mid 1980s, has dried up. In fact the area under rice started declining since the mid-1980s. The increase in domestic production is now entirely dependent on the growth in rice yield. Indeed Bangladesh must target a higher rate of growth in yield than the required increase in rice supplies to meet the demand, to release land for other crops whose demand has been growing faster than that of rice.

The adoption of HYV rice technology, which enabled Bangladesh to double the yield rate during 1969-70 to 1998-99, was not however an unmixed blessing (GOB: 1998). The increasing adoption of HYV technology led to displacement of land for non-rice crops like pulses, oilseeds and spices that resulted in the stagnation of their production. The adoption of a few profitable HYVs may have displaced many traditional varieties and contributed to an erosion of biodiversity. Again, increased cropping intensity including intensive rice mono-culture in the irrigated land, and use of improper and unbalanced doses of chemical fertilizers are reportedly depleting soil fertility causing a virtual threat to the long run sustainability of crop-based agricultural production system in Bangladesh.

On the other hand, Bangladesh needs to increase rice yield further to meet the growing demand emanating from population growth. The United Nations (UNO, 2007) project that even by 2020 the Bangladesh population will grow at 1.2% per year and will reach 173 million, 20% higher than the present number. Nearly 46% of the population will live in urban areas in 2020 compared to 27% now. Farmers will have to generate larger marketable surplus to feed the growing urban population. The demand will continue to increase due to the growth of population. The National Commission of Agriculture projected that to remain self-sufficient Bangladesh will need to produce 47 million MT of paddy (31.6 million MT of

rice) by year 2020, implying a required rate of growth of production at 1.7% per year. An earlier Agricultural Research Strategy document prepared by the Bangladesh Agricultural Research Council projected the required paddy production by 2020 at 52 million MT (34.7 million MT of rice), which would require a production growth of 2.2% per year. As mentioned earlier, Bangladesh will have to target the yield growth at a higher rate to release some land from rice cultivation for supporting crop diversification and meeting the growing demand for land for housing, industrialization and infrastructure development.

1.2 Statement of the Problem

The adoption of any agricultural technology depends on its dissemination among the potential farmers and this ultimately is measured by the level of adoption of those technologies. It is obvious that the development of Bangladesh is mostly depended on agricultural improvements which results through adoption of effective innovations. Among various technologies, BR-3, BRRI Dhan-28, BRRI Dhan-29, BRRI Dhan-36, BRRI Dhan-45, BRRI Dhan-50 and others are quite suitable for our sustainable agriculture.

To increase in rice production it is necessary to have a clear understanding of the present status of adoption of selected rice cultivation by the farmers. And it is also important to have an overview of facts, which contributed to adoption of selected rice varieties. An understanding of the relationship of farmers' adoption with their selected characteristics will be helpful to the decision makers and extension workers.

Considering the above facts in view, it is necessary to undertake a research study entitled "**Adoption of selected rice varieties at farm level**". The important purpose of the study was to have an understanding on the adoption of selected rice

production varieties by the farmers and about some selected factors contributing in the adoption of selected rice production varieties. In light of above discussion and the background information, the present study has been undertaken with the following research questions:

1. What were the farmers' characteristics that were related to adoption of selected rice varieties?
2. To what extent the farmers were adopted selected rice varieties at farm level?
3. Were there any relationships between the adoption of selected rice varieties by the farmers at farm level and their selected characteristics?

1.3 Specific Objectives of the Study

The following specific objectives were formulated for giving proper direction to the study:

1. To determine and describe the following selected characteristics of the farmers:
   (i) Age
   (ii) Level of education
   (iii) Family size
   (iv) Farm size
   (v) Annual family income
   (vi) Organizational participation
   (vii) Innovativeness
   (viii) Input availability
   (ix) Rice cultivation knowledge
2. To determine the extent of adoption of selected rice varieties at farm level.The selected varieties are BRRI dhan 28, BRRI dhan 29.
3. To explore the relationship between the selected characteristics of the farmers' and their extent of adoption of selected rice varieties at farm level.

1.4 Justification and Scope of the Study

In agricultural production drama the major actor is of course, the individual farmer. And it may well affect his decision with respect to how information is received, processed and used or not used. The statement reflected that any performance like adoption of a technology of a farmer is influenced by his different characteristics through other elements like social, physical and infrastructural environment. More than 90% of the population in Bangladesh consumes rice deriving 70% of daily calories and 54% protein requirement. Rice also plays an important role in providing valuable fodder and feed stuff to the cattle and poultry. Rice production in Bangladesh is a very old practice and hence farmers are well experienced in it. In order to have more rice production for the increased population, adoption of high yielding rice varieties and the modern cultivation practices are crucial. In this situation Bangladesh Rice research Institute (BRRI) has got the challenge to solve this food problem by developing modern rice varieties and its appropriate technologies. But many of the potential rice varieties were poorly adopted due to serious gap in the technology transfer process as a whole. Unless such gaps are identified and removed the adoption of these potential rice varieties would not be successful. In this respect, the researcher is eager to conduct a study in a sub-urban area of the outskirt of Dhaka city. In Matuail union of Demra thana the farmers are used to cultivate rice in their fields. To understand the present scenario of adoption of HYV varieties by these farmers the investigation is necessary. In addition, the national planners might consider the information to make an effective policy for speedy adoption and technological sustainability. By using farmers' adoption potentiality Bangladesh could have sustainable increase in rice production and ensures food security for her people.

1.5 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 mind while undertaking this study:

i. The responses furnished by the respondents were reliable. They expressed the truth about their convictions and awareness concerning adoption of selected rice varieties and their characteristics.
ii. The respondents selected for the study were capable to provide proper responses to the questions included in the instrument.
iii. 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.
iv. 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.
v. The environmental conditions of the farmers were deemed more or less similar throughout the study area.
vi. The adoption of selected rice varieties by the farmers was linearly related with their characteristics.

1.6 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 two villages namely Dharmikpara and Sharifpara of Demra Thana under Dhaka district.

2. There were many farmers in the study area, but only the farmers who were involved in rice cultivation were considered for this study.
3. Characteristics of the farmers were many and varied but only nine 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, adoption of the farmers was 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 her study report with relevant literature reviews.

1.7 Definition of Key Term

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

Adoption: Adoption is an implementation of a decision to continue 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).

Age: It refers to the time from the date of birth to the date of interview counted of respondent.

Annual family income: It refers to the gross income in taka gained annually from crop, livestock, fisheries and various sources (service, landed property, business etc.) by the farmer or his parents and other members of the respondent.

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).

Educational level: 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 farmer has passed from a formal educational institution.

Farmer: The person who was involved in farming activities is called farmer. They participated in different farm and community level activities like: crops, livestock, fisheries, other farming activities etc.

Family size: Family size of a youth family was defined as the number of individuals in his family including himself, his wife, children and other dependent members.

Farm size: A farm size of a respondent refers to the total land area on which he/she carried farming operations, the area being estimated in terms of full benefit to him.

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.

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.

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.

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

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.

Organizational Participation: Organizational participation of the respondent is measured in two dimension status of his participation and duration of participation in different organizations during the time of interviewing.

Rice Cultivation Knowledge: It is the extent of basic understanding of the farmers in different aspects of rice 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 rice cultivation.

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.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this study was to have an understanding of adoption of selected rice varieties at farm level and exploring the relationship with their selected characteristics. An effort was made to review the findings of past researches in this respect. Accordingly, the researcher made an exhaustive search of past studies that could be made available. Therefore, the findings of such studies related to the extent of adoption of selected rice varieties and other partially related studies have been discussed in this chapter.

This chapter is divided into following four major sections:

Section 1: Concept of adoption

Section 2: Past research findings related to extent of adoption of innovation

Section 3: Review of past studies on the relationship between selected characteristics of the farmers and adoption of selected rice varieties.

Section 4: The conceptual framework of the study.

2.1 Concept of adoption

The classic definition of the term "adoption" is found in Rogers with Shoemaker (1971): "Making full use of a new idea as the best course of action available". This definition is explicitly or implicitly used by virtually all adoption analysts. Rogers differentiates the adoption process from the diffusion process in that the diffusion process occurs within society, as a group process; whereas, the adoption process is pertains to an individual. Rogers defines "the adoption process as the mental process through which an individual passes from first hearing about an innovation to final adoption". Rogers breaks the adoption process down into five stages; (a) Awareness, (b) Interest, (c) Evaluation, (d) Trial, and (e) Adoption.

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. A figure of Rogers' innovation-decision process model is presented in Figure 2.1.

