ADOPTION OF SELECTED CONSERVATIVE AGRICULTURAL PRACTICES BY THE FARMERS

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CERTIFICATE

This is to certify that the thesis entitled **"Adoption of selected conservative agricultural practices by the farmers"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension**, embodies the result of a piece of bona fide research work carried out by **Goutam Chadro Roy**, Registration No. **13-05484** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated: December, 2018
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DEDICATED
TO
MY BELOVED
PARENTS

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The Author

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ADOPTION OF SELECTED CONSERVATIVE AGRICULTURAL PRACTICES BY THE FARMERS

Goutam Chadro Roy

Abstract

The main purpose of this study was to determine the extent of adoption of selected conservative agricultural practices by the farmers and to explore the relationship of the selected characteristics of the farmers with their adoption of selected conservative agricultural practices. The selected characteristics were age, level of education, working family size, effective land possession, cropping intensity, annual family income, marketing opportunity, cosmopoliteness, extension contact, training exposure, decision making ability, conservative agricultural knowledge, problems faced in conservative agriculture and attitude towards conservative agriculture. Data were gathered from 88 farmers of two unions Lebukhali and Pangashia unions of Dumki upazila under Patuakhali district by using personal interview schedule during the period from 6th October to 5th November, 2019. Sample Size Calculator developed by Creative Research System (1980) Formula was used and proportionate random technique was used to select the sample from each of the unions. Pearson's Product Moment Co-efficient of Correlation was used to examine the relationship of the selected characteristics of the farmers with their adoption of selected conservative agricultural practices. The findings revealed that 69.3 percent of the respondents had medium adoption , while 19.3 percent had high adoption and the rest 11.4 percent had low adoption of selected conservative agricultural practices. Correlation indicated that among the fourteen selected experimental variables, marketing opportunity, cosmopoliteness, extension contact, training exposure, decision making ability, conservative agricultural knowledge and attitude towards conservative agriculture had significant and positive relationship with their adoption of conservative agricultural practices where problems faced in conservative agriculture had shown significant negative relationship with adoption. The rest of the variables did not show any significant relationship with their adoption of conservative agricultural practices. Farmers faced higher problems in "lack of farm animal" followed by "uncertainty of pest control in case of severe attack".

Key words: Conservative agriculture, adoption, conservative agricultural practices

CHAPTER I

INTRODUCTION

1.1 General background

Agriculture is the heart of Bangladesh economy where more than 80% farmers are smallholder having land less than 1.0 hectare. The rural economy constitutes a significant component of the national GDP with agriculture (including crops, livestock, fisheries and forestry) accounting for 17.2% (BBS, 2014). In order to feed the increasing population of Bangladesh, priority was given to produce more food through intensification of land usage (Akteruzzaman *et al.*, 2012). Immediate objectives of more crop production have been achieved and crop production has increased by manifolds. For a shorter period, Bangladesh has attained self-sufficiency in food production but long term use of chemical fertilizer and pesticides in conjunction with monoculture of cereal crops without any organic fertilizer result in lack of organic matter content which causes a lot of problems to the soil health. As a result, soil fertility and productivity is decreasing day by day (Kafiluddin and Islam, 2008). In this context, introduction of conservation agriculture practice is becoming increasingly important in overcoming the problems of declining agricultural productivity in a developing country like Bangladesh.

Conservative agriculture practice is an approach to manage agro-ecosystems for improved and sustained productivity, increased profits and food security while preserving and enhancing the resource base and the environment. It can be defined as a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment. FAO (2007) has determined three key principles in the process of conservation agriculture practice which are: a) continuous minimum mechanical soil disturbance; b) permanent organic soil cover; and c) diversified crop rotations. Also, community based movement on conservation agriculture practice may contribute to livelihoods and empowerment of communities (Rahman, 2001). Although this farming aims to help farmers to earn more income with reduced amount of labour, irrigation and other high energy external input costs; keep land healthy and productive; and conserve natural environment (Lampkin and Padel, 1994); about 8-10% farmers around the world follow this practice (Parrott *et al.*, 2006; Willer *et al.*, 2008).

In economic sense, conservative agriculture practice performs better than conventional farming. Savings on inputs may help to bring benefits forward by decreasing the cost of crop production. Cover crops may reduce the cost of labor, fertilizer and fuel for subsequent crops. It is possible that using a leguminous cover crop in one crop season can decrease the need for nitrogen fertilizer for the subsequent crop, cutting fertilizer costs over the span of just one season. Cover crops also have a positive effect on crop yield. Biculture (grass and legume) cover crops can increase crop yields by an average of 21% (Miguez and Bollero, 2005). A properly managed crop rotation is not associated with any yield decrease, rather it has the greatest potential to increase the yield. Modalities of such farming have been described in a good number of literatures. A modest attempt has been made here to review the previous research studies which are: Nguema *et al.* (2013) conducted a research on farm-level economic impacts of conservation agriculture practice in Ecuador and found that specific cover crops, crop rotations and reduced tillage designed to reduce soil erosion and increase soil organic matter that can lead to increased incomes for farm households.

Bangladesh is a role model for the United Nations to be showcased for its excellent development performance to developing nations in the field of agriculture. Soil fertility and crop productivity are reducing over the time in Bangladesh due to monoculture of cereal crops (mainly rice). Introduction of conservation agriculture plays a vital role in increasing organic matter content in soil and in reducing soil erosion. It is a modern agricultural practice which is gaining popularity in many parts of the world. Conservation agriculture is characterized by a number of components which are: (i) minimum tillage operation for seedbed preparation, (ii) maintaining crop residues covering the soil, (iii) incorporating a cover crop in the rotation cycle and (iv) using organic fertilizers and integrated pest management technologies. It aims to make better use of agricultural resources through the integrated management of available soil, water and biological resources, combined with limited external inputs. It offers an opportunity for arresting and reversing downward spiral of resource degradation, decreasing cultivation costs and making agriculture more resource-use-efficient, competitive and sustainable by maintaining a permanent or semi-permanent organic soil cover, crop rotation and minimum soil disturbance. Crop production profitability under this farming practice tends to increase over time relative to conventional agriculture. In economic terms, conservation agriculture performs better than tillage-based farming. Three or four years crop rotations can reduce the use of

nitrogen fertilizer and pesticide. The labor inputs in this farming practice could be reduced by 75%. Modalities of such farming have been described in a good number of literatures in the global context as well as in the context of Bangladesh. Although conservation agriculture aims to help farmers to earn more income with reduced amount of labor, irrigation and other high energy external input costs; keep land healthy and productive; and conserve natural environment; about 8-10% farmers around the world follow this practice. Despite these apparent advantages and a few notable exceptions in the developing world, conservation agriculture practice has spread relatively slowly, especially in farming systems in temperate climates. The transformation from conventional agriculture practice to conservation agriculture practice seems to require considerable farm management skills and involves investment in new equipment. It may also require minimum levels of social capital to foster its expansion. There is also policy debate on whether conservation agriculture can ensure better sustainability and livelihood enhancement of the resource poor farmers.

The researcher intended to take an attempt to understand how extent the farmers are being adopted to conservative agriculture. Viewing and analyzing the aforesaid conditions the researcher has become interested to undertake a research entitled "adoption of selected conservative agricultural practices by the farmers".

1.2 Statement of the Problem

Adoption of conservative agricultural practices by the farmers was supposed to be influenced through interacting forces of many factors in their surroundings. Though there were some benefits in using conservative agriculture, there might be some problems in it. If farmers could minimize the problems of conservative agriculture and understand its benefits, they could be able to adopt conservative agriculture. Extension Providers including GOs and NGOs could help to minimize the problems of ecological agriculture and they could organize motivational extension program among the farmers to show the benefit of conservative agriculture. As a result the farmers could rapidly adopt conservative agricultural practices.

Some farmers respond to an innovation quickly while others delay or sometimes do not adopt at all. The success of any technology depends on its dissemination among the potential users and the success ultimately is measured by the level of adoption of the technology. It is assumed that notable improvements can take place in Bangladesh agriculture, if the conservative

agricultural practices are accepted and adopted by the farmers. However, very little is known about the adoption of conservative agricultural practices by the farmers in Bangladesh. Generalization from the studies conducted in abroad regarding the adoption of conservative agricultural practices may not be applicable due to considerable variation in socio-economic and cultural conditions.

It is necessary to have a clear understanding of the present position in respect of adoption of conservative agricultural practices by the farmers in order to prepare programs and courses of action for wider adoption of conservative agricultural practices. It is also necessary to have an understanding of the factors related to adoption of conservative agricultural practices. An understanding of the relationship of farmers' adoption behavior with their characteristics will be helpful to the planners and extension workers for promoting better action among the farmers who are concerned with the technology.

For having an understanding on the farmers' adoption of conservative agricultural practices and related matters, the researcher has undertaken this piece of research entitled "Adoption of Selected Conservative Agricultural Practices by the Farmers".

In view of the above considerations, the present study would attempt to find out the answers to the following research questions:

- What were the factors of the farmers involved in adopting conservative agricultural practices?
- What were the relationships of the selected factors of the farmers with their extent of adoption of conservative agricultural practices?
- To what extent the farmers adopted selected conservative agricultural practices?
- What were the problems faced by the farmers in adopting conservative agricultural practices?

1.3 Specific Objectives of the Study

The focal point of the research work was to determine the extent of adoption of selected conservative agricultural practices in the locale. This is why the following objectives were framed out in order to provide an appropriate track to the research work:

i) To determine and describe the following selected characteristics of farmers;

a. Age

b. Level of education

c. Working Family size

d. Effective land possession

e. Cropping intensity

f. Annual family income

g. Marketing opportunity

h. Cosmopoliteness

i. Extension contact

j. Training received

k. Decision making ability

l. Conservative agricultural knowledge

m. Attitude towards conservative agriculture

ii) To determine the extent of adoption of selected conservative agricultural practices by the farmers

iii) To explore relationship of the selected characteristics of the farmers with their adoption of conservative agriculture

iv) To determine and describe the problems faced by the farmers in using conservative agricultural practices

1.4 Scope or rationale of the Study

In this study extent of adoption of conservative agricultural practices were determined. This would also enable to identify the factors which affect the adoption of conservative agricultural practices. This important aspect would ultimately help the extension providers in formulating appropriate technologies of conservative agriculture and that would be helpful to develop sustainability in agriculture.

NGOs and private extension providers are working for development program. Some of them are working for sustainable development of agriculture by environment friendly conservative agriculture. With the help of the findings of the research, the concerned authority could expect to select appropriate strategies for establishing conservative agricultural program in Bangladesh.

However, the overall findings of the study would enable the planners, policy makers and the extension providers to formulate extension policy and appropriate strategy to reach the specific target groups. The findings of the study were expected to be helpful to the academicians and researchers. The findings might be supplementing other empirical evidences to different aspects of conservative agricultural practice in order to build an adequate conceptualization of conservative agriculture.

1.5 Justification of the Study

Some scientists thought that conservative agriculture was the best alternative for sustainable agriculture but some were against the use of conservative agricultural practices. There were arguments in favor of both the aspects. Food and Agriculture Organization (FAO) of the United Nations recognized conservative agriculture as a suitable option for sustainable agriculture (IFOAM, 1996). Many authors raised strong arguments for introduction of conservative agriculture. But, some opponents termed conservative agriculture as well as against the process of scientific development (Pretty, 1995).

According to Rahman (2001), a widespread introduction of conservative agriculture in Bangladesh could be justified through the following arguments:

• Conservative farming offers the possibility of long term sustainability;

• Conservative agriculture is affordable for resource poor farmers;

• Problem of rural unemployment could be minimized through conservative farming; and

• Bangladesh has a long heritage of farming with traditional wisdom, which acts as bases for conservative knowledge.

There were so many arguments in favor of a widespread introduction of conservative agriculture. Whatever might be the result of on-going debate on introduction of conservative agriculture in a country like Bangladesh, this approach of farming should get an opportunity to prove its feasibility (Islam, 2002). Some private extension providers like UBINIG took an initiative to promote "Nayakrishi Andolon" as ecological agriculture as well as conservative agriculture with using only manures as fertilizers and without using any kind of organic and biological pesticides. Government organization like Department of Agricultural Extension (DAE) is trying to introduce Integrated Crop Management (ICM) including Integrated Nutrient Management (INM) and Integrated Pest management (IPM) among the farmers for environment friendly agriculture. In INM, recommended doses of chemical and organic fertilizers are used for nutrient management and in IPM, there is a chance of using recommended doses of chemical pesticides at last phase of pest control. In many parts of the world this practice is already in use. As a new farming technology in Bangladesh, it is necessary to examine its different aspects. Considering these facts the researcher became interested to conduct the present study on adoption of selected conservative agricultural practices by the farmers.

1.6 Assumptions of the Study

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

The researcher had considered the following assumption while undertaking the study:

1. The respondents included in the sample were capable of furnishing proper responses to the questions included in the interview schedule.
2. The responses furnished by the respondents were reliable. They express the truth while passing their opinions and providing information.
3. The views and opinions furnished by the farmers included in the sample were the representative views and opinions of all the farmers of the study.

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

5. Data were normally and independently distributed with their means and standard deviation.

6. The findings of the study will have general applications to other parts of the country with similar personal, socio-economic and cultural conditions.

1.7 Limitations of the Study

Considering the time, respondents, communication facilities and other necessary resources and to make the study manageable and meaningful, it became necessary to impose certain limitations bellow-

- The study was confined to Dumki upazilla in Patuakhali district.
- Population for the present study was kept confined within the heads of farm families in the study area.
- There were many characteristics of the farmers in the study area but only 14 of them were selected for investigation.
- For information about the study, the researcher depended on the data furnished by the selected respondents during their interview with him.
- Facts and figures collected by the researcher applied to the situation prevailing during the year 2019.
- Reluctance of the farmers to provide information was overcome by establishing rapport.

1.8 Definition of Terms

Conservative agricultural practices: Conservative agricultural practices referred to the agricultural practices without using any chemical fertilizers and chemical pesticides.

Conservative nutrient management: Conservative nutrient management referred to the plant nutrient management without using any chemical fertilizers.

Conservative pest management: Conservative pest management referred to the pest management for crop production without using any chemical pesticides.

Integrated crop management (ICM): Integrated crop management referred to the judicious integrated use of chemical and non-chemical inputs in crop production. It has two broad dimensions: Integrated Nutrient Management (INM) and Integrated Pest Management (IPM).

Integrated nutrient management (INM): Integrated nutrient management referred to the judicious integrated use of chemical and non-chemical fertilizers for plant nutrient management. Sometimes, it is termed as integrated plant nutrient system (IPNS).

Integrated pest management (IPM): Integrated pest management referred to the judicious integrated use of chemical and non-chemical pesticides to pest control for successful crop production.

Adoption: Adoption is a decision to use an innovation by an individual and continue to use the innovation (Rogers, 1995). In the present study, adoption of selected ecological agricultural practices by the farmers was taken into consideration.

Respondents: Randomly selected people considered to be representable of the population are known as respondents. They are the people from whom a social research worker usually gets most data required for his research. In this study the respondents were the village level vegetable farmers.

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

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

Working family size: Working family size of a respondent referred to the total number of adult members and others on the basis of partial or full working ability with the age-level of more than six years.

Effective land possession: Effective land possession of a respondent referred to his total area of land in terms of ownership and benefit obtained from the land.

Cropping intensity: Cropping intensity of a respondent referred to the ratio of total cropped area and net cropped area expressed in percentage.

Extension media contact: It refers to the extent of contact with various communication media by the farmers in receiving agricultural information.

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

Training received: Training experience of a farmer was defined as the number of days s/he had so far received training. It was used to refer to the completion of an activity by the farmer which was offered by the government, semi-govt. or non-government organizations to improve the knowledge & skills of farmers and changing attitude of a farmer for doing a specific job properly.

Decision making ability: Decision making ability of a respondent referred to the extent of ability to make decision with 3 different aspects, viz. decision making by alone', 'decision making with family members', and 'decision making with others outside the family' involving six selected items of decision.

Marketing opportunity: Marketing opportunity of a respondent referred to the opportunities available in respect of transport, facilities, buying price of agricultural inputs, selling price of agricultural produces and storage facilities.

Conservative agricultural knowledge: Knowledge is those behavior and test situations which emphasized the remembering either by recognition or recall of idea, material or phenomenon (Bloom et al., 1956). In this study Conservative agricultural knowledge indicated the extent of Conservative agricultural knowledge of a respondent at the time of interview as evident from his responses to a set of questions related to ecological agriculture logically scientifically prepared for this purpose.

Problems faced in Conservative agriculture: It referred to the extent of problems faced by a respondent in using ecological agriculture in terms of social, technical, economical, marketing and psychological problems.