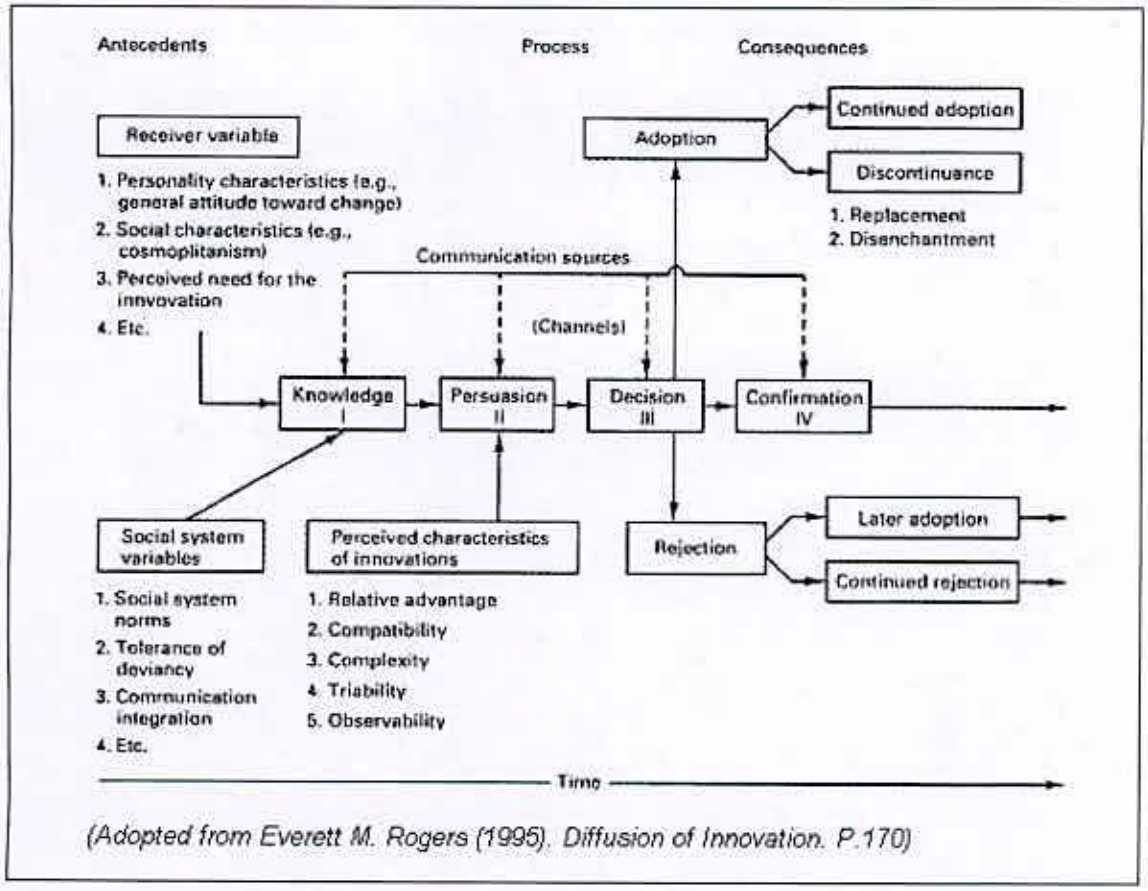


Figure 2.1 Rogers' innovation-decision process model

2.2 Past research findings related to extent of adoption of innovation

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 and (iv) recommended dose of fertilizer. It revealed that among the respondent

farmers, 57.40 percent adopted plant protection measure, 35.51 percent adopted recommended variety of paddy, 25.36 percent adopted line transplanting and 11.52 percent adopted recommended dose of fertilizers.

Karim (1973) carried out a study on the adoption of fertilizers by transplanting Aman growers in former Keyotkhali union of Mymensingh district. He investigated the adoption of three fertilizers- urea, triple super phosphate (TSP) and muriate of potash (MP). He expressed that 4 percent of the respondent growers had high level of adoption of the fertilizers, 9 percent had medium adoption and 41 percent had low adoption. Forty six percent (46) of the remaining respondent growers were non adopters.

Muhammad (1974) studied that 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 measures, 28 percent had high level of adoption, 32 percent had medium level of adoption and 25 percent had low level of adoption.

Rahman (1974) carried out a research study on the adoption of IR-20 variety of paddy in Bhabakhali union of Mymensingh district. The study revealed that 29 percent of the rice growers had medium adoption of IR-20 where 21 percent had low adoption and 19 percent had high adoption of IR-20. The 31 percent of the respondent growers were non-adopters.

Razzaque (1977) studied on the extent of adoption of HYV rice in the three villages of Agriculture University Extension Project area. He observed that among the respondent growers, 6.6 percent of the farmers had high adoption of HYV rice, 33.3 percent had medium adoption and 40 percent had low adoption.

Ahmed (1977) carried out the research study on the adoption of three specific practices of jute cultivation in Noapara union of Faridpur district. He found that among the respondent farmers, 98 percent adopted the recommended varieties of jute, 72 percent adopted plant protection measures and 49 percent adopted recommended dose fertilizers.

Hossain (1981) studied on the relationships of the farmers (Jute growers) with their adoption of improved practices of Jute cultivation. He found that more than half (54 percent) of the respondents had medium adoption of the improved practices compared to 31 percent having high adoption and 15 percent low adoption.

Hossian (1983) carried out the research study on the extent of adoption of HYV rice as transplanted Aman and other related aspects in Bhabakhali union of Mymensimgh district. He observed that among the respondent farmers, 54 percent had high adoption of HYV rice and 46 percent had medium adoption of HYV rive as transplanted Aman.

Haque (1984) investigated the research problem on the extent of adoption of improved practices in sugarcane cultivation in selected areas of Jessore district. He observed that 62.75 percent respondent growers adopted early time of planting, 60.75 percent of the respondent growers adopted recommended dose of fertilizers and 54.9 percent respondent growers adopted trench method.

Karim and Mahboob (1986) studied on the adoption of INV wheat in Kushtia union of Mymensingh district. They found that among the respondent wheat farmers 74 percent adopted HYV wheat cultivation and 26 percent farmers were non-adopters.

Rahman (1986) carried out a research study on the extent of adoption of four improved practices namely, 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 respondent farmers adopted all the four practices in combination against 49 percent adopted three practices, 22 percent adopted two practices, 5 percent adopted one practices and only 2 percent had no adopted of those practices.

Naika Rao (1989) found that more area was brought under plant protection chemicals after adoption of recommended plant protection chemicals. The area increased from 45.75 acres to 104.75 acres in adoption villages and from 8 acres to 11 acres in non-adoption villages.

Gogoi and Gogoi (1989) conducted a study on adoption of recommended plant protection practices in rice in Jorhat district of Assam state in India. The recommended practices were seed selection, seed treatment, growing of tolerant or resistant variety, prophylactic measures and chemical protection measures. The study revealed that among the respondent, 50 percent had low level of adoption, 36.36 percent had medium level of adoption and 13.64 percent had high level of adoption of recommended plant protection practices.

Juliana et al. (1991) undertook a study on adoption of integrated pest management practices in five village of vasudevanalhur block in Tirunelvi district, Tamilnadu, India. They found that about 50 percent of marginal farmers, 47.50 percent of small farmers, 52.50 percent of big farmers had medium adoption and 42.50 percent of big farmers, 22.50 percent of small farmers and 5 percent of marginal farmers had high level of adoption. In both cases, big farmers participation in was higher in comparison to other categories of respondent farmers.

Kashem et al. (1992) conducted a research study on adoption behaviour of sugarcane growers of Zilbangla Sugar Mill, Dewanganj, Jamalpur, Bangladesh. They found among the respondent growers, that 89 percent had high level of adoption of recommended practices of sugarcane.

Singh et al. (1992) undertook a research study in India on factors affecting the adoption of improved sugarcane production technology. They observed that majority of sugarcane growers had the medium level of adoption and were partial adoption of scientific recommendations of sugarcane production technology.

Kher (1992) conducted a study on adoption of improved wheat cultivation practices in selected villages of Rajouri block. He found 72 percent of the respondents had medium level of adoption, 17 percent had low level of adoption and 11 percent had high level of adoption.

Khan (1993) carried out a research study on adoption of insecticides and related issues in the village of Pachon union, Madaripur district. He observed that among the respondent thrillers, 7 percent had no adoption, 57 percent had low adoption, 32 percent had medium adoption and only 4 percent had high adoption of insecticides.

Nikhade el al. (1993) observed in their study on adoption of improved practices of soybean cultivation that cent percent adopted improved varieties. More than 82 percent had complete adoption of package practices like time by sowing, spacing and intercultural operations. Partial adoption was observed in majority of the soybean growers (74.6 percent) with regard to recommended seed rate.

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 30 percent high adoption in respect of selected agricultural technologies.