Attitude towards Conservative agriculture: Thurstone (1946) defined attitude as 'the degree of positive and negative affect associated with psychological object like symbol, phrase, slogan, person, institution, or ideas towards which people can differ in varying degrees'. In the present study, attitude towards conservative agriculture referred to the extent of knowledge, feeling, belief and action tendency towards conservative agriculture.

CHAPTER II

REVIEW OF LITERATURE

Review of literature gives the clear and concise direction to the researcher for conducting the experiment. In this chapter, review of literatures relevant to the objectives of this study was presented. This was mainly concerned with "Adoption of conservative agriculture". There was serious dearth of literature with respect to research studies on this aspect. So, the directly related literatures were not readily available for this study. Some researchers addressed various aspects of the adoption of conservative agriculture and its effect on client group and suggesting strategies for their emancipation from socio-economic deprivations. A few of these studies relevant to this research are briefly discussed in this chapter under the following three sections:

Section 1: Concept of adoption, adoption process and levels of adoption of agricultural innovation

Section 2: Factors related the adoption

Section 3: Conceptual framework of the study

2.1 Concept of adoption, adoption process and levels of adoption of agricultural innovation

2.1.1 The concept of adoption

According to Feder *et al*., (1985), adoption is "the degree of use of new innovation in long run equilibrium when a farmer has full information about the new technology and its potential". However, the equilibrium level of adoption will not be achieved if the technology is still being experimented by the farmers. Rogers (1995) defines innovation as an idea, practice, or object that is perceived as new by an individual or other unit of adoption. This wide definition captures any idea or process that is perceived to have utility. Lionberger (1968) and Van den Ban and Hawkins (1996) contended that, adoption is a process, which the decision to adopt usually takes time. People do not adopt new practice or idea as soon as they hear about it; they may wait several years before trying it. Therefore, the adoption and diffusion of innovation process has been characterized as the acceptance overtime of some specific items by individuals (or adoption unit) linked to specific channels of communication. In this study the word innovation, technology and recommended practices will be used interchangeably.

2.1.2 Adoption process

Rogers (2003) described adoption as the decision by an individual to use the introduced technology or innovations as the best available alternative. Feder *et al*., (1985) on the other hand defined adoption as-the degree of use of a new technology in the long-run equilibrium when farmers have the full information about the new technology. According to Spence (1994), adoption is not a one-off decision but a process in which the individual finally decides to use the introduced ideas or techniques, after a thorough assessment has been carried out. On the other hand, Guerin and Guerin (1994) defined technology adoption as the implementation of the already transferred knowledge about a technological innovation and is the end product of the technology transfer is the process. According to Rogers (2003), technology adoption involves a mental process that individual goes through when he or she becomes aware of information regarding the idea that is perceived to be new. The adoption process continues until decisions are made to use or reject the new idea (Rogers, 2003). The five steps in the adoption decision process are conceptualized as knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003). Spence (1994) on the other hand, indicated awareness, interest, evaluation, trial and adoption, as the stages involved in the adoption process. Although these authors term the adoption process differently, the steps described by them although have some minor differences, are very similar. These two models are compared in the following paragraphs.

The knowledge stage of the model is when an individual becomes aware of the existence of a technology as he/she receives information about it and understands how it works (Rogers, 2003). However, Spence (1994) described this stage as the awareness stage. Spence further pointed out that the individual may obtain the information through mass media, or from written, spoken or visual material which the individual farmer can access. The second stage of Rogers (2003) model is persuasion. At this stage, an individual may change his/her attitude towards the technology being introduced. Spence (1994) described this as the interest stage, whilst Pannell *et al*., (2006) referred to it as the non-trial evaluation phase. During the interest stage, an individual will typically attempt to gain more factual data in order to enable an examination of the innovation at a closer level and to explore it in the context of personal circumstances, past experiences, and prevailing beliefs (Spence, 1994). The third stage of Rogers (2003) model is decision. During this stage, the individual farmer engages in the activities that will consequently

lead to the adoption (or rejection) of the new idea or technique. Spence (1994) considered this to be the evaluation of an innovation. Furthermore, during this process, an individual is attempting to assess whether the advantages will outweigh any perceived disadvantages. Pannell *et al.,* (2006) however, described this stage as the trial evaluation. They stressed that trials contribute substantially to both the decision-making and skill development aspects of the learning process. If small-scale trials are not possible (or not enlightening) for some reason, the opportunities for widespread adoption are greatly diminished. Farmers will be cautious about leaping into full-scale adoption due to the risk that the innovation may prove to be a full-scale failure. Practices which are not trial able may still be adopted, but generally the adoption occurs only after substantial information-seeking, discussion, analysis, and reflection (Pannell *et al.,* 2006).

The fourth stage of Rogers (2003) model is implementation. At this stage, the individual begins to completely apply or use the new idea (Rogers, 1995, 2003). Also, at this stage, farmers often look for more information to find out whether they have made the correct decision by adopting the technology (Van den Ban and Hawkins, 1996). Spence (1994) considered this stage as a trial stage, since the implementation of the new idea is undertaken on a smaller scale. Duncan (1969) confirmed Spence's argument by stating that adoption is not an all-or-nothing decision. He suggested that there is a grey area between small-scale trialing and the eventual scale of adoption. Adoption is often a continuous process and it may occur within a gradual or stepwise manner, which sometimes results in only a partial adoption (Wilkinson, 2011). Farmers often change and modify their practices or technology, in order to adapt it to their own circumstances. However, Rogers (1995, 2003) argued that this is a full implementation stage, since the decision has already been made. The fifth stage of Rogers (2003) model is confirmation. This stage is reached when the individual seeks more information towards supporting and reinforcing the decision he or she has made or when he or she discontinues the use of the new idea because of resultant difficulties (Rogers, 2003). Adopters, who are sometimes confronted with conflicting messages from change agents or peers, regarding the new practices, tend to discontinue using the new practice (Van den Ban and Hawkins, 1996). Some adopters may discontinue the use of a new idea or practice after adoption (Rogers, 2003). The discontinuation of a technology may be a result of the individual adopter being dissatisfied with the performance of the new idea or practice. It may also due to the fact that the individual has found a new practice that surpasses

the existing one and as such they would like to replace it (Rogers, 2003). Spence (1994) on the other hand indicated that such a rejection could happen immediately after the acceptance of a technology, if there is a better alternative. The adoption of technology is influenced by a range of factors. In the following sections, the factors that influence the adoption decision of a new technology are examined.

2.1.3 Levels of adoption of agricultural innovation

Agriculture is a way of life to many subsistence farmers and other farmers are in constant search of ways in which to improve upon their lives. In agricultural context, adoption is decision made by an individual to start using new agricultural innovations with the aim to increase productivity. This might be a new crop variety or management practices adopted by an individual, family or corporation. Adoption of agricultural technologies is considered as one of the ways that offer opportunities for improved agricultural production and hence improved life (Niyegela, 2007).

The technology must be widely adopted in order to self-sustain. Within the rate of adoption, there is a point at which agricultural technology reaches critical mass. The categories of adopters are: innovators, early adopters, early majority, late majority, and laggard. Innovators (2.5%) - had larger farms, were more educated, more prosperous and more risk-oriented, early adopters (13.5%) - younger, more educated, tended to be community leaders, less prosperous, early majority (34%) - more conservative but open to new ideas, active in community and influence to neighbors, late majority (34%) - older, less educated, fairly conservative and less socially active, laggards (16%) - very conservative, had small farms, oldest and least educated. Level of adoption of technology manifests itself in different ways in various cultures and fields and is highly subject to the type of adopters and innovation-decision process (Rogers, 1983).

2.2 Adoption related factors

There were a number of factors identified in the literature, which have influenced the adoption. Drawing on several studies on technology adoption such as Adesina and Zinnah (1992); Aguila-Obra and Melendez (2006); Chau and Tam (1997); Doorman (1991); Feder, Just and Zilberman (1985); Rogers (1985). It can be ascertained that the factors, which influence the farmers' decision to either adopt or not to adopt can be grouped under three major headings: 1) the

characteristics of the technology; 2) internal factors; and 3) external factors. These factors are discussed in the following section.

2.2.1 Characteristic of technology as well as innovation

Rogers (1995) identified five characteristics of a technology or innovation that influenced adoption. These are: 1) relative advantage; 2) compatibility; 3) complexity; 4) trialability; and 5) observability. Feder *et al.,* (1985) identified three others and classified these technologies in relation to resource use. These characteristics included: 1) capital-saving or capital intensive; 2) land-saving or land-using; and 3) labor-saving or labor using. Feder and Umali (1993), Leathers and Smale (1991), and Pannell *et al.*, (2006) also identified associated risks with a new technology as an important factor that influenced adoption decisions of individuals. The following sections draw on the relevant literature to describe in detail each of these factors and their impacts on the adoption decisions of individuals.

a) Relative advantage: Relative advantage is the degree to which an innovation is perceived to be better than the idea it supersedes (Rogers, 1995). Relative advantage can also be described as the advantage of an innovation to achieve goals better (or at a lower cost) than previously (Van Den Ban and Hawkins, 1996). The degree of relative advantage is commonly expressed as economic profit, social prestige or other benefits (Rogers, 1995). It has been found that agricultural practices, which are believed to be profitable, have an increased likelihood of adoption, whilst those that are believed to provide less return are less likely to be adopted (Barr and Cary, 1992; Webb, 2004).

b) Compatibility: Compatibility refers to the degree to which an innovation is perceived as consistent with existing values, past experience, and the needs of the potential adopter (Roger, 1995, 2003). The more compatible an innovation is to a potential farmer's life experiences and situation, the more familiar they will be with the innovation and the less uncertain they will be about adopting the innovation (Deressa *et al*., 2009). Ogunlana (2004) also defined compatibility as being the ease by which the farmers can integrate the new practices into their farming system and access other relevant inputs that would help in its adoption.

c) Complexity: The complexity factor is the degree to which a technology is perceived to be difficult to understand and use (Rogers, 2003). The greater the complexity of an innovation the more negatively a new farmer may view the technology. For example, the discontinuation of a

system of rice intensification program, which was introduced in Madagascar for rice farmers, was largely due to the difficulties faced by farmers in understanding the application of the new practices and methods (Moser and Barrett, 2002). Gibson (1994) shared a similar view and reported that farmers in Papua New Guinea rejected growing rice because rice cultivation was seen as complex and difficult to manage.

d) Trialability: Trialability is the degree to which the technology can be tested on a small scale (Rogers, 2003). Ogunlana (2004) pointed out that farmers are always keen to adopt technologies which they have first trialed on a limited basis on their farm, compared to one they have to adopt on a larger scale - which might fail. Floyd *et al.,* (2003) and Rogers (2003) added that a technology, which can be gradually implemented without a large capital investment from outside, is important, since it will certainly enhance the farmers' decision to adopt the technology.

e) Observability: Observability is the degree to which the results of a technology can be visible to others (Rogers, 1995). Cary *et al.,* (2002) argued that a profitable outcome is an important factor that influences the adoption decision. A lack of observable profit, as result of adopting a technology would inhibit the adoption of the technology by others. The more observable the outcomes of an innovation offers and is perceived as being suitable by the farmer, the rate of adoption will become more positive (Rogers, 2003). For example, in a study on mangrove swamp rice varieties in Sierra Leone, Adesina and Zinnah (1992) found that farmers adopted a new variety of rice introduced to the area because they observed that the results were highly visible.

2.2.2 Internal factors

Several authors (Bantel and Jackson, 1989; Deressa *et al.*, 2009; Knowler and Bradshar, 2006; Pannell *et al.,* 2006; Staal *et al.,* 2002) suggested that there are four key internal factors that influence the adoption of technology. These factors include: 1) characteristics of the farmer; 2) on-farm factors; 3) cultural factors; and 4) leadership characteristics. The following sections draw on the relevant literature to describe in detail each internal factor that can influence a farmer's adoption decision.

2.3 Characteristics of the farmer

Age: The personal characteristics that may influence the adoption decision of a farmer include age, gender, education, and level of farming experience (Deressa *et al.,* 2009; Doss and Morris,

2000). These personal factors can affect the innovativeness of an individual and thus contribute to determining the rate at which farmers' will adopt new technology (Adesina and Zinnah, 1992; Deressa *et al.,* 2009; Spence, 1994). The age of the farmer is often considered to be one of the factors responsible for influencing his or her decision to adopt a technology (Souza et al., 1993). Tiamiyu *et al.,* (2009) argued that younger farmers are more likely to adopt new technologies if they are not constrained by limited cash resources, whilst older farmers are less likely to adopt new technologies if they require extra physical labor. Older farmers may be less interested because they have less need for extra income. However, there is conflicting evidence on this relationship with some researchers finding no significant evidence between age and adoption (Curtis *et al*., 2005; Guerin and Guerin, 1994; Shiferaw and Holden, 1998). For example, Adesina and Zinnah (1992), in their study on the factors affecting the adoption of rice farming in Sierra Leone found that the age of farmers had no significant relationship to their adoption decision of rice farming. On the other hand, experience may be related to age, which has often been shown to be negatively related to adoption (Polson and Spencer, 1991; Zepeda, 1990). Byron *et al.* (2005) reports that, elderly farmers seem to be somewhat less inclined to adopt new practices than younger farmers. It is also well known that, in general, the older the farmers the less their willingness to try new innovations or take risks. Older farmers may have more experience, resources, or authority that can allow them more possibilities for trying recommended production practices (CIMMYT, 1993). Some studies indicate that the number of farming years has a positive and significant relationship with the use of recommended production practices at least in early years (Mattee, 2009). Furthermore, some of the studies found there are no relationship between age and the use of recommended production practices (Mattee, 2009). Still other studies show that younger farmers are more likely to adopt recommended production practices (Van den Ban and Hawkins, 1996). A study conducted at Gurudashpur upazila under Natore district in Bangladesh that showed a non-significant negative relationship of age on adoption of conservative agriculture (Poddar *et al.,* 2017).

Level of education: Education improves human capital, farm management capacity, the ability to understand and adopt recommended agricultural practices (Bezuayehu *et al.,* 2002). It is expected that better educated farmers are more likely to adopt recommended agricultural practices than less educated farmers (Cary *et al*., 2002 and Nina, 1993). Mwaseba *et al.,* (2006) reported that, education of household head has influence on adoption of recommended agricultural practices especially when the recommended agricultural practices require

managerial skills. A study conducted at Dhamrai upazila under Dhaka district in Bangladesh that showed a significant positive relationship of education on adoption of BRRI dhan49 production technologies (Islam, 2007). Amin (2015) conducted a study at Rajapur upazila under Jhalokathi district in Bangladesh that showed a significant contribution of education on adoption of modern technologies by the rice cultivators. Poddar *et al.*, (2017) conducted a study at Gurudashpur upazila under Natore district in Bangladesh that showed a significant positive relationship of education on adoption of conservation agriculture by the farmers.

Working family size: Igodan *et al.*, (1992) conducted a research in Nigeria on the adoption of recommended management practices in oil palm. He found that in his study family size had a significant positive relationship in the adoption of the recommended management practices. Haque (1993) in his study found that family size of growers had a negative and significant relationship with their adoption of improved practices in sugarcane cultivation. Chowdhury (1997) observed that there was a positively significant relationship between family size and adoption of selected BINA technologies. Similar results were found by Islam (1993), Bashar (1993), Khan (1993), Pal (1995) and Sarkar (1997) in their respective studies. Poddar *at el.,* (2017) conducted a study at Gurudashpur upazila under Natore district in Bangladesh that showed no significant relationship of family size with adoption of conservation agriculture by the farmers.

Effective land possession: On-farm factors include farm size, location, and land tenure (Daberkow and Mcbride, 2003; Knowler and Bradshar, 2007; Staalet al., 2002). These factors exist within the farm environment in which farmers carry out their daily activities (Spence, 1994). The effect of farm size on adoption has been frequently analysed in many adoption studies (Erenstein and Faroog, 2009; Daku, 2002; Doss and Morris, 2001). Evidence from various sources has indicated that there is a positive relationship between farm size and adoption (Erenstein and Faroog, 2009; Deressa *et al.*, 2009; Kasenge, 1998). In a number of studies, it was found that those with larger farms have a greater probability of adopting an innovation than owners of smaller sized farms (Azilah, 2007; Deressa *et al.,* 2009). Farmers operating larger farms tend to have greater financial resources and their opportunities to obtain credit are higher compared with those with smaller farms. In Kenya for example, a study by Gabre-Madhin and Haggblade (2001) found that large commercial farmers adopted new high yielding maize varieties more rapidly than small holders did. The location of the farm is also an important factor, which influences the adoption of a technology. For example, Zeller *et al.,* (1998), in a

study on market access in Malawi found that farmers who had their farms located close to major markets adopted maize faster than those whose farms were located far from the market. In a developed country's context, Khanna (2001) found in the American Midwest that the farmers who had their farms located in proximity to soil research centers adopted new soil testing technology faster than those whose farms were located far away from the research Centre. Similarly, a study on the adoption of conservation tillage in Australia by Demden *et al.,* (2006), found that the proximity of the farm to the adopter's home was positively related to adoption. They further stated that farms that are located closer to locations that provide the service are more likely to adopt a new technology than farms located further away. Land ownership is widely believed to encourage the adoption of technologies linked to land (Kassie *et al.,* 2009). For example, in the Philippines, Neil and Lee (2001) found that land ownership was positively associated with hedgerow adoption. Whilst empirical studies have supported this hypothesis, the results are not unanimous and the subject has been widely debated (Feder *et al.,* 1985; Rodriguez *et al.,* 2009). For example, Smucker *et al.,* (2000) found no definitive relationship between land ownership and technology adoption by peasant farmers in Haiti. Similarly, Rodriguez *et al.,* (2009), in a study on barriers to the adoption of sustainable agricultural practices in the 13 Southern States of the USA found the relationship between land ownership and the adoption of sustainable agricultural practices to be negative. This is because the landlords who lease their land to farmers dictated what crops would be grown on this land and this led farmers to be reluctant to adopt the new technology (Rodriguez *et al.,* 2009). This suggests that farmers working on leased land are less likely to adopt long-term technology practices because they perceive that the benefits of the adoption will not be necessary accrue to them. According to CIMMYT, (1993) farm size is a common variable in determining the adoption of an innovation. It has been recognized that, small and large farm operators differ in the speed of adoption of innovations (Polson and Spencer, 1991). Rogers (1983) adverts that those farmers who own large farms enjoy a high socio economic status. They also have ample mass communication opportunities, and are more innovative in adopting new agricultural technologies. Amin (2015) conducted a study at Rajapur upazila under Jhalokathi district in Bangladesh that showed a non-significant contribution of farm size on adoption of modern technologies by the rice cultivators. Islam (2007) conducted a study at Dhamrai upazila under Dhaka district in Bangladesh that showed a significant relationship of farm size on adoption of BRRI dhan49 production technologies. In following section, the cultural factors that influenced

adoption decision are reviewed. Poddar *et al*., (2017) conducted a study at Gurudashpur upazila under Natore district in Bangladesh that showed no significant relationship of farm size with adoption of conservation agriculture by the farmers.

Cropping intensity: Ali (2009) found that the Cropping intensity of the farmers had significant positive relationship with the adoption of selected ecological agricultural practices.

Annual family income: Income may enhance labour and ability to purchase and therefore low level of income implies difficulties in buying farm inputs like improved seed, fertilizers and herbicides (Msuya, 2005). Many studies report positive contribution of income to household's adoption of recommended agricultural practices like use of improved seed varieties, fertilizers application, spacing, weeding, and pest management. For instance, different recommended agricultural practices adoption studies conducted by Kidane (2001) indicated positive relationship between income and adoption of recommended agricultural practices. Amin (2015) conducted a study at Rajapur upazila under Jhalokathi district in Bangladesh that showed a significant contribution of annual family income on adoption of modern technologies by the rice cultivators. Islam (2007) conducted a study at Dhamrai upazila under Dhaka district in Bangladesh that showed a significant relationship of annual family income on adoption of BRRI dhan49 production technologies. Poddar *et al*., (2017) conducted a study at Gurudashpur upazila under Natore district in Bangladesh that showed no significant relationship of family income with adoption of conservative agriculture by the farmers.

Marketing opportunity: Ali (2009) found that the Marketing opportunity of the farmers had no significant relationship with the adoption of selected ecological agricultural practices.

Cosmopoliteness: Mahmud (2006) found that the Cosmopoliteness of the farmers had significant positive correlation with their adoption of modern wheat cultivation technologies. Poddar *et al*., (2017) conducted a study at Gurudashpur upazila under Natore district in Bangladesh that showed positive significant relationship of organizational participation with adoption of conservative agriculture by the farmers.

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

significant relationship with their adoption of modern sugarcane cultivation practices. Aurangozeb (2002) conducted a study on adoption of integrated farming technologies by the rural women in RDRS. He found that there was a positive relationship among Cosmopoliteness and their adoption of integrated farming technologies. Haque (2003) conducted a study on farmer's adoption of modem maize cultivation technologies. He observed that Cosmopoliteness of the respondents had insignificant relationship with their extent of farmer's adoption of modern maize cultivation technologies. Sardar (2002) concluded that the Cosmopoliteness had positively significant relationship with their adoption of IPM practices. Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that Cosmo politeness of the farmers had significant positive relationship with their adoption of modem agricultural technologies.

Extension contact: Poddar *et al*., (2017) conducted a study at Gurudashpur upazila under Natore district in Bangladesh that showed positive significant relationship of extension contact with their adoption of conservation agriculture by the farmers. Sardar (2002) concluded that the extension contact had positively significant, relationship with their adoption of IPM practices. Mahmud (2006) found that the extension media contact of the farmers had significant positive correlation with their adoption of modern wheat cultivation technologies. Haque (2003) concluded that extension contact of the farmers had significant positive relationship with their adoption of modern maize cultivation technologies. Aurangozeb (2002) observed that there was significant relationship between contact with extension media and adoption of integrated homestead farming technologies. Hossain (2006) concluded that the extension contact of the farmers had positive significant relationship with their adoption of selected HYV rice. Hossain (2003) concluded that communication exposure of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation. Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that extension contact of the farmers had a significant and positive relationship with their adoption of Aalok 6201 hybrid rice.

Training exposure: Islam (2002) conducted a study on farmers' knowledge and adoption of ecological agricultural practices under the supervision of Proshika. He found that agricultural training exposure of the farmers had no significant relationship with their adoption of ecological agricultural practices. Haque (2003) found that training received of the respondent had positive

significant relationship with their practices in farmers' adoption of modern maize cultivation technologies. Rahman (2001) observed in study that training received of the farmers had a significant and positive relationship with their adoption regarding Aalok-6201 hybrid rice. Verma *et al.,* (1989) found there was significant change in attitude of rural women from before training to after training in improved home making tasks. They said that due to gain in knowledge the attitude became more favourable. Hossain (1981) showed that proper training could raise the knowledge and skill level of participants significantly. Hossain (2006) found in his study that training received of the respondents had significant positive relationship with their adoption of selected wheat varieties.

Decision making ability: Ali (2009) found that the Decision making ability of the farmers had significant positive relationship with the adoption of selected ecological agricultural practices.

Conservative agricultural knowledge: In this study knowledge refers to as an awareness of recommended practices or the optimum that is achievable in terms of efficiency. In this case refer to as awareness of recommended rice production practices in the study area. A lack of understanding or knowledge about the recommended practices is often cited as a strong barrier to the adoption of recommended practices or innovations (Duvel, 1991). Sarder (2002) in his study revealed that agricultural knowledge of the farmers had positively significant with their adoption of IPM practices. In this study knowledge refers to as an awareness of recommended practices or the optimum that is achievable in terms of efficiency. In this case refer to as awareness of recommended rice production practices in the study area. A lack of understanding or knowledge about the recommended practices is often cited as a strong barrier to the adoption of recommended practices or innovations (Duvel, 1991). Amin (2015) conducted a study at Rajapur upazila under Jhalokathi district in Bangladesh that showed a significant contribution of knowledge on modern technologies on adoption of modern technologies by the rice cultivators. Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was a positive significant relationship between knowledge of the respondents and their adoption of integrated homestead farming technologies. Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that agricultural knowledge of the farmers had significant relationship with their adoption of modern agricultural technologies. Chowdhury (1997) conducted a search on adoption of selected BINA technologies by the

farmers. He indicated that knowledge of the farmers had a strongly positive significant relationship with their adoption of selected BINA technologies. Hossain (2009) showed that knowledge on IPM of the farmers had positive significant relationship with their use of IPM practices**.**

2.3.1.13 Attitude towards conservative agriculture

Attitude is the process by which a person receives information or stimuli from the environment and transforms it into psychological awareness (Van de Ban and Hawkin, 1988). According to Duvel (1991) perception is understood to be of more specific nature and is analyzed based on attribute of innovation. The attributes that can be directly associated with field forces are; prominence and relative advantages. Alam (2016) found that the attitude towards litchi cultivation of the litchi farmers had positive significant relationship with their adoption of litchi cultivation practices. It could influence directly to adopt litchi cultivation. Ahmed (2006) found that the attitude toward wheat cultivation of the farmers had significant positive relationship with their adoption of selected wheat varieties. Islam (2002) revealed that the attitude towards technology of the farmers had a significant positive relationship with their adoption of modern agricultural technologies. Podder *et al.,* (2000) conducted a study on the adoption of Mehersagar Banana by the farmers of Gazaria union under Sakhipur Thana of Tangail district. He found that there was no relationship between attitude towards technology of the growers and their adoption of modern agricultural technologies. Hossain (2009) conducted a study on adoption of some selected agricultural technologies among the farmers as perceived by the frontline GO and NGO workers. He found that there was strong positive relationship between attitude towards development and perceived adoption of selected technologies.

2.3.2 Cultural factors

Cultural factors have also been identified as having influenced adoption decisions by farmers. These factors include: 1) norms and 2) the traditions of a society (Herbig and Miller, 1991; Pannell et al., 2006; Roger, 1995; Sommers and Napier, 1993; Straub, 1994; Tiraieyar, 2009; Twati and Tripoli, 2008; Wejnert, 2002). The cultural norms of a society are also an important factor that influences an adoption decision. Wejnert (2002) argued that technologies, which are not compatible with cultural norms, are adopted only by a relatively small percentage of potential, individual adopters. For example, Rogers (1995) found that the residents of Los Molino in Peru did not adopt the practice of boiling drinkable water because it conflicted with

their norm of serving such water only to sick people. Similarly, in Costa Rica, the rate of adoption of fertility-control practices by married couples was low because they conflicted with their cultural values relating to optimum family size (Rosero-Bixby and Casterline, 1993; 1994). The traditions of a society are one of the factors that play an important role in affecting farmers‟ decision-making, which includes the likelihood of them adopting new practices (Stanley et al., 2000). For example, Sommer and Napier (1993) found that the adoption of sustainable agriculture practices by farmers in Amish communities was influenced by their cultural traditions towards land and soil protection. However, in contrast, Wejnert (2002) stated that the cultural traditionalism associated with social inertia when adopting new practices and ideas can negatively affect the adoption of technology. Lawrence et al., (2004) argued that society's resistance to discarding long-held traditions would lead to a strong resistance (within that society) to change the adoption of new technology. In the following section, the leadership characteristics that influenced adoption decision are discussed.

2.3.3 Leadership characteristics

Leadership characteristic is another internal factor, which has been found to influence the decision to adopt new technology (Bantel and Jackson, 1989; Damanpour and Schneider, 2009; Howell and Higgins, 1990; Levi and Litwin, 1986; Scott and Bruce, 1994; West and Anderson, 1996). Ross and Lappin (1967) referred to leadership characteristics as attitudes and behaviors of those individuals who perform leadership roles. They believe that good leaders need to possess a positive identification with their people and also with others outside their community. Based on their work on community and cooperatives in participatory development Levi and Litwin (1986), supported this view. They found that good leaders are those who know their people intimately, who share with them their problems, and who lead their people towards common goals. Onyx and Leonard (2010) further support this view, in their study on complex systems leadership in emergent community projects in Australia, Uruguay, Sweden, and Peru. They found that the five community projects studied in five different countries were successful because the leadership of these community projects was open to their members in relation to shared decision making with members, honesty with members, and committed to their communities. The other important characteristics of leaders, which influence adoption decisions, are skills and knowledge (Cernea and Meinzen-Dick, 1995). According to Cernea

and Meinzen-Dick (1995), these characteristics can be further divided into two types: 1) those that are required in an organizational role; and 2) those that are required in a technical role.

2.3.4 External factors

Apart from the internal factors, the adoption decision of farmers is also influenced by external factors. Several authors such as Akpabio and Inyang (2007); Anderson and Feder (2007); Caswell *et al*., (2001); Cornejo *et al*., (2001); D'Emden *et al*., (2008); Doss (2006); Fliegel (1993); Grarner and Sharp (2004); Kurlalova *et al*., (2006); Mansuri and Rao (2003); Saltiel *et al*., (1994); Sunding and Zilberman (2001); and Zeller *et al*., (1998) identified five main external factors to have influenced the adoption decision of farmers. These were: 1) government policy; 2) infrastructure development; 3) agro-climatic condition; 4) extension support; and 5) market access.

2.4 Conceptual framework of the study

In scientific research, selection and measurement of variables constitute an important task. Studies on individual, group and society revealed that acceptance of modern technologies is conditional upon many factors. Some of these are social, personal, economical and situational factors and the behavior of farmers are influenced by these characteristics. The hypothesis of a research while constructed properly consist at least two important elements i.e.: a predicted variable and an experimental variable. A predicted variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the experimental variables (Townsend, 1953). An experimental variable is that factor which is manipulated by the researcher in his 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 for a specific events or issues.

This study is concerned with the Adoption of Conservative Agriculture in the Selected Areas of Dumki Upazila. Thus, the adoption of Selected Conservative Agriculture Practices by the farmers in the selected area of Patuakhali district was the predicted variable and 14 selected characteristics of the farmers were considered as the experimental variables under the study. Adoption of Conservative Agriculture may be affected through interacting forces of many experimental variables. It is not possible to deal with all of the experimental variables in a single study. It was therefore, necessary to limit the independent variables, which include age, level

of education, working family size, effective land possession, cropping intensity, annual family income, marketing opportunity, cosmopoliteness, extension contact, training exposure, decision making ability, conservative agricultural knowledge, problems faced in conservative agriculture and attitude towards conservative agriculture for this study. Considering the above-mentioned situation and discussion, a conceptual framework has been developed for this study, which is diagrammatically presented in the following Figure 2.1.

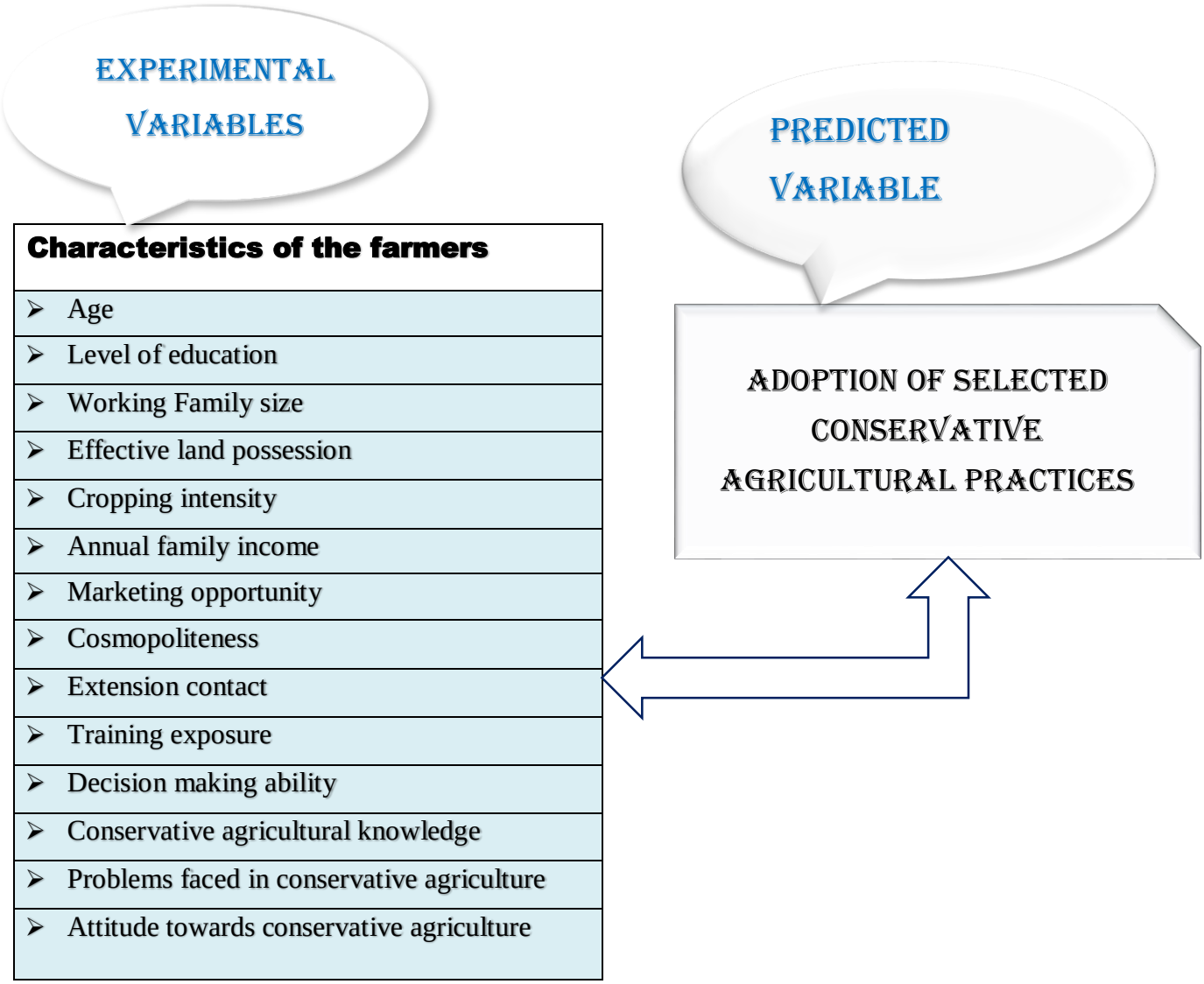

Figure 2.1 The Conceptual Framework of the Study

CHAPTER III

MATERIALS AND METHODS

In conducting a research study, methodological issue is one of the prime considerations for yielding of valid and reliable findings. Appropriate methodology enables the researcher to collect valid and reliable information and to analyze the information properly in order to arrive at correct conclusions. However, the methods and operational procedures followed in conducting this study has been described in the subsequent sections of this chapter.