Islam (1996) carried out a study on farmers' use of indigenous technical knowledge (ITK) in the context of sustainable agricultural development. He found in the extent of use of ITK by individual farmers that the highest proportion (42.73 percent) of 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.

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 suberization of cut tuber hand picking of cutworm and rouging of diseased plant.

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.

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.

Swinkeles *et al.* (2002) studied assessing the adoption potential of hedgerow intercropping for improving soil fertility, in western Kenya. They conduct the average cost or 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 plaited 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.

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.

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.

2.3 Review of past studies on the relationship between the selected characteristics of the farmers and adoption of selected rice varieties

2.3.1 Age and adoption of selected rice varieties

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 (1992), Okoro *et al.* (1992) and Hossain *et al.* (1991)

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)

Sardar (2002) found that the age of the farmers had positive significant 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.

Talukder (2006) found that the age of the farmers had a significant positive relationship with their adoption of selected rice production practices.

Hossain (2006) found that the age of the farmers had a significant positive relationship with their adoption of selected high yielding varieties of rice.

2.3.2 Level of education and adoption of selected rice varieties

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

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).

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.

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

Hossain (2006) found that level of education of the farmers had a significant positive relationship with their adoption of selected high yielding varieties of rice.

2.3.3 Family size and adoption of selected rice varieties

Hossain (1999) found that family size of the farmers had positive significant relationship with the adoption of agro-chemical. Similar results were also observed by Pal (1995), Muttaleb (1998), Sarker (1997), Chowhdury (1997), Rahman (1986), Haque (1993) and Khan (1993).

Hossain (1991) in his study in sadar thana of Jamalpur observed that family size of the farmers had no significant effect on their adoption of improved farm practices. Similar results were observed by Sobhan (1975), Haque (1993), Bashar (1993).

Chowdhury (1997) conducted a research study on adoption of selected BINA technologies by the farmers of Boira union in Mymensingh district. He observed that family size of the farmers had positive and significant relationship with the adoption of selected BINA technologies.

Hossain (1999) conducted a study to determine the farmers' perception of the effects of agro-chemicals on environment. He found no relationship between the

farmer's family sizes with their adoption of fertilizer.

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

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

Talukder (2006) found that the family size of the farmers had no significant and negative relationship with their adoption of selected rice production practices.

2.3.4 Farm size and adoption of selected rice varieties

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.

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.

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.

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

2.3.5 Annual family income and adoption of selected rice varieties

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

Rahman (1995) found that a negative and substantially significant relationship between annual income of the farmers and their faced constraints in cotton cultivation.

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).

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

Hossain (2006) found that annual income of the farmers had significant and positive relationship with their adoption of selected high yielding varieties of rice.

2.3.6 Organizational participation and adoption of selected rice varieties

Hossain (1983) in his study found that organizational participation of transplanted aman growers had no relationship with their adoption of HYV rice.

Mostafa (1999) conducted a study on adoption of recommended mango cultivation practices by the mango growers of Nawabganj Sadar thana. He found that organizational participation of mango growers had a significant positive relationship with their adoption of recommended mango cultivation practices.

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

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

2.3.7 Innovativeness and adoption of selected rice varieties

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.

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.

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.

2.3.8 Input availability and adoption of selected rice varieties

The researcher could not find any literature involving relationship between training exposure and constraints faced by the farmers.

2.3.9 Rice cultivation knowledge and adoption of selected rice varieties

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.

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).

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

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

Hossain (2006) found that knowledge on HYV rice of the farmers had significant positive relationship with their adoption of selected high yielding varieties of rice.

2.4 Conceptual Framework of the study

In scientific research, selection and measurement of variables constitute an important task. The hypothesis of a research while constructed properly consist at least two important elements i.e., a dependent variable and an independent variable. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variables (Townsend, 1953). An independent variable is that factor which is manipulated by the researcher in her attempt to ascertain its relationship to an observed

phenomenon. Variables together are the causes and the phenomenon is effect and thus, there is cause effect relationship everywhere in the universe.

The conceptual framework of Rosenberg and Hovland (1960) was kept in mind while making structural arrangements for the dependent and independent variables of the study. This study is concerned with the adoption of selected rice varieties at farm level. Thus, adoption of selected rice varieties was the dependent variable and nine selected characteristics of the farmers were considered as the independent variables. Adoption of selected rice varieties of an individual may be affected through interacting forces of many independent variables. It is not possible to deal with all independent variables in a single study. It was therefore, necessary to limit the independent variables, which include: age, level of education, family size, farm size, annual family income, organizational participation, innovativeness, input availability and rice cultivation knowledge. Considering the above discussion, a conceptual framework has been developed for this study, which is diagrammatically presented in the following Figure 2.2.

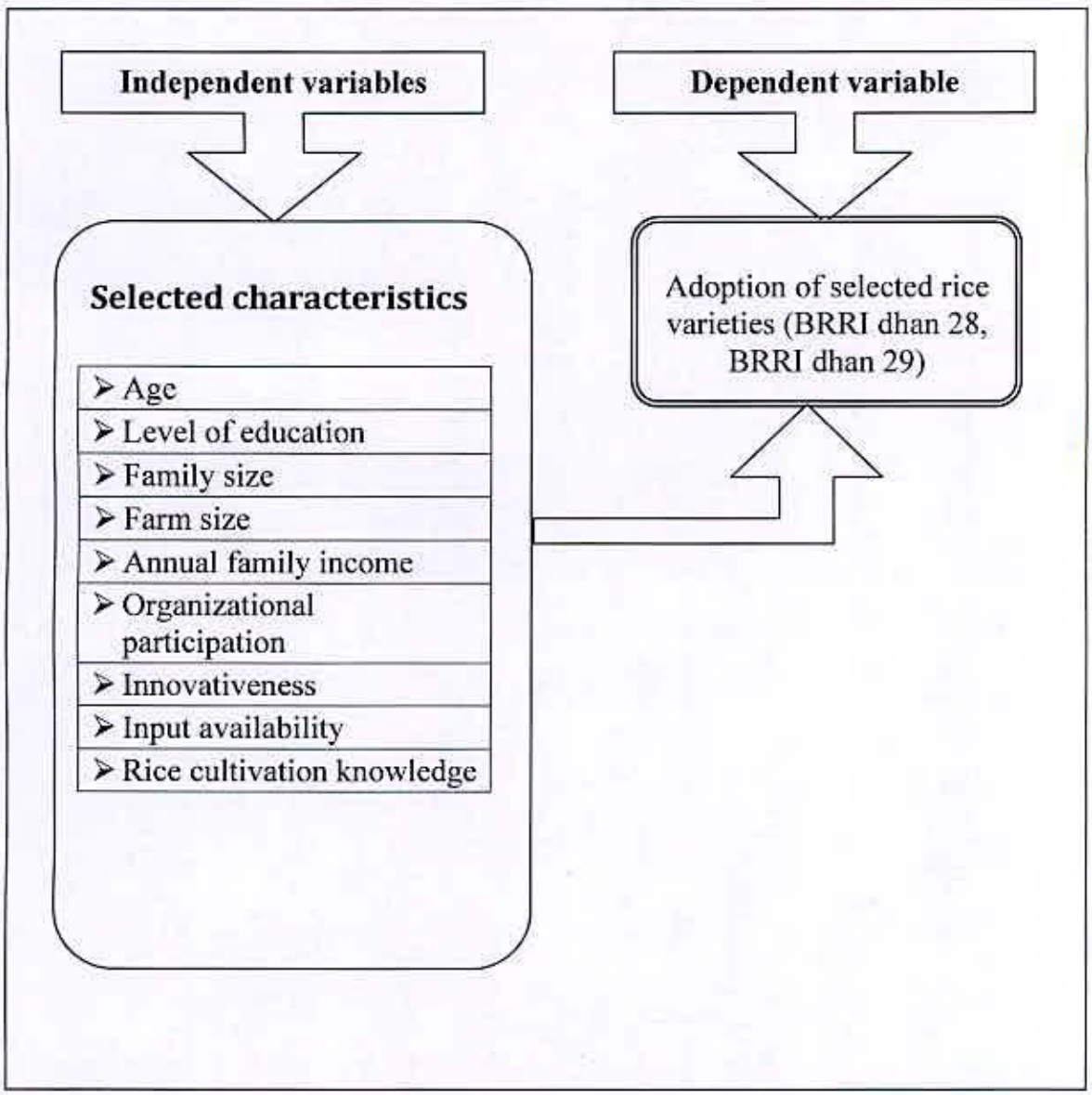


Fig. 2.2 Conceptual framework of the study

CHAPTER 3

METHODOLOGY

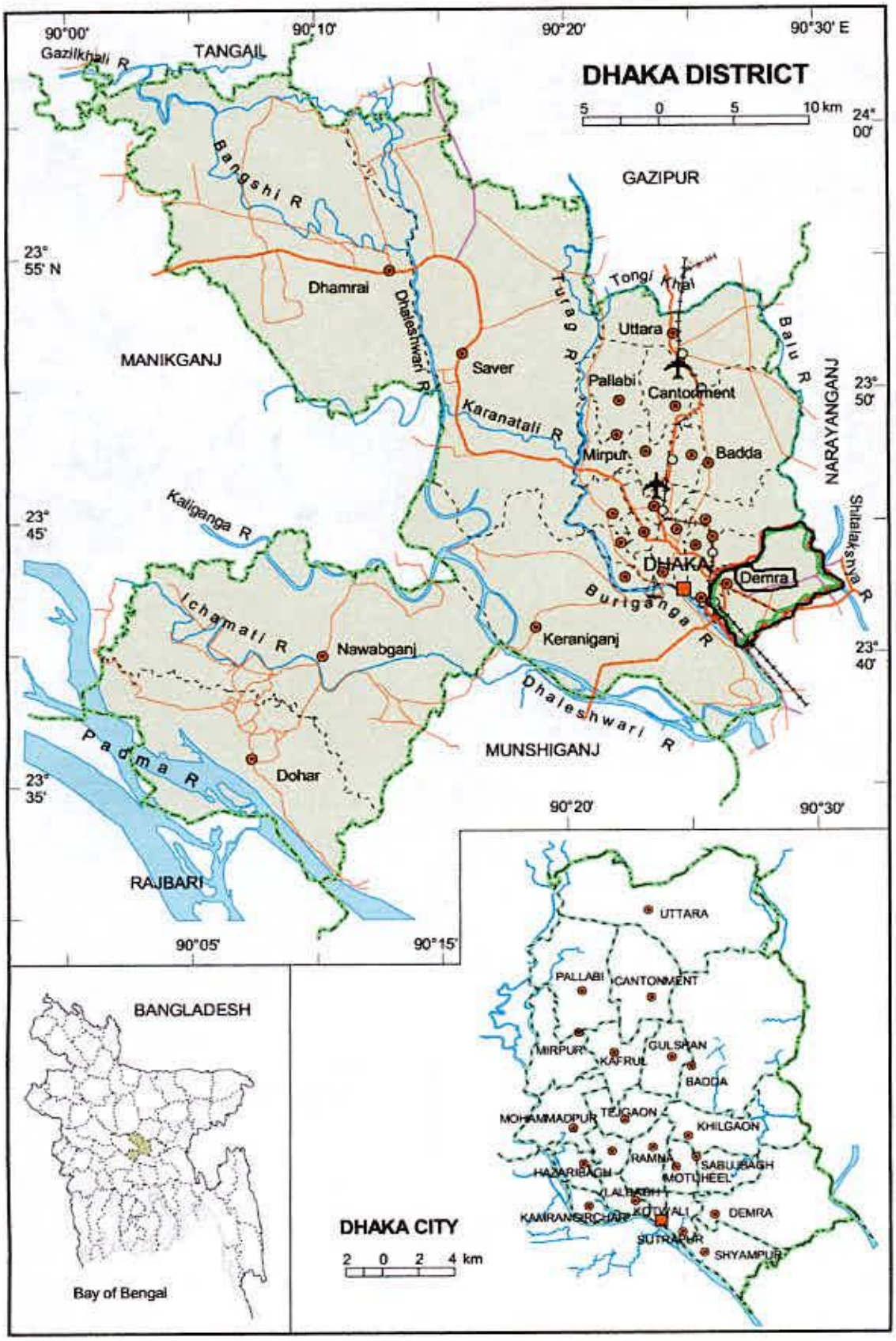
Importance of methodology for conducting any research can hardly be overemphasized. Keeping this point in view, the researcher took great care for the use of proper methods in all aspects of investigation. Methods and procedures followed in this study are discussed in this chapter.

3.1 Locale of the Study

Considering time and budget the study was conducted in two villages namely, Dharmikpara and Sharifpara of Matuail union of Demra thana under Dhaka district. These villages are situated at suburban area of the outskirt of Dhaka city. The farmers live in these villages are mostly used to cultivate rice in their fields. As the area is familiar for rice cultivation and no previous study was conducted in this area on farmers' adoption regarding rice cultivation, to bring the area in the light of nations' concern it was selected as the locale of the study. Maps of Dhaka District and Demra thana showing the study areas are presented in Figures 3.1 and 3.2 respectively.

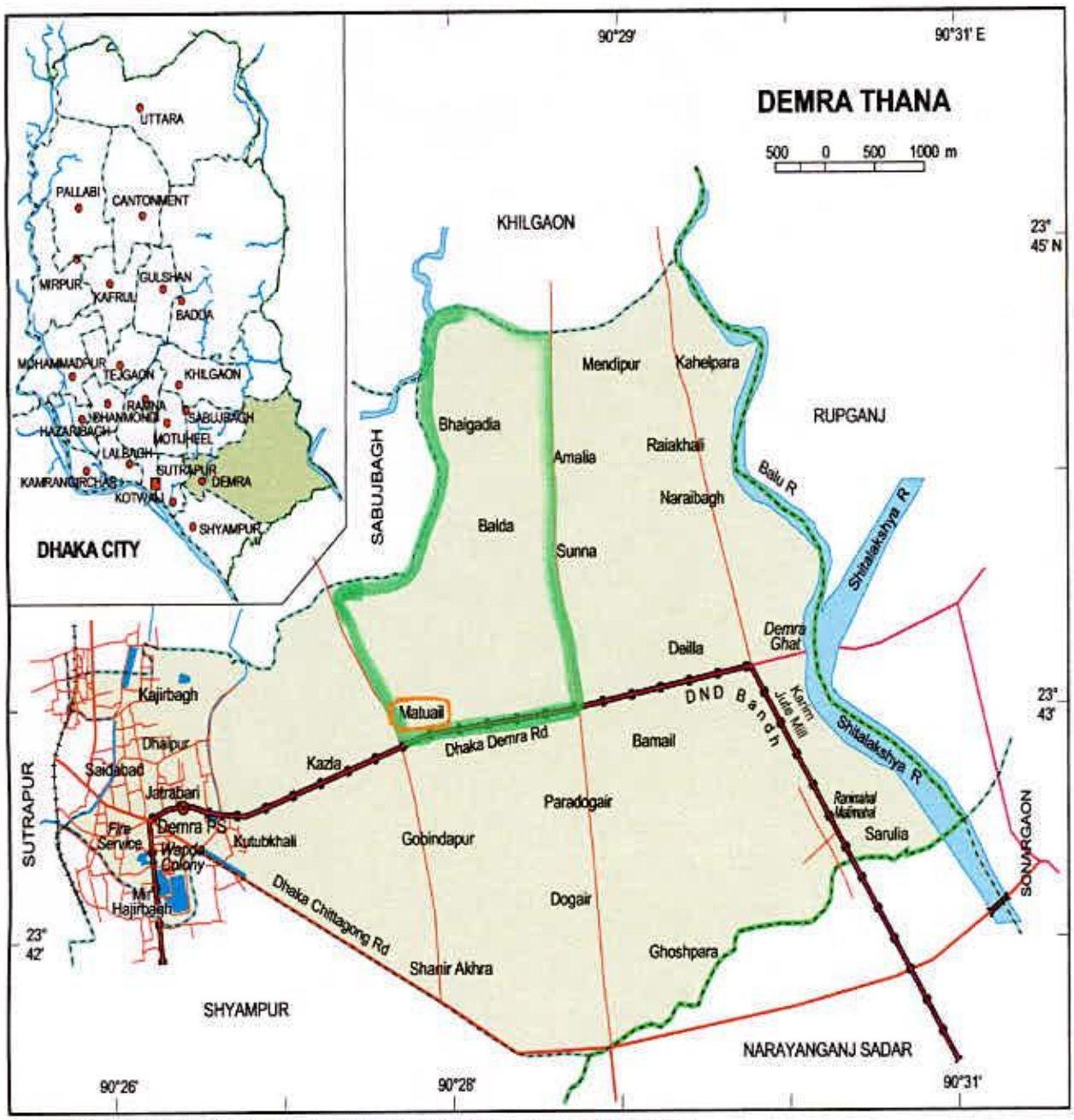
3.2 Population and Sample

Rice growers of Dharmikpara and Sharifpara of Matuail union constituted the population of the study. An update list of 414 rice cultivators from the selected villages was prepared with the help of Sub-Assistant Agricultural Officers of the study areas. Twenty five (25) percent of the populations were randomly selected as the sample of the study by using random sampling method. Thus, 104 rice farmers constituted the sample of the study. A reserve list of 10 rice farmers was also prepared by the same method so that the respondents of this list could be used



Source: http://zesun35geo.webs.com/DISTRICTS%20MAPS/Dhaka%20DISTRICT.GIF

Figure 3.1 Map of Dhaka District showing Demra Thana



Source: http://bangladesh-maps.blogspot.com/2012/03/demra-thana-map-map-of.html

Figure 3.2 Map of Demra thana Showing the Study Area Matuail Union

for interview if the respondents included in the original sample were not available at the time of data collection. The distribution of the population sample and number of rice farmers in the reserve list are given in Table 3.1.