3.1 Locale of the Study

The study was conducted at Lebukhali and Pangashia unions of Dumki upazila under Patuakhali district. Out of four unions of the mentioned upazilla, Lebukhali and Pangashia union were purposively selected because of higher agricultural production. Thereafter, two villages namely, South Pangashia and Kartikpasha were selected randomly from 11 villages of these unions. A map of Patuakhali district showing Dumki upazila and a map of Dumki upazila showing the study area have been shown in Fig 3.1 and 3.2, respectively.

3.2 Population and Sample of the Study

Two separate lists of farmers of the selected two villages were prepared by the researcher himself with the help of the Sub-Assistant Agriculture Officer (SAAO) of Upazila Agriculture Office (UAO), Dumki. The list comprised of a total of farm family from which 401 farm family heads from Kartikpasha village and 685 from South Pangashia village under the union of Lebukhali and Pangashia were selected respectively which constituted the population of the study.

There are several methods for determining the sample size. Hear, researcher used Creative Research System (1980) formula for study group:

$$\text{SS} = \frac{z^2 * (\text{p}) * (1-\text{p})}{c^2}$$

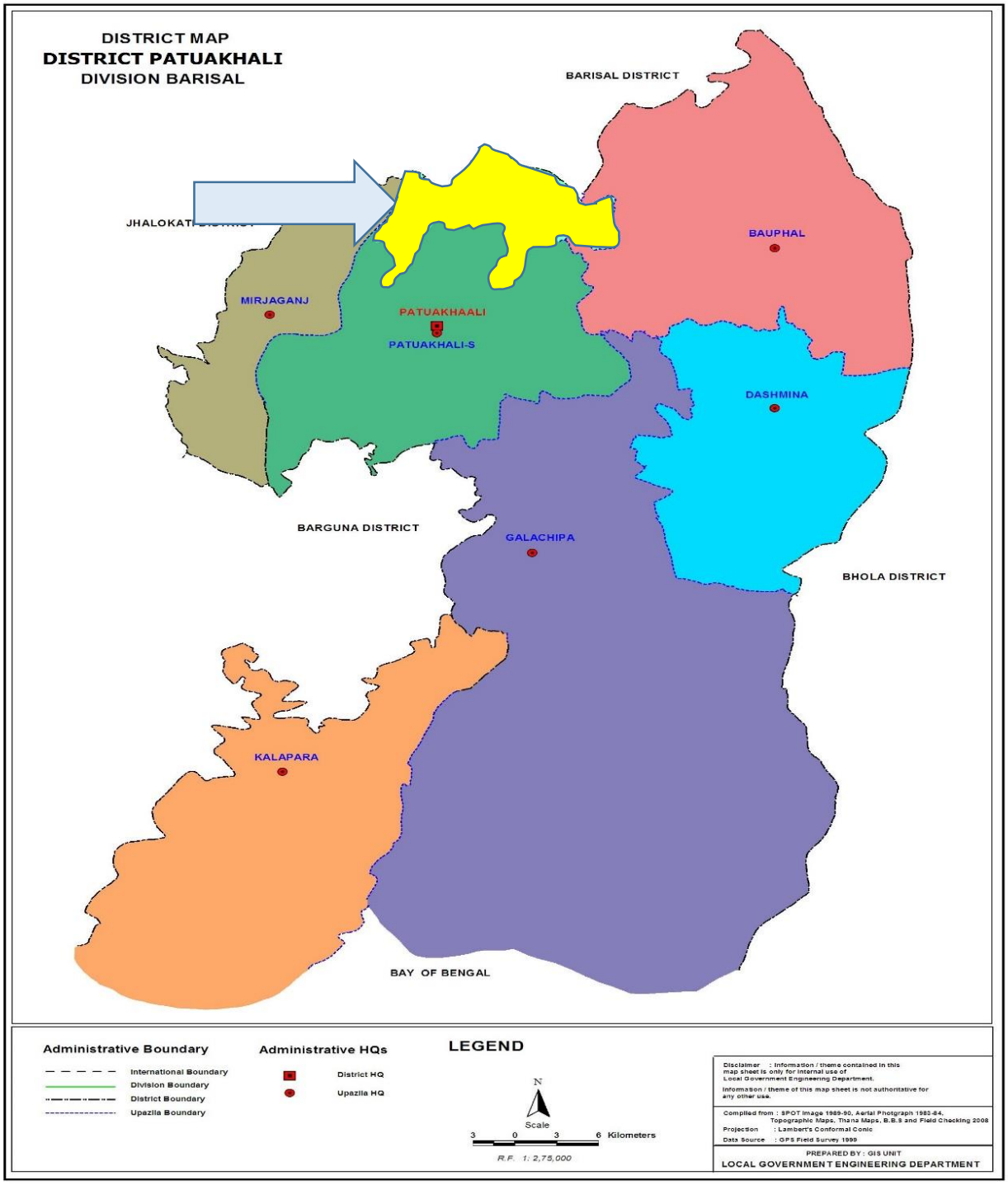

Figure 3.1 A Map of Patuakhali district showing Dumki upazila

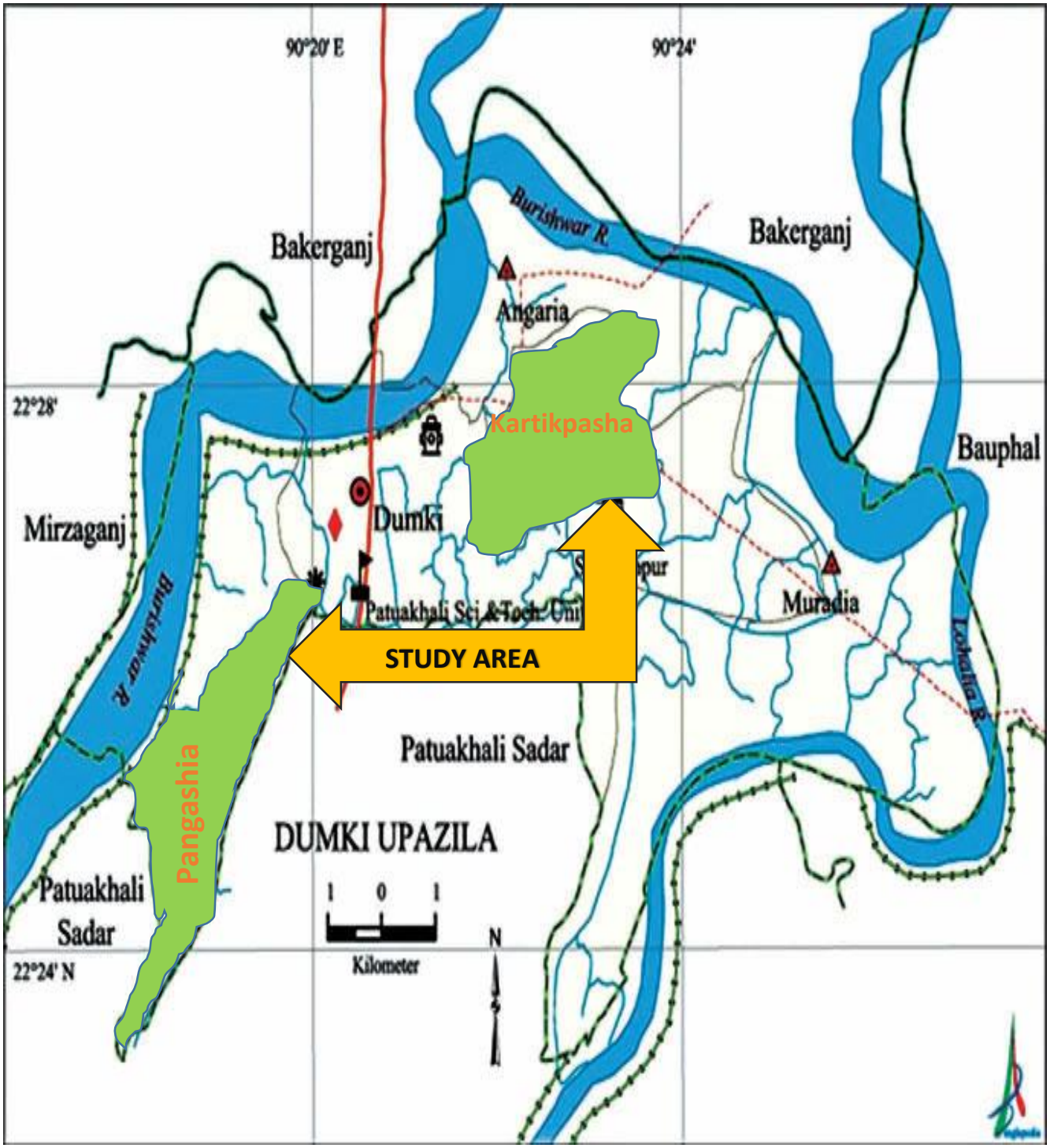

Figure 3.2 A map of Dumki upazila showing the study area (Lebukhali and Pangashia Union)

Where,

SS = Sample size

Z = Z value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal (.5 used for sample size needed)

c = confidence interval, expressed as decimal (e.g., .01 = ±1) 10%

Correction for Finite Population:

$$\text{New ss} = \frac{SS}{1+\frac{ss-1}{PoP}}$$

Where,

PoP = Population

By using the above formula, the sample size was determined as 88 for this study. Separate sample sizes of each of the villages were determined proportionately. Sample was drawn from the population by using proportionate random sampling method.

A reserve list of 9 farmers was also prepared by using 10 percent of the sample size so that the respondent of this list could be used for interview if the respondents included in the original sample were not available at the time of conduction of interview. The distribution of the population, sample and number of respondent in the reserve list are given in Table 3.1.

Table 3.1 Distribution of the population and sample of the respondents with reserve list

Name of Unions	Name of villages	Population (No. of total farmers)	Sample Size	Reserve list
Lebukhali	Kartikpasha	401	32	3
Pangashia	South Pangashia	685	56	6
Total		1086	88	9

3.3 Data Collecting Instrument

In a social research, preparation of an interview schedule for collection of information with very careful consideration is necessary. Keeping this fact in mind the researcher prepared an interview schedule carefully for collecting data from the respondents. Objectives of the study were kept in view while preparing the interview schedule.

The initially prepared interview schedule was pre-tested among 10 respondents of the study area. The pretest was helpful to find out gaps and to locate faulty questions and statements. Alterations and adjustments were made in the schedule on the basis of experience of the pretest. English version of the interview schedule is shown in appendix-A.

3.4 Collection of Data

The researcher collected data from the sample farmers with the help of a pretested interview schedule. Before starting collection of data, the researchers met with the local SAAOs of the respective blocks in order to explain the objectives of the study and requested them to provide necessary help and cooperation in collection of data. The local leaders of the area were also approached to render essential help. As a result of all these a good working atmosphere was created in the study area which was very helpful for collection of data by the researcher.

Before going to the respondents for interview they were informed earlier, so that they would be available in their respective area. The interviews were held individually in the house or farms of the respective respondent. The researcher established adequate rapport so that the respondents did not feel hesitant to provide actual information. Whenever any respondent faced difficulty in understanding a particular question, the researcher took care to explain the same clearly. No serious constraints were faced by the researcher in collecting data. Collection of data took 31 days from 6th October to 5th November 2019.

3.5 Variables of the study

Adoption of selected conservative agricultural practices by the farmers were the main focus of this study and it was considered as the predicted variable.

For selection of experimental variables the researcher went through the past related literature as far as available. He discussed with the researcher, experts in the relevant fields and research fellows in agricultural and related disciplines. He also carefully noticed the various

characteristics of the farmers of the study. Availability of time, money and other resources were also kept in view in selecting the variables. Characteristics of the farmers like age, level of education, working family size, effective land possession, cropping intensity, annual family income, marketing opportunity, cosmopoliteness, extension contact, training exposure, decision making ability, conservative agricultural knowledge, problems faced in conservative agriculture and attitude towards conservative agriculture were selected as the experimental variables.

3.6 Measurement of Variables

In order to conduct the study in accordance with the objectives, it was necessary to measure the selected variables. This section contains procedures for measurement of both experimental as well as predicted variables of the study. The procedures followed in measuring the variables are presented below:

3.6.1 Measurement of experimental variables

It was pertinent to follow a methodological procedure for measuring the selected variables in order to conduct the study in accordance with the objectives already formulated. The procedures for measuring the experimental variables are described below:

3.6.1.1 Age

Age of a respondent was measured in terms of years from birth to the time of interview which was found on the basis of response (Azad, 2014). A score of one (1) was assigned for each year of age. Question regarding this variable appears in item no. 1 in the interview schedule (Shown in Appendix-A).

3.6.1.2 Level of education

Education was measured in terms of one's year of schooling. One score was given for passing each year in an educational institution (Amin, 2004). For example, if the respondent passed the S.S.C. examination, his education score was given as 10, if passed the final examination of class Seven (VII), his education scores was given as 7. If the 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/her name only. Question regarding this variable appears in the item no. 2 in the interview schedule (Shown in Appendix-A).

3.6.1.3 Working family size

The working family size was measured by the total number of members in the family except below age 6 of a respondent. The family members included family head and other dependent members like husband/wife, children, etc. who lived and ate together. A unit score 1 was assigned for each member of the family. If a respondent had five members in his/her family, his/her family size score was given as 5. Question regarding this variable appears in the item no. 3 in the interview schedule (Shown in Appendix-A).

3.6.1.4 Effective land possession

Effective land possession of a respondent referred to his total area of land in terms of ownership and benefit obtained from the land. It was measured in hectares using the following formula as developed by Karim and Mahboob (1974) with some modification:

ELP = a + b + c + ½(d + e)

Where,

ELP = Effective land possession (in hectare)

a = Homestead agricultural area

b = Own land under own cultivation

c = Land taken from others on lease

d = Land taken from others as half-share basis

e = Land given to others as half-share basis

3.5.1.5 Cropping intensity

Based on net cropped area and total cropped area, cropping intensity of a farmer's land was measured by using the following formula:

$$\text{Cropping Intensity} = \frac{\text{Total cropped area}}{\text{Net cropped area}} \times 100$$

Where,

Net cropped area = Total area of land (in hectares) regardless the number of crops raised in the last year on which the respondent's family carried out farming operation

= Single cropped area + Double cropped area + Triple cropped area

Total cropped area = Total area of land (in hectares) regardless the number of crops raised in the last year on which the respondent's family carried out farming operation

= Single cropped area×1 + Double cropped area×2 + Triple cropped area×3

3.6.1.6 Annual family income

Annual family income referred to the total earnings of a respondent and the members of his family from agricultural and non-agricultural sources (business, services, daily labour etc.) during the previous year. It was measured by the total earning of all the members of the family. Annual family income was expressed in '000' taka (Shown in Appendix-A).