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

Name of the of village	No. of Rice farmers	No. of Rice farmers included in the sample	No. of Rice farmers in the reserve list
Dharmikpara	211	53	5
Sharifpara	203	51	5
Total	414	104	10

3.3 The Research Instrument

A well structured interview schedule was developed based on objectives of the study for collecting information. An interview schedule was constructed containing direct and simple questions in open form and close form keeping in view the dependent and independent variables. Appropriate scales were developed to measure both independent and dependent variables.

The interview schedule was pre-tested with ten rice cultivators in actual situation before finalized it for collection of data. Necessary corrections, additions, alternations, rearrangements and adjustments were made in the interview schedule based on pretest experience. The interview schedule was then multiplied by printing in its final form. A copy of the interview schedule is presented into Appendix-A.

3.4 Measurement of Variables

The variable is any characteristic, which can assumed varying different values in successive individual cases (Ezekiel and Fox, 1969). A research work usually contains at least two important variables viz. independent and dependent

variables. An independent variable is that factor which is manipulated by the researcher in her attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953). In the scientific research, the selection and measurement of variable constitute a significant task. Following this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant to this research. At last the researcher had selected nine independent variables and one dependent variable. The dependent variable of this study was adoption of selected rice varieties.

3.4.1 Measurement of Independent Variables

The independent variables were: age, level of education, family size, farm size, annual family income, organizational participation, innovativeness, input availability and rice cultivation knowledge. The following procedures were followed for measuring the independent variables:

3.4.1.1 Age

Age of a respondent was measured in terms of actual years from his birth to the time of interview. A score of one (1) was assigned for each year of age. No fraction of year was considered.

3.4.1.2 Level of education

Education was measured in terms of grades of education (school/college) completed by an individual. It was expressed in terms of year of schooling. A score of one (1) was assigned for each year of successful schooling completed. For example, if a respondent passed the S.S.C examination, his education score was given as 10, if he passes the final examination of class five, his education

score was given as 5. If a respondent did not know how to read and write, his education score was given as '0' (zero). A score of 0.5 (half) was given to that respondent who could sign his name only.

3.4.1.3 Family size

Family size of a rice farmer's family was measured on the basis of total number of family members dependant on their and assigned score one for each member of the family. For example, if a respondent has 5 members in his family, then his/her family size score was 5.

3.4.1.4 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

3.4.1.5 Annual family income

The income of a farmer is an important indicator of how much he can invest in his rice cultivation. Annual income of a respondent was measured in taka on the basis

of total yearly earnings from rice 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 as shown in the item no. 5 of the interview schedule. The aspects are: agriculture, poultry rearing, domestic animal, fish, job, business and others. In calculating the annual 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.

3.4.1.6 Organization participation

Organizational participation score of a respondent was computed on the basis of his/her participation in different organizations as shown in item 6 of the interview schedule. This was multiplied by its duration i.e., number of years. The scores were assigned for participation of a respondent in an organization in the following manner:

Nature of participation	Scores assigned
Not participation	0
Ordinary member	1
Office bearers	2
President/Secretary	3

Then, organizational participation score of a respondent was computed by using the following formula:

Organization participation Score = $\sum P_{OM}$ (1× D) + $\sum P_{OB}$ (2× D) + $\sum P_{P/S}$ (3× D)

Where,

P_{OM} = Participation as ordinary member

P_{OB} = Participation as office bearers

$P_{P/S}$ = Participation as president/secretary

D = Duration of participation in year

$\sum$ = Summation

3.4.1.7 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 seven agricultural technologies by the respondents. A four 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**
Do not use	0
Used above 3 years after hearing	1
Used between 1-3 years after hearing	2
Used within 1 year after hearing	3

Thus, the innovativeness score of a respondent was obtained by adding his/her scores for all the seven items and it could range from '0' to 21 where '0' indicated no innovativeness and 21 indicated highest innovativeness.

3.4.1.8 Input availability

Input availability indicates how available the agricultural inputs in the locality

when they are required. Here, input availability score was measured on the basis of the availability of eight agricultural inputs. A four point scale was used to compute the input availability of a respondent. The score was assigned on the basis of extent of availability of the inputs. The scoring was done in the following manner:

Extent of availability	Assigned score
Not available	0
Available at times	1
Easily available	2
Always available	3

Thus, the input availability score of a respondent was obtained by adding his/her scores for all the eight items and it could range from '0' to 24 where '0' indicated no input availability and 24 indicated highest input availability.

3.4.1.9 Rice cultivation knowledge

Rice cultivation knowledge referred to the knowledge gained by the farmers in rice cultivation. Twenty questions on different aspects of rice cultivation were asked to the rice farmers to ascertain their knowledge score. The score was assigned as 2 for full correct answer and zero (0) for incorrect or no answer for each question. Partial score was assigned for partial correct answer. Thus, the knowledge scores of the respondents could range from '0' to 40 where zero (0) indicated very low and 40 indicated very high knowledge on rice cultivation.

3.4.2 Measurement of Dependent Variable

Adoption has been measured in a number of ways in India (Ray, 1991). The simplest amongst them are preparation of indexes. Bose and Saxena (1965) developed an adoption index by asking the farmers as how many improved

practices recommended by the extension service they had adopted and for how many years. The summation of the number of years and the selected varieties will make the index. A more rigorous and widely used method of measuring adoption by the formula of adoption quotient was developed by Chattapadhya (1963). According to him adoption quotient is the ratio scale designed to quantify the adoption behavior of an individual. The method of adoption quotient is more accurate as it involves all the related concepts like potentiality, extent, time consistency and weightage.

However, adoption score of the selected HYV rice cultivation practices in this study was computed by using the following formula:

$$\text{Adoption of selected rice varieties} = D \times \frac{\sum E_a}{P_a} \times 100$$

Where,

$\sum$ = Summation

E_a = Cultivated area used for a particular variety of rice

P_a = Cultivable area for rice cultivation

D = Duration of rice cultivation

As duration for adoption calculation was assumed maximum three years in the interview schedule, the score of adoption of a farmer could ranged from zero (0) to 300, where (0) indicated no adoption and 300 indicated highest adoption.

3.5 Hypothesis of the Study

The following null hypotheses were formulated in the present study:

"There are no relationships between the farmers' selected characteristics with their adoption of selected rice varieties".

3.6 Data Collection Procedure

Data were collected personally by the researcher herself with the help of an interview schedule from the sample respondents through face to face interview during the pre-scheduled leisure period of respondent at his/her house or field. Desired rapport was established with the respondents and the objectives were clearly explanted prior to interview so that they did not feel any hesitation at the time of interview. Whenever any respondent faced difficulty in understanding questions, more attention was taken to explain the same with a view to enable the farmers to answer properly. No serious problem was faced by the investigator during data collection but obtained co-operation from the respondents. Data collection was started in 05 October, 2012 and completed in 15 November, 2012.

3.7 Data processing

For data processing the following steps were followed:

3.7.1 Compilation and coding of data

The interview schedules were compiled, tabulated and analyzed according to the objectives of the study after completion of field survey. Qualitative data were converted into quantitative form by means of suitable scoring techniques for the purpose of analysis. Tabulation was done on the basis of categories developed by the investigator herself.

3.7.2 Categorization of respondents

For describing the various independent and dependent variables the respondents were classified into various categories. In developing categories the researcher was guided by the nature of data and general consideration prevailing on the social system. The procedures have been discussed while describing the variable in the sub-sequent sections of next chapter.

3.8 Statistical Analysis of Data

Various statistical measures such as frequency counts, percentage distribution, mean, and standard deviation were used in describing the variables of the study. SPSS (version 11.5) computer program was used for analyzing the data. The categories and tables were used in describing data. The categories and tables were also used in presenting data for better understanding. In order to explore the relationships of the selected characteristics of the rice farmers with their adoption of selected rice varieties, Pearson's Product Moment Correlation was used. Five percent (0.05) level of probability was used as the basis for rejecting any null hypothesis. If the computed value of co-efficient of correlation (r) was equal to or greater than the tabulated value at designated 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. Otherwise, the null hypothesis could not be rejected and hence there was no significant relationship between the concerned variables

CHAPTER 4

RESULTS AND DISCUSSION

The findings of the study and interpretation of the results have been presented in this Chapter. The first section deals with the selected characteristics of the farmers. The second section has dealt with their adoption of selected rice varieties. The last section has dealt with relationships between the selected characteristics of the farmers and the extent of adoption of selected rice varieties.

4.1 Characteristics of the Farmers

The findings relating to the selected characteristics of the farmers namely, age, level of education, family size, farm size, annual family income, organizational participation, innovativeness, input availability and rice cultivation knowledge are presented and discussed as follows:

4.1.1 Age

The age of the rice farmers ranged from 18 to 68 years with a mean and standard deviation of 35.11 and 11.41 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)	51	49.03	35.11	11.41
Middle aged (35-50 years)	43	41.35		
Old aged (above 50 years)	10	9.62		
Total	104	100		

Table 4.1 indicates that the young aged rice farmers comprise the highest proportion (49.03 percent) followed by middle aged category (4135 percent) and the lowest proportion were made by the old aged category (9.62 percent). Data also indicate that the young and middle aged rice farmers constitute about 90.38 percent of the respondents. Probably young and middle aged person were more dynamic and basically they were more involved in rice production.

4.1.2 Level of education

The level of education scores of the respondent farmers ranged from 0 to 16 score with a mean and standard deviation of 4.91 and 4.38 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 level of education

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Illiterate (0)	9	8.65	4.91	4.38
Can sign only (0.5)	27	25.96		
Primary education (1-5)	31	29.81		
Secondary education (6-10)	25	24.04		
Above secondary education (above 10)	12	11.54		
Total	104	100		

Table 4.2 shows that farmers under 'primary education category constitute the highest proportion (29.81 percent) compared to 25.96 percent can sign only category, 24.04 percent secondary level and 11.54 percent above secondary level category. On the other hand the lowest 8.65 percent belongs to illiterate category. As the study area is very near to Dhaka city and there are many schools and Colleges around the area, so the illiterate percent is low.

4.1.3 Family size

The family size of the respondents' ranged from 2 to 12 with a mean and standard deviation of 4.09 and 2.15 respectively. Based on their family size, the respondents were classified into three categories viz., small family size (below 5 nos.), medium family size (5 to 8 nos.) and large family size (above 8 nos.). The distribution of the farmers according to their family size has been presented in Table 4.3.

Table 4.3 Distribution of the farmers according to their family size

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Small family size (below 5)	71	68.27	4.09	2.15
Medium family size (5 to 8)	28	26.92		
Large family size (above 8)	5	4.81		
Total	104	100		

Table 4.3 indicates that the small family size constitutes the highest proportion (68.27 percent) of the farmers followed by 26.92 percent with medium family size and the lowest 4.81 percent large family size. The findings of the study reveal that majority (95.19 percent) of the farmers have small to medium family size. The result is due to strong campaign of family planning programs.

4.1.4 Farm size

The farm size of the rice farmers ranged from 0.01 hectare to 1.56 hectare with a mean and standard deviation of 0.49 and 0.40 respectively. Based on their farm size, the respondents were classified into three categories following the categorization of DAE (1999). These categories were small land holder ($\leq$ 1.0 ha), medium land holder (1.01 to 3.0 ha) and large land holder ($>$ 3.0 ha). The distribution of the farmers according to their farm size categories has been presented in Table 4.4.

Table 4.4 Distribution of the farmers according to their farm size

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Small (≤ 1.0 ha)	89	85.58	0.49	0.40
Medium (1.01-3.0 ha)	15	14.42		
Large (> 3.0 ha)	0	0		
Total	104	100		

Table 4.4 indicates that the small farm holder constitute the highest proportion (85.58 percent) of the respondent followed by 14.42 percent with medium land holder. The findings of the study reveal that cent percent of the farmers were small to medium land holder. As the study has conducted in suburban area near the Dhaka city farmers are low involved in crop cultivation because the land value is very high.

4.1.5 Annual family income

Annual family income of the respondents ranged from 48 to 409 thousand taka with a mean and standard deviation of 144.65 and 85.32 respectively. On the basis of their annual 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 4.5.

Table 4.5 Distribution of the farmers according to their annual family income

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Low income (< 100,000)	40	38.46	144.65	85.32
Medium income (100,000-200,000)	45	43.27		
High income (>200,000)	19	18.27		
Total	104	100		

Data in table 4.5 reveal that the farmers having medium income constitute the highest proportion (43.27 percent) followed by low annual income (38.46 percent)

and high annual income (18.27 percent). In the study area medium to high income group farmers were 61.54% which means that the farmers have other source of income than agriculture.

4.1.6 Organizational participation

Organizational participation of the respondents ranged from 0 to 12 with a mean and standard deviation of 0.92 and 1.88 respectively. On the basis of their organizational participation, the farmers were classified into four categories, viz. no participation, low participation, medium participation and high participation. The distribution of the farmers according to the organizational participation categories has been presented in Table 4.6.

Table 4.6 Distribution of the farmers according to their organizational participation

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
No participation (= 0)	67	64.43	0.92	1.88
Low participation (1-5)	34	32.69		
Medium participation (6-10)	2	1.92		
High participation (> 10)	1	0.96		
Total	104	100		

Data in table 4.6 reveal that the farmers having no organizational participation constitute the highest proportion (64.43 percent) followed by low organizational participation (32.69 percent) and medium organizational participation (1.92 percent). Only 0.96 percent of the farmers had high organizational participation. Table 4.7 showed overwhelming majorities (97.12 percent) of the farmers had no to low organizational participation.

4.1.7 Innovativeness

Innovativeness of the respondents ranged from 5 to 18 with a mean and standard deviation of 10.47 and 2.80 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 4.7.

Table 4.7 Distribution of the farmers according to their innovativeness

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Low innovativeness (< 9)	28	26.92	10.47	2.80
Medium innovativeness (9-14)	67	64.43		
High innovativeness (> 14)	9	8.65		
Total	104	100		

Data in table 4.7 revealed that the farmers having medium innovativeness constitute the highest proportion (64.43 percent) followed by low innovativeness (26.92 percent) and high innovativeness (8.65 percent). Table 4.7 showed overwhelming majorities (91.35 percent) of the farmers had low to medium innovativeness. It means that extension work has been doing well in the study area.

4.1.8 Input availability

The input availability score of the respondents farmers ranged from 5 to 22 against the possible range of zero '0' to 24 score with a mean and standard deviation of 12.26 and 4.18 respectively. Based on their input availability score, the respondents were classified into three categories. These categories were low availability, medium availability and high availability. The distribution of the respondents according to their input availability has been presented in Table 4.8.

Table 4.8 Distribution of the farmers according to their input availability

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low availability (≤ 8)	22	21.15	12.26	4.18
Medium availability (9-15)	62	59.62		
High availability (> 15)	20	19.23		
Total	104	100		

Table 4.8 indicates that the farmers having medium input availability category constituted the highest proportion (59.62 percent) followed by low availability (21.15 percent) and high availability category (19.23 percent). Table 4.8 showed that the majorities (80.77 percent) is the category of the farmers had low to medium input availability category.

4.1.9 Rice cultivation knowledge

Rice cultivation knowledge of the farmers ranged from 5 to 19 score with a mean and standard deviation of 12.68 and 3.83 respectively. Based on their cultivation knowledge score, the respondents were classified into three categories. These categories were low, medium and high rice cultivation knowledge. The distribution of the respondents according to their rice cultivation knowledge has been presented in Table 4.9.

Table 4.9 Distribution of the farmers according to their rice cultivation knowledge

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low knowledge (≤ 8)	20	19.23	12.68	3.83
Medium knowledge (9-14)	48	46.15		
High knowledge (≥15)	36	34.62		
Total	104	100		

Data in Table 4.9 indicates that 46.15 percent of the respondents were in medium knowledge group followed by 34.62 percent high knowledge group and the remaining 19.23 percent had low rice cultivation knowledge. Table 4.9 showed that the majorities (80.77 percent) is the category of the farmers had medium to high rice cultivation knowledge.

4.2 Adoption of selected rice varieties

Adoption of selected rice varieties of the farmers ranged from 20 to 300 against the possible score from zero (0) to 300 with a mean and standard deviation of 204.97 and 82.31 respectively. Based on their adoption score, the respondents were classified into three categories. These categories were low, medium and high adoption of selected rice varieties. The distribution of the respondents according to their adoption of selected rice varieties has been presented in Table 4.10.