3.6.1.7 Marketing opportunity

Marketing opportunity of a farmer was considered to be very suitable when the four indicators such as transport facilities, buying price of agricultural inputs, selling price of agricultural produces and storage facilities were very good, very low, very high and very good respectively and vice-versa. In this connection, scoring system was used as follows:

Items	Scores				
Transport facilities	Very good (5)	Good (4)	Fair (3)	Bad (2)	Very bad (1)
Buying products of agricultural inputs	Very low (5)	Low (4)	Fair (3)	High (2)	Very high (1)
Selling price of agricultural produces	Very high (5)	High (4)	Fair (3)	Low (2)	Very low (1)
Storage facilities	Very good (5)	Good (4)	Fair (3)	Bad (2)	Very bad (1)

Respondents were asked on the above items and they gave responses as perceived by them. Finally marketing opportunity was determined by summing up all the scores of all the responses of a respondent. Thus, marketing opportunity score of a respondent could range from 4 - 20, where 4 indicated very low marketing opportunity and 20 indicated very high marketing opportunity (Shown in Appendix-A).

3.6.1.8 Cosmopoliteness

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

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

The cosmopoliteness score of a respondent was determined by adding together the scores obtained from visit to each of the eight (8) types of places. The cosmopoliteness score of the respondents could range from 0 to 32, where, 0 indicating no cosmopoliteness and 32 indicating very high cosmopoliteness (Appendix-A).

3.6.1.9 Extension contact

The extension contact of a respondent was measured in terms of his extent of contact with twenty selected extension media. A scale was developed arranging the weights for 0, 1, 2, 3 and 4 for the responses for never, rarely, occasionally, frequently and regularly contact with these media respectively. Extension contact score of the respondents could range from 0 to 80, while '0' indicating no extension contact and '80' indicating very high extension contact (Appendix-A).

3.6.1.10 Training exposure

Training exposure was measured by the total number of days a respondent received training in his/her life on conservative agriculture. A score of 1 (one) was given to a respondent for every day of training. A zero (0) score was assigned for no training exposure (Shown in Appendix-A).

3.6.1.11 Decision making ability

Decision making ability of a respondent was measured by using a 3-point rating scale. Each respondent was asked to indicate the extent of his decision making ability in each of the six (6) selected items by checking any one of the responses viz. 'decision making by alone', 'decision making with family members', and 'decision making with others outside the family'. The weights were assigned to the responses as 3, 2 and 1 for decision making by alone, decision making with family members and decision making with others outside the family respectively. Finally decision making ability score of a respondent was computed by summing up his all the scores for his responses to all the items. Thus decision making ability scores of the respondents could range from 6 - 18, where 6 indicated very low decision making ability and 18 indicated very high decision making ability (Appendix-A).

3.6.1.12 Conservative agricultural knowledge

The knowledge of a farmer was determined by computing a knowledge score based on the answer against 24 questions regarding conservative agriculture**.** The ecological knowledge scale developed by Ali (2009) was used by the present researcher to measure the conservative agricultural knowledge. Each of the questions of the scale carried a full weight of 1 (one). Respondent were asked to choose correct answer against alternative answer. A farmer received a full weight of 1, for each correct answer and 0 for wrong and no answer. Thus, knowledge score of a farmer could range from 0 to 24, where '0' indicated very low knowledge and '24' indicated highest level of knowledge on conservative agriculture (Appendix-A).

3.6.1.13 Problems faced in conservative agriculture

For measuring problems faced in conservative agriculture, items containing social, technical, economical, marketing and psychological problems were selected after thorough consultation with the extension experts, researchers and from other available sources. Twenty four items of problems were selected and arranged in the scale in order to have real feelings on problems faced in conservative agriculture.

The nature of responses of the respondents to the items was 'severe problem, moderate problem, Low problem and no problem and the scores were assigned as 3, 2, 1, 0 respectively. Problems faced in conservative agriculture score of a respondent was determined by adding up all the scores for all the responses of the items of that respondent. The possible range of score of

problems faced in ecological agriculture was 0 - 72, while 0 indicating no problems and 72 indicating very severe problems faced in conservative agriculture (Appendix-A).

Attempts were made to compare the Problems by using problems Faced index (PFI) with the following formula

$$PFI = Ps\times3 + Pm\times2 + P_l\times1 + Pn\times0$$

Where, PFI= Problem Faced Index

Ps = No. of farmers faced serious problem

Pm = No. of farmers faced moderate problem

P_l = No. of farmers faced less problem

P_n = No. of farmers faced no problems

Thus, the possible PFI of problems items could range from 0 – 264, where '0' indicating no problems and '264' indicating serious problem. To compare the severity of the problems, rank order was made by the descending order of the PFI.

3.6.1.14 Attitude towards conservative agriculture

Attitude towards conservative agriculture was measured by using scale developed by Ali (2009) for measuring attitude towards ecological agriculture. Each of the 12 statements (containing 6 positive and 6 negative) had five alternative choices of responses, viz. 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree'. Scores were assigned for the alternative responses as 4, 3, 2, 1 and 0 respectively for the positive statements and reverse scores were assigned for the negative statements.

Thus the possible score of attitude towards ecological agriculture of the pretest sample farmers could range from 0 - 48, while 0 indicating very high unfavorable attitude and 48 indicating very high favorable attitude towards conservative agriculture (Appendix-A).

3.6.2 Measurement of adoption of conservative agricultural practices

Sixteen conservative agricultural practices containing seven for nutrient management and nine for pest management were selected from scale developed by Ali (2009) for measuring adoption of ecological agricultural practice. The adoption of a particular conservative agricultural practice by each farmer was then measured by the following formula:

$$A = \sum_{1}^{4} \frac{\mathrm{e}}{\mathrm{p}} 100m$$

Where, A = Adoption of a particular practice

e = Effective area or area (in hectare) actually covered by the practice under respective mode

p = Potential area or area (in hectare) suitable for the practice

m= weight of respective mode (0/0.33/0.67/1.00)

Weight of mode of application of each practice was as follows:

Mode of application of the practice		**Weight**
Mode-1 (M_1):	No use of the practice	0.00
Mode-2 (M_2):	Less use of the practice with large use of chemical fertilizers or chemical pesticides (large use of chemical fertilizers means use of >50% of the recommended doses of chemical fertilizers and large use of chemical pesticides means use of chemical pesticides for pest control at normal attack.)	0.33
Mode-3 (M_3):	Large use of the practice with less use of chemical fertilizers or chemical pesticides (less use of chemical fertilizers means use of <50% of the recommended doses of chemical fertilizers and less use of chemical pesticides means use of chemical pesticides for pest control only at the time of severe attack.)	0.67
Mode-4 (M_4):	Use of the practice without any chemical fertilizers or chemical pesticides	1.00

Thus, adoption of a particular conservative agricultural practice could range from 0 to 100, where 0 indicated no adoption and 100 indicated very high adoption of that conservative agricultural practice.

Score of adoption of conservative nutrient management practices of each farmer was measured by summing up all the scores of seven selected conservative nutrient management practices. Thus, score of adoption of conservative nutrient management practices of the farmers could range from 0 to 700, where 0 indicated no adoption and 700 indicated very high adoption of conservative nutrient management practices.

Similarly, Score of adoption of conservative pest management practices of each farmer was measured by summing up all the scores of nine selected conservative pest management practices for crop production. Thus, score of adoption of conservative pest management practices of the farmers could range from 0 to 900, where 0 indicated no adoption and 900 indicated very high adoption of conservative pest management practices. Composite adoption of conservative agricultural practices of each farmer was then determined by adding up the scores of adoption of conservative nutrient management practices and adoption of conservative pest management practices. Therefore, score of composite adoption of conservative agricultural practices could range from 0 to 1600, where 0 indicated no adoption and 1600 indicated very high adoption of conservative agricultural practices (Appendix-A).

3.7 Statement of the Hypotheses

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

3.7.1 Research hypotheses

In the light of the objectives of the study and variables selected, the following research hypotheses were formulated to test them in. The research hypotheses were stated in positive form, the hypotheses were as follows:

"Each of the fourteen selected characteristics of the farmers have signifying relationship with their adoption of selected conservative agricultural practices."

3.7.2 Null hypotheses

In order to conduct statistical tests, the research hypotheses were converted to null form. Hence, the null hypotheses were as follows:

"Each of the fourteen selected characteristics of the farmers have no relationship with their adoption of selected conservative agricultural practices."

3.8 Data Processing

3.8.1 Editing

The collected raw data were examined thoroughly to detect errors and omissions. As a matter of fact the researcher made a careful scrutiny of the completed interview schedule to make sure that necessary data were entered as complete as possible and well arranged to facilitate coding and tabulation. Very minor mistakes were detected by doing this, which were corrected promptly.

3.8.2 Coding and tabulation

Having consulted with the research supervisor and co-supervisor, the investigator prepared a detailed coding plan. In case of qualitative data, suitable scoring techniques were followed by putting proper weight age against each of the traits to transform the data into quantitative forms. These were then tabulated in accordance with the objective of the study.

3.8.3 Categorization of data

Following coding operation, the collected raw data as well as the respondents were classified into various categories to facilitate the description of variables. These categories were developed for each of the variables by considering the nature of distribution of the data and extensive literature review. The procedures for categorization have been discussed while describing the variables under consideration in chapter IV.

3.9 Statistical Analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Science) computer program, version 20.

The statistical measures such as range, mean, standard deviation, percentage, rank order were used for describing both the independent and dependent variables. Tables were also used in presenting data for clarity of understanding. Initially, Pearson Product Moment correlation was run to determine the relationship between the selected characteristics of the vegetable grower with their marketing constraints. Five percent (0.05) level of probability was used as the basis for rejection of a null hypothesis throughout the study. Co-efficient values significant at 0.05 level is indicated by one asterisk (*) and that at 0.01 level by two asterisks (**). For determining severity of the problems, rank order was made based on the descending order of the Problem Faced Index (PFI).

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter deals with the result and discussion of present research work. Necessary explanations and appropriate interpretations have also been made showing possible and logical basis of the findings. The **first** section deals with selected characteristics of the farmers, while the **second** section deals with the adoption of selected conservative agricultural practices by the farmers, in the **third** section, relationships between selected characteristics of the farmers and their adoption of selected conservative practices have been discussed. The **fourth** section deals with the problem confronted by the farmers during adoption of selected conservative agricultural practices. However, for convenience of the discussions, the findings are systematically presented in the following sections.

4.1 Characteristics of the farmers

This section deals with the selected characteristics of rice farmers which were assumed to be associated with the adoption of selected conservative practices. Different farmers possess different characteristics which are focused by his/her behavior. In this section 15 characteristics have been discussed. The selected characteristics of the farmers were; age, level of education, working family size, effective land possession, cropping intensity, annual family income, marketing opportunity, cosmopoliteness, extension contact, training exposure, decision making ability, conservative agricultural knowledge, problems faced in conservative agriculture, attitude towards conservative agriculture and adoption of conservative agriculture. Measuring unit, range, mean and standard deviations of those characteristics of farmers were described in this section.

Table 4.1 Farmers' Personal Characteristics Profile

Sl. No.	Characteristics (with measuring unit)	Range		Mean	Standard deviation
		Possible	Observed		
01	Age (years)	Unknown	25 – 75	52.72	13.01
02	Level of education (schooling years)	Unknown	0.5 – 16	4.023	4.17
03	Working family size (number of members)	Unknown	2 – 13	6.19	2.084
04	Effective land possession (hectare)	Unknown	0.89 –2.0	0.57	0.402
05	Cropping intensity (Percentage)	Unknown	123.52 – 300	207.16	29.79
06	Annual family income ('000'BDT)	Unknown	29-199	86.069	34.74
07	Marketing opportunity (Score)	4 – 20	4-13	7.14	2.001
08	Cosmopoliteness (Score)	0 – 32	2 – 26	10.36	4.902
09	Extension contact (Score)	0 – 80	7-52	24.59	10.03
10	Training received (Number of days)	Unknown	0-10	1.53	2.38
11	Decision making ability (Score)	6 – 18	6– 17	10.69	2.89
12	Conservative agricultural knowledge (Score)	0 – 24	6 – 23	14.31	4.05
13	Problems faced in conservative agriculture (Score)	0 – 72	22 – 57	36.16	8.99
14	Attitude towards conservative agriculture (Score)	0 - 48	19– 48	31.27	6.565
15	Adoption of selected conservative agricultural practice (Score)	0 - 1600	160.2 - 913.7	498.72	221.95

4.1.1 Age

Age of the respondents varied from 25 to 75 years, the average being 52.72 years with the standard deviation of 13.010. According to their age, the respondents were classified into three categories as "young aged", "middle aged" and "old aged". The distribution of the farmers according to their age is shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their age

Categories	Basis of categorization (year)	Respondents	
		Numbers	Percent
Young aged	Up to 35	8	9.1
Middle aged	36-50	32	36.4
Old aged	Above 50	48	54.5
Total		88	100

Data represented in Table 4.2 indicate that the old aged rice farmers comprised the highest proportion (54.5 percent) followed by middle aged category (36.4 percent) and the lowest proportion were made by the young aged category (9.1 percent). Data also indicates that the old and middle aged respondents constitute almost 90.9 percent of total respondents. The old and middle aged respondents were generally more involved in rice farmers than the young aged.

4.1.2 Level of Education

Education level of the respondents ranged from 0.5-16 in accordance with year of schooling. The average education score of the respondents was 4.023 with a standard deviation of 4.1688. On the basis of their level of education, the farmers were classified into five categories as shown in Table 4.3.

Table 4.3 Distribution of the farmers according to their level of education

Categories	Basis of Categorization (schooling years)	Respondents	
		Number	Percent
Can sign only	0.5	40	45.5
Primary	1-5	23	26.1
Secondary	6-10	17	19.3
Above secondary	Above 10	8	9.1
Total		88	100

Data shown in the Table 4.3 indicates that respondent under can sign only category constitute the highest proportion (45.5 percent) followed by primary education category (26.1 percent). On the other hand, the lowest proportion (9.1 percent) in above secondary education category followed by secondary education category (19.3 percent). Education broadens the horizon of outlook of farmers and expands their capability to analyze any situation related to agricultural production. An educated farmers is likely to be more responsive to the modern facts, ideas, technology and information of agricultural production. To adjust with the same, they would be progressive minded to adopt as well as involve with modern cultural, processing facilities of agricultural produces with searching for the opportunities to exports their produces in different countries through proper marketing channel (Azad *et al.*, 2014).

4.1.3 Working family Size

The number of family members of the respondents ranged from 2 to 13 with an average of 6.19 and standard deviation of 2.084. Based on the family size the respondents were classified into three categories as small, medium and large family as shown in Table 4.4.

Table 4.4 Distribution of the farmers according to their family size

Categories (No. of members)	Basis of categorization (No. of family member)	Respondents	
		Numbers	Percent
Small family	Up to 4	16	18.2
Medium family	5-8	60	68.2
Large family	Above 8	12	13.6
Total		88	100

Data furnished in the Table 4.4 indicated that the highest proportion (68.2 percent) of the respondents had medium family size consisting 5 to 8 members, while 18.2 percent of the respondents belonged to the category of small family compared to 13.6 percent of them having large family size. Such findings is quite normal as per the situation of Bangladesh (BBS, 2017). The trend of nuclear family has been rising in the study area and subsequent the family member becoming smaller than the extended family.

4.1.4 Effective land possession

Farm size of the respondents ranged from .89 hectare to 2.00 hectares with the mean of 0.57 and standard deviation of 0.40. On the basis of their farm size, the farmers were classified into three categories as shown in Table 4.5.

Table 4.5 Distribution of the farmers according to their farm size

Categories	Basis of categorization (ha)	Respondents	
		Number	Percent
Marginal farm	Up to .497	52	59.1
Small farm	0.5 – 1.0	26	29.5
Medium farm	1.01 – 3.0	10	11.4
Total		88	100

Data presented in the Table 4.5 demonstrated that highest proportion (59.1 percent) of the farmers had marginal farm compared to 29.5 percent having small farm and only 11.4 percent had medium farm. The findings indicated that overwhelming majority (88.6 percent) of the farmers had marginal to small farm size. In Bangladesh most of the farmers live below a subsistence level. This in one of the vital reasons for not adopting improved farming practices in their farm as well as having lower skill on agricultural production practices.

4.1.5 Cropping intensity

Procedure for measurement of cropping intensity of the respondent farmers is described in Chapter 3 of this dissertation. Cropping intensity of the respondents was found to range from 123.52% to 300% with an average of 207.164% and standard deviation of 29.794. Depending on the cropping intensity, the farmers were classified into three categories, while national average cropping intensity is about 190% (BBS, 2019). The categories and distribution of the respondents were shown in Table 4.6

Table 4.6 Distribution of the farmers according to their cropping intensity

Categories	Basis of categorization (percent)	Respondents	
		Number	Percent
Low (< Mean - Sd)	Up to 177.37	15	17.0
Medium (Mean ± Sd)	177.38 – 236.96	61	69.4
High (> Mean + Sd)	Above 236.96	12	13.6
Total		88	100

Data furnished in Table 4.6 indicated that the higher proportion (83.0 percent) of the farmers had cropping intensity near about national average as compared to 17.0 percent having cropping intensity below from national average. The farmers were conservative farmers and conservative farming encourages the farmers to produce more types of crops in their field. These might be the reasons for higher cropping intensity of the farmers of the study area.