Table 4.10 Distribution of the farmers according to their adoption of selected rice varieties

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low adoption (< 100)	20	19.23	204.97	82.31
Medium adoption (100-200)	32	30.77		
High adoption (>200)	52	50.00		
Total	104	100		

Data in Table 4.10 indicates that 50 percent of the respondents were in high adoption group and 30.77 percent of them had medium adoption of selected rice varieties while remaining 19.23 percent had low adoption of selected rice varieties. From the study it is revealed that majority (80.77 percent) of the rice farmers had medium to high adoption of selected rice varieties. Though, six different high yielding varieties of rice were included in the interview schedule to study the adoption of selected rice varieties. But, the researcher found that two specific rice varieties were adopted by most farmers of the study area. It may be the farmers are getting desired yield from these two varieties due to the local environmental suitability than the other varieties. So, it is concluded that farmers of the study area had adopted the selected rice varieties as appreciable portion.

4.3 Relationship between selected characteristics of the farmers with their adoption of selected rice varieties

This section deals with the relationship between the selected characteristics of the farmers and their adoption of selected rice varieties. Pearson's Product Moment Correlation Co-efficient (r) was computed in order to test the hypothesis concerning the relationships between two variables. Five percent (0.05) level of probability was used to reject or accept any null hypotheses. Results of correlation have been shown in Table 4.11. Correlation co-efficient among all the variables may be seen in the correlation matrix in Appendix-B.

Table 4.11 Pearson's product moment co-efficient of correlation showing relationship between adoption of selected rice varieties and their selected characteristics

N =104

Dependent variable	Independent variables	Computed value of (r)	Tabulated value at 102 degrees of freedom	
			0.05 level	0.01 level
Adoption of selected rice varieties	Age	-0.155^{NS}	0.194	0.254
	Level of education	0.369**		
	Family size	0.007^{NS}		
	Farm size	0.068^{NS}		
	Annual family income	0.042^{NS}		
	Organizational participation	0.397**		
	Innovativeness	0.471**		
	Input availability	0.162^{NS}		
	Rice cultivation knowledge	0.502**		

^{NS} Not significant

* Significant at the 0.05 level

** Significant at the 0.01 level

4.3.1 Relationships between age and adoption of selected rice varieties

Relationship between age and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between age and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found -0.155. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

- *Firstly, the relationship showed a negative trend between the concerned variables.*
- *The observed value of "r" (-0.155) between the concerned variables was found to be smaller than the tabulated value (r = 0.194) with 102 degrees of freedom at 0.05 level of probability.*
- *The null hypothesis could not be rejected.*
- *Hence, 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 non-significant negative relationships with the adoption of selected rice varieties. Usually, young farmers are more innovative than the older farmers.

4.3.2 Relationships between level of education and adoption of selected rice varieties

Relationship between level of education and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between level of education and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.369. 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" (0.369) between the concerned variables was found to be greater than the tabulated value (r = 0.254) with 102 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 level of education of the famers had significant positive relationships with the adoption of selected rice varieties. Similar findings were also observed by Hossain (2006), Hamid (1995) and Khan (1993). Education enables individuals to gain knowledge and thus increase their power of understanding. So, adoption of selected rice varieties may be higher by the farmers who were relatively more educated than others.

4.3.3 Relationships between family size and adoption of selected rice varieties

Relationship between family size and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between family size and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.007. 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" (0.007) between the concerned variables was found to be smaller than the tabulated value (r = 0.194) with 102 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 family size of the famers had non-significant positive relationship with the adoption of selected rice varieties and the strength of relationship between the variables was very low.

4.3.4 Relationships between farm size and adoption of selected rice varieties

Relationship between farm size and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between farm size and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.068. 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" (0.068) between the concerned variables was found to be smaller than the tabulated value (r = 0.194) with 102 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 non-significant positive relationship with the adoption of selected rice varieties.

4.3.5 Relationships between annual family income and adoption of selected rice varieties

Relationship between annual family income and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between annual family income and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.042. 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" (0.042) between the concerned variables was found to be smaller than the tabulated value (r = 0.194) with 102 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 non-significant positive relationships with the adoption of selected rice varieties.

4.3.6 Relationships between organizational participation and adoption of selected rice varieties

Relationship between organizational participation and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between organizational participation and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.397. 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" (0.397) between the concerned variables was found to be greater than the tabulated value (r = 0.256) with 102 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 organizational participation of the famers had significant positive relationship with the adoption of selected rice varieties. Farmers who had high organizational participation were more likely to be dynamic and had leadership power and consequently they were supposed to be more innovative.

4.3.7 Relationships between innovativeness and adoption of selected rice varieties

Relationship between innovativeness and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between innovativeness and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.471. 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" (0.471) between the concerned variables was found to be greater than the tabulated value (r = 0.256) with 102 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 innovativeness of the famers had significant positive relationship with the adoption of selected rice varieties. Innovativeness is the measurement of the extent of adoption. The farmer is more innovative, he adopts the innovation more quickly.

4.3.8 Relationships between input availability and adoption of selected rice varieties

Relationship between input availability and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between input availability and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.162. 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" (0.162) between the concerned variables was found to be smaller than the tabulated value (r = 0.194) with 102 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 availability of the famers had no significant positive relationship with the adoption of selected rice varieties. This represents that the more available of an input in the locality of the respondents, the adoption of that input is more. Because, farmers are not interested to use any input or new technology that is not available in the market.

4.3.9 Relationships between rice cultivation knowledge and adoption of selected rice varieties

Relationship between rice cultivation knowledge and adoption of selected rice varieties was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between rice cultivation knowledge and adoption of selected rice varieties is presented in table 4.11. The coefficient of correlation between the concerned variables was found 0.502. 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" (0.502) between the concerned variables was found to be greater than the tabulated value (r = 0.256) with 102 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 rice cultivation knowledge of the famers had significant positive relationship with the adoption of selected rice varieties. This represents that rice cultivation knowledge of the respondent farmers was an important factor in their adoption. With the increase in rice cultivation knowledge of the respondents, adoption of selected rice varieties were increased. Similar findings were also observed by Hossain (2006), Bashar (1993), Ali (1993) and Reddy, *et al.* (1987).

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

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

5.1 Summary of findings

The major findings of the study are summarized below:

5.1.1 Characteristics of the farmers

Age:

The young aged rice farmers comprise the highest proportion (49.03 percent) followed by middle aged category (4135 percent) and the lowest proportion were made by the old aged category (9.62 percent).

Level of education:

Farmers under 'primary education category constitute the highest proportion (29.81 percent) compared to 25.96 percent can sign only category, 24.04 percent secondary level and 11.54 percent above secondary level category. On the other hand the lowest 8.65 percent belongs to illiterate category.

Family size:

The small family size constitutes the highest proportion (68.27 percent) of the farmers followed by 26.92 percent with medium family size and the lowest 4.81 percent large family size.

Farm size:

The small farm holders constitute the highest proportion (85.58 percent) of the respondent followed by 14.42 percent with medium land holder. The findings of the study reveal that cent percent of the farmers were small to medium land holder.

Annual family income:

The farmers having medium income constitute the highest proportion (43.27 percent) followed by low annual income (38.46 percent) and high annual income (18.27 percent).

Organizational participation:

The farmers having no organizational participation constitute the highest proportion (64.43 percent) followed by low organizational participation (32.69 percent) and medium organizational participation (1.92 percent). Only 0.96 percent of the farmers had high organizational participation.

Innovativeness:

The farmers having medium innovativeness constitute the highest proportion (64.43 percent) followed by low innovativeness (26.92 percent) and high innovativeness (8.65 percent).

Input availability:

The farmers having medium input availability category constituted the highest proportion (59.62 percent) followed by low availability (21.15 percent) and high availability category (19.23 percent).

Rice cultivation knowledge:

The highest 46.15 percent of the respondents were in medium knowledge group followed by 34.62 percent high knowledge group and the remaining 19.23 percent had low rice cultivation knowledge.

5.1.2 Adoption of selected rice varieties

The highest proportion (50 percent) of the respondents were in high adoption group and 30.77 percent of them had medium adoption of selected rice varieties while remaining 19.23 percent had low adoption of selected rice varieties at the farm level.

5.1.3 Relationship between selected characteristics of the farmers with their adoption of selected rice varieties

Level of education, organizational participation, innovativeness, and rice cultivation knowledge had significant positive relationships with the adoption of selected rice varieties. Family size, farm size, annual family income and input availability had non-significant positive relationships with adoption of selected rice varieties. On the other hand, age had non-significant negative relationship with the adoption of selected rice varieties.

5.2 Conclusions

Findings of the study and the logical interpretations of their meaning in light of other relevant facts prompted the researcher to draw the following conclusions:

1. The adoption of selected rice varieties at farm level of the farmers was good, as nearly 88.77 percent of the farmers had medium to high adoption. Though, the farmers adopted particular two varieties among the six high yielding rice varieties included in this study. However, to gain the food self-sufficiency, there need to further enhance the rate and extent of adoption of selected rice

varieties among the farmers. So, the GOs and NGOs should provide more extension and other support services to the farmers.

2. There existed a positively significant relationship between farmers' educational level and their adoption of selected rice varieties. Education is a contributory factor of gaining knowledge and skill and creating positive attitude in an individual which support to adopt innovation. So, educational level should be increased of the farmers by providing adult education and other supportive training.

3. An over-whelming majority (97.12 percent) of the farmers had no to low organizational participation, and there was a strong positive significant relationship between farmers' organizational participation and their adoption of selected rice varieties. Therefore, it may be concluded that, with the increase in organizational participation of the farmers tends to increase their adoption of selected rice varieties.

4. 80.77 percent of the farmers possessed low to medium innovativeness, while there was a strong positive significant relationship between innovativeness of the farmers and their adoption of selected rice varieties. High innovative farmers are tended to more adoptive in selected rice varieties. Therefore, it may be concluded that, innovativeness is a most valuable factor for adoption and proper steps to increase the innovativeness will be helpful for the farmers to become adoptive.

5. Knowledge on rice cultivation of the farmers had significant positive relationship with their adoption of selected rice varieties. Having more knowledge an individual farmer becomes aware of the recent information on

the various aspects of rice cultivation. So, it can be concluded that, knowledge is an important factor to increase the adoption of selected rice varieties at farm level. Here, Farm size, income, input availability had non significant positive relationship with their adoption of selected rice varieties.

5.3 Recommendations for policy implications

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

1. An increased rate and extent of adoption of selected rice varieties are important for increasing the rice production. But one half of the famers had either low or medium adoption of selected rice varieties. It is, therefore, recommended that effective steps should be taken by the DAE, different NGOs and other extension providers for strengthening extension services in order to increase adoption behavior of the rice growers.

2. Though the literacy rate is higher than the national rate in the study area, but thirty six percent of the farmers were either illiterate or could sign only and thirty one percent of the farmers had completed merely primary education. Therefore, it may be recommended that, establishment of adult education centers, night school and other extension method might be helpful to increase adoption behavior of the rice growers.

3. Overwhelming majorities (97.12 percent) of the farmers had no to low organizational participation and had significant positive relationship with their adoption of selected rice varieties. Therefore, it may be recommended that, organizational participation should be increased by conducting different motivational programs and growing leadership attitude among them.

4. Innovativeness had significant positive relationship with their adoption of selected rice varieties. Therefore, it may be recommended that, DAE and relevant authorities should increase their motivational programs that would make the farmers more innovative to adopt various new convenient technologies in rice cultivation.

5. Rice cultivation knowledge had significant positive relationship with their adoption of selected rice varieties. Therefore, it may be recommended that, there should be conducted more extension works for educating and training the farmers which will be supportive to increase their knowledge as well as adoption behavior.

5.3.1 Recommendation for further study

As a small and limited research has been conducted in the present study cannot provide much information related to adoption of selected rice varieties. So the following suggestions were put forward for further research:

1. The present study was conducted only in two villages of Demra thana under Dhaka district. Findings of the study need further verification through similar research in other parts of the country.

2. The present study was concerned only with the extent of adoption of selected rice varieties. It is therefore, suggested that should be included attributes in relation to adoption stages and adopter categories.

3. The study investigated the relationship of nine characteristics of the rice growers with their adoption of selected rice varieties. So it is recommended that further study would be conducted with other characteristics of the rice growers.

4. An exhaustive study on problems faced by the farmers in cultivation of selected rice varieties should also be undertaken.

5. Research should be undertaken to indentify the factors causing hindrance to the high adoption of selected rice varieties at farm level.

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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 FOR COLLECTION OF DATA

ON

ADOPTION OF SELECTED RICE VARIETIES AT FARM LEVEL

SL. NO.....
Name of the respondent : .....
Father's name : .....
Village : .....
Union : .....
Upazilla : .....
District : .....

Please answer the following questions:

1. Age:

How old are you?---------- Years

2. Level of education :

Please indicate your educational qualification

a. Can't read and write ----------
b. Can sign only ----------
c. Studied up to ---------- class.

3. Family size

Please mention the total number of members of your family.

How many members are there in your family? .....persons.

4. Farm size

Please state your land mention local unit

Sl. No.	Type of land use	Land area	
		Local unit	Hectare
1.	Homestead area		
2.	Own land under own cultivation		
3.	Own land given to other's on borga		
4.	Land taken from other's on borga		
5.	Land taken from others' on lease		
6.	Own land given to other's on lease		
Total			

5. Annual family income

Describe your annual family income of last year.

Source of income	Amount of income (Taka)
a) From field crop	
b) From domestic animal	
c) From poultry	
d) From fish	
e)From job	
f)From business	
g) Others (write down specific)	
Total	

6. Organizational participation

Please give detail information about your organizational participation according to the following table.

Sl. No.	Name of the organization	Nature of participation				
		No participation	Ordinary member	Executive member	President/ Secretary	Duration
01	NGO co-operative					
02	Mosque/Mondir committee					
03	School committee					
04	Union parishad					
05	Farmers co-operative association					
06	Bazaar committee					

7. Innovativeness:

Please indicate the extent of use of the following modern agricultural practices.

Sl. No.	Name of innovation	Do not use	Application Period		
			Within 1 year after hearing	Between 1-3 years after hearing	Above 3 years after hearing
01.	Use of hybrid rice seed				
02.	Use of Compost				
03.	Use of Bio fertilizer				
04.	Use of Gypsum				
05.	Use of Gutee urea				
06.	Use of green manure in crop cultivation				
07.	Use of herbicide /weedicide				

8. Input availability

Give your opinion against each of the 8 facilities mentioned in the following table.

Name of inputs	Always available	Easily available	Available at times	Not available
1.Quality seed				
2.Fertilizer & insecticides				
3.Farm machineries				
4.Irrigation facility				
5.Technical assistance				
6.Information technology				
7.Market facility				
8.Credit facility				

9. Rice cultivation knowledge

Please answer the following questions.

Sl. No.	Questions	Assigned score (2)	Obtained marks
1	Name four high yielding varieties of rice.	2	
2	Mention two major insects of rice.	2	
3	What are the qualities of good rice seed?	2	
4	What type of soil is suitable for rice cultivation?	2	
5	Name two diseases of rice.	2	
6	Name two beneficial insects.	2	
7	Mention two harmful weeds of rice field.	2	
8	What precautions should need to follow at the time of pesticide application?	2	
9	How much cow dung is required for rice cultivation per bigha?	2	
10	What types of irrigation are needed in boro rice cultivation?	2	
11	Mention two major problems of rice cultivation.	2	
12	Mention the fertilizer doses in rice cultivation (Urea, TSP, MP).	2	
13	What is the control measure of rat in the field?	2	
14	What is the nitrogen deficiency symptom of rice	2	
15	What is the benefit of rice with fish cultivation?	2	
16	What is the benefit of intercropping?	2	
17	What is the cause of empty grain of rice?	2	
18	What is the harmful effect of chemical fertilizer?	2	
19	What should be done for rice seed storage	2	
20	How can use Azola in rice field?	2	

10. Adoption of selected rice varieties

Please give the following information about the selected rice varieties.

Sl. No.	Recommended variety	2010		2011		2012	
		Net useable land (ha)	Net used land(ha)	Net useable land (ha)	Net used land (ha)	Net useable land (ha)	Net used land (ha)
1.	BR3 (Biplob)						
2.	BRRI dhan28						
3.	BRRI dhan29						
4.	BRRI dhan36						
5.	BRRI dhan45						
6.	BRRI dhan50						

Thanks for your co-operation.

.....
Signature of the Interviewer

Dated.....

Appendix-B. Correlation Matrix

Characters	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	Y
X_1	1									
X_2	-.068	1								
X_3	-.010	-.102	1							
X_4	-.058	.031	-.137	1						
X_5	-.100	.131	.085	.102	1					
X_6	-.109	.250(*)	.059	.241*	.158	1				
X_7	-.021	.187	.224*	-.105	-.001	.203*	1			
X_8	.028	.049	-.062	.080	.050	.193*	.226*	1		
X_9	-.361**	.291**	.220*	.033	.039	.313**	.270**	.033	1	
Y	-0.155	0.369**	0.007	0.068	0.042	0.397**	0.471**	0.162	0.502**	1

X_1: Age
X_2: Level of education
X_3: Family size
X_4: Farm size
X_5: Annual family income
X_6: Organizational participation
X_7: Innovativeness
X_8: Input availability
X_9: Rice cultivation knowledge
Y: Adoption of selected rice varieties