4.1.6 Annual family income

Annual family income of the respondents ranged from 29.0 to 199.0 thousand taka. The mean was 86.069 thousand taka and standard deviation was 34.74. On the basis of annual family income, the respondents were categorized into two groups as shown in Table 4.7.

Table 4.7 Distribution of the farmers regarding annual family income

Categories	Basis of categorization ('000' BDT)	Respondents	
		Number	Percent
Low income	Up to 100	60	68.2
Medium income	Above 100	28	31.8
Total		88	100

Data shown in Table 4.7 presented that the highest proportion (68.2 percent) of the respondents had low family income while 31.8 percent of the respondents had medium annual family income.

The gross annual family income of a farmer is an important indicator of how much s/he can invest in his farming. Generally higher income encourages one's integrity to achieve better

performance and to show his/her individual better status in the society. The higher income increases the risk taking capacity of the farmers' adoption of conservative agriculture practices. Farmers with low income generally invest less in their farms. It is therefore, likely that a considerable portion of farmers may face difficulty in conservative agriculture practices.

4.1.7 Marketing opportunity

Marketing opportunity score of the farmers was found to range from 4 to 13 against the possible range of 4 to 20 with mean and standard deviation were 7.14 and 2.001 respectively. On the basis of marketing opportunity, the respondent farmers were classified into three categories such as, low marketing opportunity, medium marketing opportunity and high marketing opportunity (Table 4.8).

Table 4.8 Distribution of the farmers regarding marketing opportunity

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low marketing opportunity	Up to 7	47	53.4
Medium marketing opportunity	8 – 10	37	42.1
High marketing opportunity	Above 10	4	4.5
Total		88	100

Data presented in Table 4.8 showed the distribution of the farmers on the basis of their marketing opportunity. It indicated that the highest proportion (53.4 percent) of the farmers belonged to low marketing opportunity group, while 42.1 and 4.5 percent were medium and high marketing opportunity group respectively. Thus, an overwhelming majority (95.5 percent) of the respondents had low to medium marketing opportunities. However, there existed positive relationship between marketing opportunities and adoption of conservative agricultural practices of the respondent.

4.1.8 Cosmopoliteness

The observed cosmopoliteness scores of the farmers ranged from 2 to 26 against the possible range of 0 to 32. The mean score was 10.36 with the standard deviation 4.90. Based on the observed cosmopoliteness scores, the farmers were classified into three categories as shown in Table 4.9.

Table 4.9 Distribution of the farmers regarding cosmopoliteness

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low cosmopoliteness	Up to 10	53	60.2
Medium cosmopoliteness	11-19	31	35.3
High cosmopoliteness	Above 19	4	4.5
Total		88	100

Data furnished in Table 4.9 indicated that more than half (60.2 percent) of the farmers had low cosmopoliteness as compared to 35.5 percent having medium cosmopoliteness and 4 percent high cosmopoliteness. Data also indicate that 95.5 percent of the farmers were under low to medium cosmopoliteness. However, cosmopoliteness of the respondent farmers was positively related to their adoption of conservative agricultural practices (r = 873, significant at 0.01 level).

4.1.9 Extension contact

The observed extension contact scores of farmers ranged from 7 to 52 against the possible range from 0 to 80, the mean and standard deviation were 24.59 and 10.028 respectively. According to this score, the farmers were classified into three categories: "low extension contact" (up to 20), "medium extension contact" (21-40) and "high extension contact" (above 40). The distribution of the farmers according to their extension contact is shown in Table 4.10

Table 4.10 Distribution of the farmers according to their extension contact on conservative agricultural practice

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low extension contact	Up to 20	32	36.4
Medium extension contact	21-40	49	55.6
High extension contact	Above 40	7	8
Total		88	100

Data presented in the Table 4.10 showed that a proportion of 55.6 percent of the farmers had medium extension contact compared to 36.4 percent of them having low extension contact. Only 8 percent of the farmers had high contact. Thus, overwhelming majority (92.0 percent) of the farmers had low to medium extension contact. Extension contact is a very effective and powerful source of receiving information about various new and modern technologies. The status of no or having low and medium contacts might have significant impacts on the adoption of conservative agriculture.

4.1.10 Training exposure

The score of training exposure on conservative agriculture of the farmers ranged from 0-10 days. The mean was 1.53 days and standard deviation was 2.38. On the basis of training exposure on agricultural cultivation, the respondents were categorized into three groups as shown in Table 4.11.

Table 4.11 Distribution of the farmers according to their training exposure on agricultural cultivation

Categories	**Basis of categorization** (Number of days)	**Respondents**	
		Number	**Percent**
No training	0	52	59.1
Very short duration training	1-3	22	25
Short duration training	4-10	14	15.9
Total		88	100

Data presented in the Table 4.11 showed that more than half (59.1 percent) of the farmers had no training exposure; while only 15.9 percent of the farmers had short duration training exposure where 14 percent of the farmers had very short duration training exposure. Training develops farmers' knowledge, skill, and attitude in positive manner. However, the findings show interns of training received, respondent status was found unsatisfactory.

4.1.11 Decision making ability

Decision making ability scores of the farmers ranged from 6 to 17 against the possible range of 6 to 18, the mean was 10.69 and standard deviation was 2.89. Based on the decision making

ability scores, the farmers were classified into three categories as low decision making ability, medium decision making ability and high decision making ability. The respondents were categorized into three groups as shown in Table 4.12.

Table 4.12 Distribution of the farmers regarding decision making ability

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low decision making ability	Up to 9	33	37.5
Medium decision making ability	10-13	38	43.2
High decision making ability	Above 13	17	19.3
Total		88	100

Table 4.12 indicated that majority (43.2 percent) of the respondents had medium decision making ability, while 37.5 and 19.3 percent had low and high decision making ability respectively. The data also revealed that an overwhelming majority (80.7 percent) of the respondent farmers had low to medium decision making ability. However, there was a positive relationship between decision making ability and adoption of conservative agricultural practices (r = 0.831, significant at 0.01 level).

4.1.12 Conservative agricultural knowledge

The procedure followed in computing conservative agricultural knowledge of the farmers has been described in Chapter 3. Conservative agricultural knowledge scores of the farmers of the study area ranged from 6 to 23 against the possible range of 0 to 24. The mean and standard deviation were 14.31 and 4.05 respectively. According to the conservative agricultural knowledge score, the farmers were classified into three categories as low knowledge, medium knowledge and high knowledge in conservative agriculture. The respondents were categorized into three groups as shown in Table 4.13.

Table 4.13 Distribution of the farmers regarding conservative agricultural knowledge

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low knowledge	Up to 8	5	5.7
Medium knowledge	9-16	52	59.1
High knowledge	Above 16	31	35.2
Total		88	100

Data contained in Table 4.13 indicated that about two-third (59.1 percent) of the farmers had medium conservative agricultural knowledge, while 5.7 and 35.2 percent had low and high conservative agricultural knowledge respectively. The data again revealed that the overwhelming majority of the farmers had either low or medium conservative agricultural knowledge. However, there was a positive relationship between conservative agricultural knowledge and adoption of conservative agricultural practices (r = 0.782, significant at 0.000 level).

4.1.13 Problem faced in conservative agriculture

Problem faced in conservative agriculture score of the farmers was found to range from 22 to 57 against the possible range of 0 to 72 with mean and standard deviation were 36.16 and 8.999 respectively. On the basis of problem faced in conservative agriculture, the respondent farmers were classified into three categories as low problem faced, medium problem faced and high problem faced in practicing conservative agriculture. The respondents were categorized into three groups as shown in Table 4.14.

Table 4.14 Distribution of the farmers regarding problem faced in conservative agriculture

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low problem	Up to 24	4	4.5
Medium problem	25 – 48	73	83
High problem	Above 48	11	12.5
Total		88	100

Data presented in Table 4.14 indicated that highest proportion (83 percent) of the farmers faced medium problem in conservative agriculture compared to 12.5 and 4.5 percent having high and low problem faced in conservative agriculture. Thus, majority (95.5 percent) of the respondent faced medium to high problem in conservative agriculture. However, problem faced in conservative agriculture had a negative relationship with adoption of conservative agricultural practices of the farmers (r = -0.677, significant at 0.01 level).

4.1.14 Attitude towards conservative agriculture

The procedure followed in computing the respondent farmers' attitude towards conservative agriculture has been described in Chapter 3. The computed attitude towards conservative agriculture scores of the respondent farmers ranged from 19 to 48 against possible scores of 0 to 48. The mean and standard deviation were 31.27 and 6.57 respectively. There were 12 statements in attitude towards conservative agriculture scale. Some respondents have negative attitude towards some statements. But somebody had composite negative attitude towards conservative agriculture. On the basis of the computed attitude towards conservative agriculture scores, the farmers were classified into three categories as Unfavorable attitude, low favorable attitude and high favorable attitude towards conservative agriculture. The respondents were categorized into three groups as shown in Table 4.15.

Table 4.15 Distribution of the farmers regarding attitude towards conservative agriculture

Categories	Basis of categorization (ha)	Respondents	
		Number	Percent
Unfavorable attitude	Up to 23	11	12.5
Low favorable attitude	24 – 36	57	64.8
High favorable attitude	Above 36	20	22.7
Total		88	100

Data entered in the Table 4.15 indicated that the highest proportion (64.8 percent) of the farmer had low favorable attitude towards conservative agriculture as compared to 22.7 and 12.5 percent having high and unfavorable attitude towards conservative agriculture respectively.

The data also revealed that the most (87.5 percent) of the respondent farmers had low to high favorable attitude towards conservative agriculture. However, attitude towards conservative agriculture of the respondent farmers had a positive relationship with their adoption of conservative agricultural practices (r = 0.764, significant at 0.000 level).

4.2 Adoption of conservative agricultural practices

Adoption of conservative agricultural practices by the farmers was the predicted variable of this study and it was measured by computing scores according to extent of adoption as described in methodology (Chapter III). Adoption of conservative agricultural practices by the farmers scored varied from 160.20 to 913.70 with the mean and standard deviation of 498.72 and 221.95 respectively. On the basis of adoption scores, the farmers were classified into three categories namely low, medium and high adoption of conservative agricultural practices. The distribution of the farmers according to their adoption of conservative agricultural practices score under the study is given in Table 4.16.

Table 4.16 Distribution of the farmers regarding adoption of conservative agriculture

Categories	Basis of categorization (Score)	Respondents	
		Number	Percent
Low adoption (< Mean - Sd)	< 276.77	10	11.4
Medium adoption (Mean ± Sd)	276.77 – 720.68	61	69.3
High adoption (> Mean + Sd)	> 720.68	17	19.3
Total		88	100.0

Table 4.16 indicates that among the respondents, the highest proportion (69.3 percent) of the farmers belongs to the group of medium adoption and the lowest percentage (11.4 percent) in low adoption followed by high adoption (19.3 percent) of conservative agricultural practices. The findings again revealed that overwhelming proportion (80.7 percent) of the farmers have low to medium adoption of conservative agricultural practices.

Extent of Adoption of Selected Conservative Agricultural Practices

Two dimensions of conservative agricultural practices namely, Conservative nutrient management practices and conservative pest management practices were considered in this

study. Salient features like possible range, observed range, mean and standard deviation of adoption scores of these two dimensions of conservative agricultural practices with category wise distribution of the farmers are presented in Table 4.17.

Table 4.17 Salient features and distribution of the farmers according to their extent of adoption of two types of conservative agricultural practices

Dimensions of ecological agricultural practices	Categories	Range		Farmers		Mean	SD
		Possible	Observed	Number	Percent		
Conservative Nutrient management practices	Low adoption (up to 134.40)	0 - 700	64 - 604	16	18.2	282.79	148.38
	Medium adoption(134.41– 431.17)			52	59.1		
	High adoption (above 431.17)			20	22.7		
	Total			88	100		
Conservative pest management practices	Low adoption (Up to 122.04)	0 - 900	56 - 454	12	13.6	215.29	93.237
	Medium adoption(122.05–308.53)			58	65.9		
	High adoption (above 308.53)			18	20.5		
	Total			88	100		

4.2.1 Extent of adoption of conservative nutrient management practices

Findings indicated that adoption of conservative nutrient management practices scores of the farmers ranged from 64 to 604 against the possible range of 0 to 700. The mean and standard deviation were 282.79 and 148.384 respectively. The farmers were classified into three categories on the basis of their adoption of conservative nutrient management practices as shown in Table 4.17.

Majority (59.1 percent) of the farmers had medium adoption as compared to 18.2 and 22.7 percent having low and high adoption of conservative nutrient management practices respectively. Thus, a great majority (77.3 percent) of the farmers had low to medium adoption of conservative nutrient management practices. Only a few of them had high adoption of conservative nutrient management practices. These facts implied that extension educational programs including training need to be arranged by the concerned agencies for the farmers in order to achieve desired benefit in respect of conservative nutrient management practices.

4.2.2 Extent of adoption of conservative pest management practices

Findings indicated that adoption of conservative pest management practices scores of the farmers ranged from 56.0 to 454 against the possible range of 0 to 900. The mean and standard deviation were 215.29 and 93.237 respectively. The farmers were classified into three categories on the basis of their adoption of conservative pest management practices as shown in Table 4.17.

Majority (65.9 percent) of the farmers had medium adoption as compared to 13.6 and 20.5 percent having low and high adoption of conservative pest management practices respectively. Thus, a great majority (79.5 percent) of the farmers had low to medium adoption of conservative pest management practices. Only a few of them had high adoption of conservative pest management practices. These facts implied that training and non-formal educational programs need to be organized by the concerned agencies for the farmers in order to achieve desired benefit in respect of conservative pest management practices.

4.3 Relationship between Selected Characteristics of the Farmers and Their adoption of conservative agriculture

To explore the relationships between the selected characteristics of farmers with their adoption of conservative agriculture practices, Pearson Product Moment correlation was run. From this correlation test, it was found that problem faced in conservative agriculture of the farmers had significant negative and marketing opportunity, cosmopoliteness, extension contact, training exposure, decision making ability, conservative agricultural knowledge and attitude towards conservative agriculture had significant positive relationship with their adoption of selective conservative agriculture practices. Beside these eight characteristics, rest six characteristics of the farmers (age, level of education, active family size, effective land possession, cropping intensity and annual family income) had no significant relationship with their adoption of selective conservative agriculture practices. (Table 4.18). Intercorrelation among all the variables may be seen in Appendix-B.

Table 4.18 Co-efficient of correlation showing relationship between selected characteristics of the farmers and adoption of selective conservative agriculture practices.

Predicted variable	**Experimental variable**	**Computed value " r "**
Adoption of selective conservative agriculture practices	1. Age	.051 NS
	2. Level of education	.122 NS
	3. Active family members	-.042 NS
	4. Effective land possession	.033 NS
	5. Cropping intensity	.015 NS
	6. Annual family income	.088 NS
	7. Marketing opportunity	.539**
	8. Cosmopoliteness	.873**
	9. Extension contact	.930**
	10. Training exposure	.344**
	11. Decision making ability	.831**
	12. Conservative agricultural knowledge	.948**
	13. Problem faced in conservative agriculture	-.677**
	14. Attitude towards conservative agriculture	.919**

NS Not significant

** Significant at 0.01 level of probability

4.3 Relationship between selected characteristics of the farmers and their adoption of selected conservative agricultural practices

4.3.1 Age and adoption of selected conservative agricultural practices

The relationship between age of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between age of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.51 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.51) was smaller than the table value with 86 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was accepted.
- The co-efficient of correlation between the concerned variable was non-significant at 0.05 level of probability.

Thus, the age of the farmers had positive non-significant relationship with their adoption of selective conservative agriculture practices. Poddar *et al.*, (2017) observed the similar findings in their studies.

4.3.2 Level of education and adoption of selected conservative agricultural practices

The relationship between education level of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between education level of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.122 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.122) was smaller than the table value with 86 degrees of freedom at 0.05 level of probability.

- ❖ The concerned null hypothesis was accepted.
- ❖ The co-efficient of correlation between the concerned variable was non-significant at 0.05 level of probability.

Thus, the level of education of the farmers had positive non-significant relationship with their adoption of selective conservative agriculture practices. Poddar *et al.*, (2017) observed the similar findings in their studies.

4.3.3 Working family size and adoption of selected conservative agricultural practices

The relationship between family size of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between family size of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = -.042 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- ❖ The relationship showed a negative trend.
- ❖ The computed value of 'r' (-0.042) was smaller than the table value with 86 degrees of freedom at 0.05 level of probability.
- ❖ The concerned null hypothesis was accepted.
- ❖ The co-efficient of correlation between the concerned variable was non-significant at 0.05 level of probability.

Thus, the working family size of the farmers had negative non-significant relationship with their adoption of selective conservative agriculture practices. Poddar *et al.*, (2017) observed the similar findings in their studies.

4.3.4 Effective farm size and adoption of selected conservative agricultural practices

The relationship between effective farm size of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between effective farm size of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.033 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.033) was smaller than the table value with 86 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was accepted.
- The co-efficient of correlation between the concerned variable was non-significant at 0.05 level of probability.

Thus, the effective farm size of the farmers had positive non-significant relationship with their adoption of selective conservative agriculture practices. Poddar *et al.*, (2017) observed the similar findings in their studies.

4.3.5 Cropping intensity and adoption of conservative agriculture

The relationship between cropping intensity of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between cropping intensity of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.015 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.015) was smaller than the table value with 86 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was accepted.
- The co-efficient of correlation between the concerned variable was non-significant at 0.05 level of probability.

Thus, the cropping intensity of the farmers had positive non-significant relationship with their adoption of selective conservative agriculture practices.

4.3.6 Annual family income and adoption of selected conservative agricultural practices

The relationship between annual family income of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between annual family income of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.088 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.088) was smaller than the table value with 86 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was accepted.
- The co-efficient of correlation between the concerned variable was non-significant at 0.05 level of probability.

Thus, the annual family income of the farmers had positive non-significant relationship with their adoption of selective conservative agriculture practices. Poddar *et al.*, (2017) observed the similar findings in their studies.

4.3.7 Marketing opportunity and adoption of selected conservative agricultural practices

The relationship between marketing opportunity of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between marketing opportunity of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.539 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.539) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.

- ❖ The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the marketing opportunity of the farmers had positive significant relationship with their adoption of selective conservative agriculture practices.

4.3.8 Cosmopoliteness and adoption of selected conservative agricultural practices

The relationship between cosmopoliteness of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between cosmopoliteness of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.873 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- ❖ The relationship showed a positive trend.
- ❖ The computed value of 'r' (0.873) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- ❖ The concerned null hypothesis was rejected.
- ❖ The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the cosmopoliteness of the farmers had positive significant relationship with their adoption of selective conservative agriculture practices. Poddar *et al.,* (2017) observed the similar findings in their studies.

4.3.9 Extension contact and adoption of selected conservative agricultural practices

The relationship between extension contact of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between extension contact of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.930 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.930) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the extension contact of the farmers had positive significant relationship with their adoption of selective conservative agriculture practices. Poddar *et al.*, (2017) observed the similar findings in their studies.

4.3.10 Training exposure and adoption of selected conservative agricultural practices

The relationship between training exposure of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between training exposure of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.344 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.344) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the training exposure of the farmers had positive significant relationship with their adoption of selective conservative agriculture practices. Ahmed (2006) observed the similar findings in their studies.

4.3.11 Decision making ability and adoption of selected conservative agricultural practices

The relationship between decision making ability of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between decision making ability of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.831 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.831) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the decision making ability of the farmers had positive significant relationship with their adoption of selective conservative agriculture practices.

4.3.12 Conservative agricultural knowledge and adoption of selected conservative agricultural practices

The relationship between conservative agricultural knowledge of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between conservative agricultural knowledge of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.948 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- ❖ The relationship showed a positive trend.
- ❖ The computed value of 'r' (0.948) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- ❖ The concerned null hypothesis was rejected.
- ❖ The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the conservative agricultural knowledge of the farmers had positive significant relationship with their adoption of selective conservative agriculture practices.

4.3.13 Problems faced in conservative agriculture and adoption of selected conservative agricultural practices

The relationship between problems faced in conservative agriculture of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between problems faced in conservative agriculture of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = -0.677 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- ❖ The relationship showed a negative trend.
- ❖ The computed value of 'r' (-0.677) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- ❖ The concerned null hypothesis was rejected.
- ❖ The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the problems faced in conservative agriculture of the farmers had negative significant relationship with their adoption of selective conservative agriculture practices.

4.3.14 Attitude towards conservative agriculture and adoption of selected conservative agricultural practices

The relationship between attitude towards conservative agriculture of the farmers and their adoption of selective conservative agriculture practices was examined by testing the following null hypothesis:

"There is no relationship between attitude towards conservative agriculture of the farmers and their adoption of selective conservative agriculture practices."

Co-efficient of correlation between the concerned variables was found to be 'r' = 0.919 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of 'r' (0.919) was greater than the table value with 86 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, the attitude towards conservative agriculture of the farmers had positive significant relationship with their adoption of selective conservative agriculture practices. Alam (2016), Rahman (2019) observed the similar findings in their studies.

4.4 Indexing of the problems faced by the farmers

Data contained in Table 4.19 indicate that "Lack of farm animal" ranked first with PFI value of 230. The second most important problem of the growers was "Uncertainty of pest control in case of severe attack'' with the PFI of 223. The farmers of the study area did not get sufficient information and publicity for the adoption of selected Conservative agricultural practices. However, low production, lack of information and publicity, poor plant nutrient in organic manure, poor extension service, poor adoption of conservative agriculture by maximum farmers, lack of proper organization, need excess labor, criticism from fertilizer and pesticide dealers and criticism from relatives and neighboring farmers were also some important

problems which are needed to pay attention. No program for the farmers cannot be successful unless these problems are not properly addressed and triggered to be eliminated.

Table 4.19 Problem faced Index (PFI) with Rank Order

Items of problem	**PFI**	**Rank order**
Social problems		
1. Lack of information and publicity	175	4
2. Lack of proper organization	173	8
3. Poor extension service	174	6
4. Poor adoption of conservative agriculture by maximum farmers	173	7
Technical problems		
5. Difficult to collect ingredients of compost and to prepare it	129	14
6. Difficult to prepare green manure	80	18
7. Difficult to collect ingredients of botanical pesticide and to prepare it	167	12
8. Difficult to prepare light trap	101	16
9. Difficult to maintain crop rotation	95	17
10. Poor plant nutrient in organic manure	174	5
11. Uncertainty of pest control in case of severe attack	212	2
Economic problems		
12. Lack of farm animal	218	1
13. Low production	193	3
14. Need excess time	72	19
15. Need excess labor	172	9
16. Lower price of organic product	124	15
Marketing problems		
17. Poor and inadequate roads for transportation	63	21
18. Difficult to move to a distance place	50	22
19. Lack of proper transport	69	20
20. Undesirable involvement of middle men	24	24
21. Lack of storage facilities	45	23
Psychological problems		
22. Criticism from family members	160	13
23. Criticism from relatives and neighboring farmers	170	11
24. Criticism from fertilizer and pesticide dealers	170	10

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The study was conducted in the Kartikpasha and South Pangashia villages of Lebukhali and Pangashia unions respectively under Dumki upazila of Patuakhali district to find out the adoption of selective conservative agricultural practices. Total 1086 farmers selected from the study area are the population according to Creative Research System (1980), the respondents comprised of 88 conservative agricultural cultivators constituted the sample of the study. A well-structured interview schedule was developed based on objectives of the study for collecting information. The Experimental variables were: age, level of education, working family size, effective land possession, cropping intensity, annual family income, marketing opportunity, cosmopolitans, extension contact, training exposure, decision making ability, conservative agricultural knowledge, problems faced in conservative agriculture and attitude towards conservative agriculture. The Predicted variable of this study was the adoption of selected conservative agricultural practices. Data collection was started in 6th September, 2019 and completed in 18th September, 2019. Various statistical measures such as frequency counts, percentage distribution, average, and standard deviation were used in describing data. In order to estimate the relationship of the selected characteristics of conservative agriculture farmers in the adoption of conservative agriculture, Pearson Product Moment correlation (r) was used. The major findings of the study are summarized below:

5.1 Summary of the Findings

5.1.1 Selected characteristics of the farmers

Age: Vast majority (90.9 percent) of the farmers were old aged to middle aged. This seems that agricultural production in the study area is being managed by comparatively old aged farmers.

Level of education: The highest proportions (45.5 percent) of the farmers were in the can sign only. Primary, secondary, higher secondary and above higher secondary found 26.1 percent, 15.9 percent, 19.3 percent and 9.1 percent respectively. It means, about majority percent (54.5

percent) of the respondent were literate or having education up to above higher secondary level.

Working family Size: The highest proportion (68.2 percent) of the farmers had medium family size, while 18.2 percent and 13.6 percent belonged to the small family size and large family size respectively.

Effective farm size: The highest proportion (59.1 percent) of the farmers had marginal farm size, while 29.5 percent and 11.4 percent belonged to the small farm and medium farm respectively.

Cropping intensity: The highest proportion (69.5 percent) of the farmers had medium cropping intensity, while 17.0 percent and 13.6 percent belonged to the low cropping intensity and high cropping intensity respectively.

Annual family income: The highest proportion (68.2 percent) of the farmers had low annual family income and 31.8 percent belonged to the medium income category.

Marketing opportunity: The highest proportion (53.4 percent) of the farmers had low marketing opportunity, while 42.1 percent and 4.5 percent belonged to the medium marketing opportunity and high marketing opportunity respectively.

Cosmopoliteness: The highest proportion (60.2 percent) had low Cosmopoliteness category where 35.2 percent had medium and only 4.4 percent had high Cosmopoliteness category.

Extension contact: More than half (55.6 percent) of the farmers had medium extension contact where 36.4 percent had low and only 8 percent had high extension contact.

Training exposure: Overwhelming majority (59.1 percent) of the farmers received no training. While 25.0 percent had very short duration training and only 15.9 percent had short duration training.

Decision making ability: The highest proportion (43.2 percent) had medium decision making ability where 37.5 percent had low and only 19.3 percent had high decision making ability category.

Conservative agricultural knowledge: The highest proportion (59.1 percent) of the farmers had medium knowledge on conservative agriculture as compared to 35.2 percent high knowledge on conservative agriculture.

Problems faced in conservative agriculture: About 83.0 percent of the farmers had medium problem.

Attitude towards conservative agriculture: The highest proportion (64.8 percent) of the farmers had low favorable attitude towards conservative agriculture compared to 22.7 percent having high favorable and 12.5 percent having unfavorable attitude towards conservative agriculture.

5.1.2 Adoption of selected conservative agricultural practices

The highest 69.3 percent farmers belong to the group of medium adoption and the lowest percentage 11.4 percent in low adoption followed by high adoption (19.3 percent) by the farmers in adoption of selected conservative agricultural practices.

5.1.2.1 Adoption of conservative nutrient management practices

Majority (59.1 percent) of the farmers had medium adoption as compared to 18.2 and 22.7 percent having low and high adoption of conservative nutrient management practices respectively. Thus, a great majority (77.3 percent) of the farmers had low to medium adoption of conservative nutrient management practices.

5.1.2.2 Adoption of conservative pest management practices

Majority (65.9 percent) of the farmers had medium adoption as compared to 13.6 and 20.5 percent having low and high adoption of conservative pest management practices respectively. Thus, a great majority (79.5 percent) of the farmers had low to medium adoption of conservative pest management practices.

5.1.3 Result of hypothesis testing

Out of fourteen selected characteristics of the farmers, marketing opportunity, cosmopoliteness, extension contact, training exposure, decision making ability, conservative agricultural knowledge and attitude towards conservative agriculture of the farmers had

significant positive relationship with their adoption of selected conservative agricultural practices, while problems faced in conservative agriculture had significant negative relationship with their conservative agricultural practice adoption. Rest six characteristics i.e. age, level of education, working family size, effective farm size, cropping intensity and annual family income had no significant relationship with their adoption of selected conservative agricultural practice.

5.2 Indexing of the problems faced by the farmers

For indexing the problems, rank order of the twenty four dimensions of selected conservative agriculture practices related to adoption of farmers was made by the descending order of constraints faced index (PFI). As per problems faced index (PFI) lack of farm animal positioned the 1st and undesirable involvement of middle men was in the last position.

5.3 Conclusions

The findings and relevant facts of research work prompted the researcher to draw following conclusions.

i. Majority (69.3 percent) of the farmers had medium adoption of selected conservative agricultural practices. Therefore, it may concluded that the adoption behavior of the farmers in respect of conservative agricultural practices presents a promising picture, but there is further scope for increasing the extent of adoption of conservative agricultural practices.

ii. Cosmopoliteness of the farmers had significant positive relationship with the adoption of conservative agricultural practices. Therefore, it was concluded that any arrangement made to increase the cosmopoliteness would ultimately increase the conservative agricultural practices.

iii. Extension media contact of the farmers had a significant positive relationship with the adoption of conservative agricultural practices. Through extension media contact an individual farmer became facilitating of the information on the various aspect of selected conservative agricultural practices. The above facts lead to conclude that necessary arrangements should be made to increase the extension media contact of farmers which would ultimately increase the adoption of selected conservative agricultural practices.

iv. Overwhelming majority (59.1 percent) of the farmers had no training on agricultural production. Pearson product moment correlation also revealed that training on vegetable cultivation of the respondent had significant positive relationship with their knowledge and skill adoption of conservative agricultural practices. Therefore, it may be concluded that individuals having more training exposure had more knowledge and skill with the adoption of selected conservative agricultural practices.

v. Conservative agricultural knowledge of the farmer had a significant positive relationship with their adoption of conservative agricultural practices. The above facts lead to the conclusion that necessary arrangements should be made to increase the knowledge of farmers which would ultimately increase the adoption of selected conservative agricultural practices.

vi. Overwhelming majority (83.0 percent) of the farmers faced medium problem in conservative agricultural practices. Pearson product moment correlation also revealed that problems faced in adoption of conservative agriculture practices of the respondent had significant negative relationship with their adoption of conservative agricultural practices. Therefore, it may be concluded that individuals having more knowledge faced low problems in adoption of conservative agricultural practices.

vi. Farmer's attitude towards conservative agricultural practices had a significant positive relationship with the adoption of conservative agricultural practices. It is important to realize about the temperament of human behavior which is very complex. It is, therefore, concluded that extension workers should vocation adequately with the farm people through various teaching methods and correctly envisaging those characteristics of the farmers which have some bearing on these activities.

5.4 Recommendations

5.4.1 Recommendations for policy implications

On the basis of observation and conclusions drawn from the findings of the study. Following recommendations are made:

i. It may be recommended that agricultural extension agencies especially the DAE and relevant NGOs should critically review their training programs and make sound provisions so that the

farmers understand the benefits of adoption of conservative agricultural practices. The DAE and other non-governmental organizations should strengthen their extension.

ii. Bangladesh government through Bureau of Non-formal Education (BNFE) and NGO_s can take necessary stapes to increase farmers' primary level of education through the establishment of night school, adult education and regular farmers' training, workshop, rally needs to be organized to broaden their knowledge.

iii. It is recommended that extension organizations and other support services should be conscientious of to facilitate annual family income of farmers through different income generating activities. So, concerned extension organizations and other sponsor services must settle training and arrange discussion as well as some meetings so that farmers can change their decision to adopt the conservative agricultural practices to a higher degree.

iv. It is recommended that support services and extension organizations should be conscientious of to facilitate farmer's extension media contact. So, concerned extension organizations and other sponsor services must settle training and arrange discussion as well as some meetings so that farmers can change their decision to adopt the conservative agricultural practices to a higher degree.

v. Farmers having medium to high knowledge about conservative agricultural knowledge. It should be selected on priority basis for any motivational training by Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for gaining sustainable conservative agriculture practices.

vi. It was observed that higher (64.8 percent) number of the farmers had low favorable attitude score towards conservative agricultural practices. It may be recommended that massive demonstration programs, training programs, field trips etc. should be implemented to bring about considerable changes in the farmers' attitude.

5.4.2 Recommendations for further study

On the basis of scope and limitations of the present study and observation made by the researcher, the following recommendations are made for future study.

i. It is recommended that similar studies should be conducted in other areas of Bangladesh.

ii. It is recommended that further study should be conducted with other characteristics of the farmers with their adoption.

iii. Studies need to be undertaken to ascertain the principles and procedures for installation, patronization of nursing association in rural areas of Bangladesh.

iv. It is therefore suggested that future studies should be included more reliable measurement of concerned variable.

v. The study was based on the farmers' adoption of conservative agricultural practices. Further studies may be conducted in respect of adoption of other crop cultivation technologies.

vi. It is suggested that there should be continuous adoption research in various aspects for agricultural development in Bangladesh.

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APPENDICES

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 a research study entitled:

"ADOPTION OF SELECTED CONSERVATIVE AGRICULTURAL PRACTICES BY THE FARMERS"

Serial no…….. Name of respondent……
Village……. Union…….. Thana …….
District…… Mobile No:

(Please provide the following information. Give tick (√) marks if necessary. Your information will be kept confidential and will be used research purpose only.)

1. Age

Please mention your age .....years

2. Level of Education

Please mention your educational level:

a) Can't read and write……..
b) Can sign only ……...……..
c) Up to or equivalent to class.....

3. Working family size

State the number of your family members.

Sex	Number of femily member according to age				
	<6 years	>6 years -12 years	>12 years -18 years	> 18 years	Total
Male					
Female					
Total					

4. Effective land possession/cropping intensity

Please furnish the following information about your land area.

Nature of land	Land Possession		Cropped area									
			Single cropped area		Double cropped area		Triple cropped area		Net cropped area		Total cropped area	
	local unit	Hectare	Local unit	Hectare	Local unit	Hectare	Local unit	Hectare	Local unit	Hectare	Local unit	Hectare
Homestead agricultural land												
Own land under own cultivation												
Land taken from others on lease												
Land taken from others on half share basis												
Land given to others as half share basis												
Total												

Cropping intensity: .....

5. Annual family income

Please state your annual family income in the previous year.

Sl. No.	Income source	Annual family income(taka)
1	Agriculture	
2	Farm animals (cow, buffalo, goat, sheep etc.)	
3	Poultry	
4	Fisheries	
5	Service	
6	Business	
7	Others (please specify……)	
Total		

6. Marketing opportunity

Please give information about the extent of your facilities in connection with purchase of agricultural inputs, sale and storage of agricultural produces along with transportation facilities.

Items	Degree of facilities				
Buying price of agricultural inputs	Very low (5)	Low (4)	Medium (3)	High (2)	Very high (1)
Selling price of agricultural produces	Very high (5)	High (4)	Medium (3)	Low (2)	Very low (1)
Storage facilities of agricultural produces	Very good (5)	Good (4)	Medium (3)	Bad (2)	Very bad (1)
Transportation of produces	Very good (5)	Good (4)	Medium (3)	Bad (2)	Very bad (1)

7. Cosmopoliteness

Please state the extent of your visit in the following places in the previous year.

Places of visit	Extent of visit with weights for frequencies				
	Regularly (4)	Frequently (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1. House of relatives/friends outside own village	>6 times /month ( )	5-6 times /month ( )	3-4 times /month ( )	1-2 times /month ( )	Not at all ( )

2. Local Hat/Bazar (Market)	>12 times /month ( )	9-12 times /month ( )	5-8 times /month ( )	1-4 times /month ( )	Not at all ( )
3. Own Upazila headquarter	>6 times /month ( )	5-6 times /month ( )	3-4 times /month ( )	1-2 times /month ( )	Not at all ( )
4. Other Upazila	>12 times /year ( )	9-12 times /year ( )	5-8 times /year ( )	1-4 times /year ( )	Not at all ( )
5. Own District town	>12 times /year ( )	9-12 times /year ( )	5-8 times /year ( )	1-4 times /year ( )	Not at all ( )
6. Other District (except Divisional city),	>6 times /year ( )	5-6 times /year ( )	3-4 times /year ( )	1-2 times /year ( )	Not at all ( )
7. Divisional/ Capital city,	>6 times /year ( )	5-6 times /year ( )	3-4 times /year ( )	1-2 times /year ( )	Not at all ( )
8. Foreign country	>3 times /life ( )	3 times /life ( )	2 times /life ( )	1times/life ( )	Not at all ( )

8. Extension contact

Please state the extent of your contact with the following local individuals.

Individuals	Extent of contact with weights for frequencies				
	Regularly (4)	Frequently (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1. Neighbour farmers/friends/ relatives	>6 times /month ( )	5-6 times /month ( )	3-4 times /month ( )	1-2 times /month ( )	Not at all ( )
2. Group leaders	>6 times /month ( )	5-6 times /month ( )	3-4 times /month ( )	1-2 times /month ( )	Not at all ( )
3. Input dealers	>6 times /quarter ( )	5-6 times /quarter ( )	3-4 times /quarter ( )	1-2 times /quarter ( )	Not at all ( )
4. Unit level NGO Workers	>6 times /quarter ( )	5-6 times /quarter ( )	3-4 times /quarter ( )	1-2 times /quarter ( )	Not at all ( )
5. ADC Level NGO Workers	>6 times /six months ( )	5-6 times /six months ( )	3-4 times /six month ( )	1-2 times /six months ( )	Not at all ( )

6. Central NGO personnel	>6 times /year ( )	5-6 times /year ( )	3-4 times /year ( )	1-2 times /year ( )	Not at all ( )
7. Sub Assistant Agriculture Officers	>6 times /quarter ( )	5-6 times /quarter ( )	3-4 times /quarter ( )	1-2 times /quarter ( )	Not at al ( )
8. Upazila level Agriculture Officers	>6 times /six months ( )	5-6 times /six months ( )	3-4 times /six months ( )	1-2 times /six months ( )	Not at all ( )
9. District or above Level Agricultural Officers	>6 times /year ( )	5-6 times /year ( )	3-4 times /year ( )	1-2 times /year ( )	Not at all ( )
10. Group meeting	>6 times /quarter ( )	5-6 times /quarter ( )	3-4 times /quarter ( )	1-2 times /quarter ( )	Not at all ( )
11. Farmers' field day	>6 times /life ( )	5-6 times /life ( )	3-4 times /life ( )	1-2 times /life ( )	Not at all ( )
12. Method demonstration meeting	>6 times /life ( )	5-6 times /life ( )	3-4 times /life ( )	1-2 times /life ( )	Not at all ( )
13. Result demonstration meeting	>6 times /life ( )	5-6 times /life ( )	3-4 times /life ( )	1-2 times /life ( )	Not at all ( )
14. Radio	>6 times /week ( )	5-6 times /week ( )	3-4 times /week ( )	1-2 times /week ( )	Not at all ( )
15.Television	>6 times /week ( )	5-6 times /week ( )	3-4 times /week ( )	1-2 times /week ( )	Not at all ( )
16. Daily newspapers	>6 times /week ( )	5-6 times /week ( )	3-4 times /week ( )	1-2 times /week ( )	Not at all ( )
17. Leaflet/folder	>6 times /year ( )	5-6 times /year ( )	3-4 times /year ( )	1-2 times /year ( )	Not at all ( )
18. Booklets/ agricultural magazines	>6 times /year ( )	5-6 times /year ( )	3-4 times /year ( )	1-2 times /year ( )	Not at all ( )
19. Film show	>6 times /life ( )	5-6 times /life ( )	3-4 times /life ( )	1-2 times /life ( )	Not at all ( )
20. Agricultural fair	>6 times /life ( )	5-6 times /life ( )	3-4 times /life ( )	1-2 times /life ( )	Not at all ( )

9. Training exposure

Did you receive any kind of agricultural/conservative agricultural training in the last five years?

Yes ☐ **No** ☐

If yes please furnish the following information

SL. No.	Title of training course	Duration (days)	Conducting organization and place
1			
2			
3			
4			
5			
Total			

10. Decision making ability

Please mention the extent of your decision making ability by putting tick mark (√) in appropriate column.

Items of decision making	Extent of decision making		
	Able to make self-decision	Able to make decision with family members	Able to make decision with outsiders of the family
a) Adoption agricultural technology	( )	( )	( )
b) Buying of agricultural inputs	( )	( )	( )
c) Selling of agricultural products	( )	( )	( )
d) Family affairs	( )	( )	( )
e) Education of children	( )	( )	( )
f) Participation in social activities	( )	( )	( )

11. Conservative agricultural knowledge

Please answer the following questions.

Item No.	Items of Conservative Agricultural Knowledge Test
Remembering	
1.a	Which of the following is beneficial insect? ☐ Lady bird beetle ☐ Fruit and shoot borer ☐ Aphid
1.b	Which of the following is green manuring crop? ☐ Maize ☐ Dhancha ☐ Mustard
1.c	Which of the following is the best component for compost?

	☐ Water hyacinth ☐ Oil cake ☐ Cow dung
1.d	Which of the following is botanical pesticide? ☐ Tobacco extract ☐ Mango seed extract ☐ Azola
Understanding	
2.a	Which is the cause for increasing air pollution? ☐ Use of chemical fertilizer and pesticides in the crop field ☐ Use of organic manure and botanical pesticides in the crop field ☐ Both of the above
2.b	How can you produce ecological agricultural crops? ☐ By using chemical fertilizer and pesticides in the crop field ☐ By using organic manure and botanical pesticides in the crop field ☐ Don't know
2.c	Why rice produces higher yield if it is cultivated after pulse cultivation? ☐ Nodules formed in the root of pulse crops add nitrogen in the soil ☐ Nodules formed in the root of pulse crops add phosphorus in the soil ☐ Nodules formed in the root of pulse crops add potash in the soil
2.d	What nutrient adds to soil from the nodules formed in root of bean and the nutrient works as the substitute of what type of fertilizer? ☐ Nitrogen, which is the substitute of urea fertilizer ☐ Phosphorus, which is the substitute of TSP fertilizer ☐ Potash, which is the substitute of MP fertilizer
Applying	
3.a	How insects can be controlled by light trap? ☐ By killing flying insects accumulated in the light trap ☐ All types of insects can accumulate in the light trap, then these should be killed ☐ No insect can be controlled by light trap
3.b	How mulching can help in crop cultivation? ☐ Protect temperature ☐ Protect moisture ☐ Both
3.c	When green manuring crops are to be mixed in the soil? ☐ At seeding stage ☐ Before flowering stage ☐ At adult stage
3.d	How bio-fertilizers are used? ☐ By mixing with other fertilizers ☐ By mixing with seeds ☐ None of the above
Analyzing	
4.a	It is becoming hard to control pest even after use of high doses of chemical pesticides, why? ☐ Pests are becoming resistant to chemical pesticides ☐ Impure pesticides ☐ Both of the above
4.b	Soils of Bangladesh are becoming hard nowadays, why? ☐ Excess use of chemical fertilizers ☐ Use of manures ☐ Both of the above
4.c	Why fish species are decreasing day by day?

	☐ Use of chemical fertilizers and pesticides in the crop field ☐ Use of manure in the crop field ☐ None of the above
4.d	How beneficial insects can help in agriculture? ☐ By eating harmful insects ☐ Help in pollination ☐ Both of the above
Evaluating	
5.a	What is the demerit of using chemical fertilizer in the crop field? ☐ Create toxicity in the soil ☐ Decrease soil microbial activity ☐ Both of the above
5.b	What is the demerit of using chemical pesticide in the crop field? ☐ Create toxicity in the soil ☐ Decrease soil microbial activity ☐ Both of the above
5.c	What is the advantage of crop rotation? ☐ Increase soil fertility ☐ Decrease pest attack ☐ Both
5.d	What is the demerit of decreasing of trees and plants? ☐ Create environmental pollution ☐ Decrease crop productivity ☐ Both of the two
Creating	
6.a	How can you control aphid from bean field? ☐ By applying ash on the bean plant ☐ By putting bamboo in the field ☐ By putting tree branches in the field
6.b	How can you increase soil fertility? ☐ By using manure in the field ☐ By using only chemical fertilizers in the field ☐ None of the above
6.c	What do you do with the crop residues and weeds? ☐ It is mixed in the soil as fertilizers ☐ It is thrown to other places without any use ☐ It is used as fuel
6.d	How can you control virus diseases of crops? ☐ By eradication and destruction of virus attacked plants ☐ By spraying pesticides ☐ None of the above

12. Problems faced in conservative agriculture

Please indicate the extent of problems faced by you in conservative agriculture.

Items of problem	Extent of problem faced			
	Severe problem(3)	Moderate problem(2)	Low problem(1)	Not at all problem(0)
Social problems				
1. Lack of information and publicity				
2. Lack of proper organization				
3. Poor extension service				
4. Poor adoption of conservative agriculture by maximum farmers				
Technical problems				
5. Difficult to collect ingredients of compost and to prepare it				
6. Difficult to prepare green manure				
7. Difficult to collect ingredients of botanical pesticide and to prepare it				
8. Difficult to prepare light trap				
9. Difficult to maintain crop rotation				
10. Poor plant nutrient in organic manure				
11. Uncertainty of pest control in case of severe attack				
Economic problems				
12. Lack of farm animal				
13. Low production				
14. Need excess time				
15. Need excess labor				
16. Lower price of organic product				
Marketing problems				
17. Poor and inadequate roads for transportation				
18. Difficult to move to a distance place				
19. Lack of proper transport				
20. Undesirable involvement of middle men				
21. Lack of storage facilities				
Psychological problems				

22. Criticism from family members				
23. Criticism from relatives and neighboring farmers				
24. Criticism from fertilizer and pesticide dealers				

13. Attitude towards conservative agriculture

Please state your degree of agreement with the following statements.

Sl. No.	Statements	Extent of agreement				
		Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1	Despite problems in ecological agriculture, it is better for crop production.					
2	Ecological pest control is difficult and nonprofit able to farmers.					
3	Most of the pest can be controlled by clean cultivation.					
4	The use of chemical fertilizers in crop field should not be reduced.					
5	Farmers should not hesitate to participate in ecological agricultural practices.					
6	Ecological agriculture is not profitable in relation to crop production.					
7	Benefits of chemical fertilizer are larger than its harmful effects.					
8	It is not possible to get high production by using organic manures only.					
9	Water is being polluted by using chemical pesticide which is harmful to fishes.					
10	Without use of chemical pesticides, it is not possible to get good quality crops.					
11	It is not logical to use chemical fertilizers though it is necessary for present high production.					
12	Human diseases are increasing due to increased use of chemical fertilizers.					

14. Adoption of selected conservative agricultural practices

Please mention the extent of your adoption of the following selected conservative agricultural practices.

Conservative agricultural practices	Usable land (hac.)	Used land								Total score
		Not at all use		less use with large amount of chemical (>50% of Recommended doses)		Large use with less amount of chemicals (<50% of Recommended doses)		Full use without any chemicals		
		ha	%x0.00	ha	%x o.33	ha	%x 0.67	ha	%x 1.00	
Nutrient management without chemical fertilizers										
1. Cow dung										
2. Poultry excreta										
3. Farm yard manure										
4. Compost										
5. Vermi-compost										
6. Water hyacinth										
5. Green manure										
6.Crop residence/ weed fertilizer										
7.Biofertilizer										
Sub total										
Pest management without chemical pesticides										
1. Perching										
2.Light trap										

3. Botanical pesticides (neem, nishinda, biskatali, garlic extract etc.)										
4. Use of quality seed										
5. Pest control by ash										
6. Beneficial insects										
7. Pest resistant varieties										
8. Crop rotation										
9. Intercultural operation										
Sub total										
Total										

Thank you for your cooperation.

_____

(Signature of the Interviewer)

Date:

Correlation Matrix of the dependent and independent variables (N = 88)

Variables	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}
X_1	-														
X_2	-.556**	-													
X_3	.390**	-.110													
X_4	-.455**	.365**	-.041	-											
X_5	-.200	.109	-.116	.049	-										
X_6	-.374**	.357**	-.013	.529**	.181	-									
X_7	-.172	.213*	-.108	.215*	.157	.215*	-								
X_8	-.032	.124	.036	.070	-.027	.127	.489**	-							
X_9	.043	.133	-.062	.008	-.022	.062	.517**	.819**	-						
X_{10}	-.193	.320**	-.021	.159	-.005	.113	.388**	.259*	.300**	-					
X_{11}	-.019	.060	-.030	.055	.045	.126	.492**	.731**	.804**	.298**	-				
X_{12}	.071	.047	-.015	.009	.033	.075	.493**	.807**	.890**	.341**	.810**	-			
X_{13}	.076	-.025	.078	-.246*	-.088	-.136	-.528**	-.586**	-.597**	-.280**	-.666**	-.695**	-		
X_{14}	.037	.089	-.066	-.047	.067	.052	.480**	.810**	.873**	.301**	.731**	.875**	-.542**	-	
X_{15}	.051	.122	-.042	.033	.015	.088	.539**	.873**	.930**	.344**	.831**	.948**	-.677**	.919**	-

* = Correlation is significant at 0.05 level of probability

** = Correlation is significant at 0.01 level of probability

X_1= Age
X_2= Education
X_3 = Family size
X_4= Farm size
X_5= Cropping intensity
X_6= Family income
X_7= Marketing opportunity
X_8= Cosmopoliteness
X_9= Extension contact
X_{10}= Training exposure
X_{11}= Decision making ability
X_{12}= Conservative agricultural knowledge
X_{13}= Problem faced in conservative agriculture
X_{14}= Attitude towards conservative agriculture
X_{15}= Adoption of conservative agricultural practices