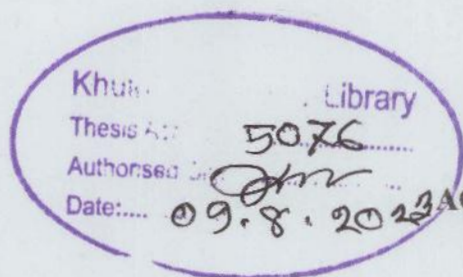


**EXTENT OF ADOPTION OF VERMICOMPOST BY THE FARMERS  
OF BATHIAGHATA UPAZILA UNDER KHULNA DISTRICT**



**A Thesis**

**Submitted to**

**AGROTECHNOLOGY DISCIPLINE**

**KHULNA UNIVERSITY**

**By**

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**STUDENT ID: MS-160817**

**MASTER OF SCIENCE**

**IN**

**AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT**

**In partial fulfillment of the requirements for the degree of  
Master of Science in Agricultural Extension and Rural Development**

**AGROTECHNOLOGY DISCIPLINE  
LIFE SCIENCE SCHOOL  
KHULNA UNIVERSITY  
KHULNA, BANGLADESH**

**JUNE, 2018**

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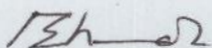
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**Approved as to style and contents**

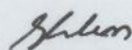
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KHULNA, BANGLADESH**

**JUNE, 2018**



**DEDICATED TO**

**MY BELOVED PARENTS**



## ABSTRACT

The main objectives of this study were to determine the farmers' extent of adoption of vermicompost and to explore the relationship between selected characteristics of the farmers and their extent of adoption of vermicompost. Data were collected from randomly selected 80 respondents of five villages such as Raingamari, sachibunia, Dorgatola, Jhorvanga and Mathavanga of Bathiaghata upazila under Khulna district through personal interview method by the researcher himself using an interview schedule during 4 March to 6 April, 2018. Farmers extent of adoption of vermicompost was the dependent variable and the twelve selected characteristics of the respondents considered as the independent variables of the study. Majority (68.8%) of the respondents had low adoption followed by medium (26.3%) and high adoption (5%). Among twelve selected characteristics of the respondents educational qualification, extension media contact, cosmopoliteness, knowledge on vermicompost and training experience on vermicompost of the respondents showed a significant positive relationship with their extent of adoption while age, family size and farming experience showed a significant negative relationship with their extent of adoption of vermicompost. Most (96.25%) of the respondents belong to medium problem confrontation category followed by low problem confrontation (3.75%). Out of 10 identified problems, respondents indicate "Lack of training in adoption of vermicompost" as the highly severe problem followed by "Lack of knowledge on vermicompost." The least severe problem was "An unpleasant odor comes from the bin."

**Key words:** Extent of adoption, Vermicompost, Farmers



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June, 2017



The Author

## CONTENTS

|                                                                                                       | Page<br>no. |
|-------------------------------------------------------------------------------------------------------|-------------|
| ABSTRACT                                                                                              | i           |
| ACKNOWLEDGEMENT                                                                                       | ii          |
| CONTENTS                                                                                              | iii         |
| LIST OF TABLE                                                                                         | vii         |
| LIST OF FIGURE                                                                                        | ix          |
| ACRONYMS                                                                                              | x           |
| <br>Chapter I                                                                                         |             |
| INTRODUCTION                                                                                          | 1-7         |
| 1.1 Background of the study                                                                           | 1           |
| 1.2 Objectives of the study                                                                           | 3           |
| 1.3 Statement of the problem                                                                          | 3           |
| 1.4 Assumptions of the study                                                                          | 4           |
| 1.5 Limitation of the study                                                                           | 4           |
| 1.6 Definitions of some terms related to this study                                                   | 5           |
| <br>Chapter II                                                                                        |             |
| REVIEW OF LITERATURE                                                                                  | 8-27        |
| 2.1 Conceptual issues about adoption                                                                  | 8           |
| 2.1.1 Concept of adoption                                                                             | 8           |
| 2.2 Studies related to adoption                                                                       | 9           |
| 2.3 Studies regarding relationship between selected characteristics of the farmers and their adoption | 10          |
| 2.3.1 Age and adoption                                                                                | 10          |
| 2.3.2 Educational qualification and adoption                                                          | 12          |
| 2.3.3 Family size and adoption                                                                        | 13          |
| 2.3.4 Farming experience and adoption                                                                 | 14          |
| 2.3.5 Innovativeness and adoption                                                                     | 15          |
| 2.3.6 Farm size and adoption                                                                          | 17          |
| 2.3.7 Annual family income and adoption                                                               | 18          |
| 2.3.8 Extension media contact and adoption                                                            | 20          |
| 2.3.9 Organizational participation and adoption                                                       | 22          |
| 2.3.10 Cosmopolitaness and adoption                                                                   | 23          |
| 2.3.11 Knowledge and adoption                                                                         | 25          |
| 2.3.12 Training experience and adoption                                                               | 26          |
| 2.4 Conceptual framework of the study                                                                 | 27          |



|             |                                                                              |       |
|-------------|------------------------------------------------------------------------------|-------|
| Chapter III | METHODOLOGY                                                                  | 28-39 |
| 3.1         | Design of the study                                                          | 28    |
| 3.2         | Locale of the study and sampling                                             | 28    |
| 3.3         | Preparation of interview schedule                                            | 28    |
| 3.4         | Data collection                                                              | 29    |
| 3.5         | Data processing                                                              | 29    |
| 3.6         | Selection and measurement of variables                                       | 29    |
| 3.6.1       | Selection of variables                                                       | 29    |
| 3.6.2       | Measurement of variables                                                     | 30    |
| 3.6.2.1     | Age of the respondents                                                       | 30    |
| 3.6.2.2     | Educational qualification of the respondents                                 | 31    |
| 3.6.2.3     | Family size of the respondents                                               | 31    |
| 3.6.2.4     | Farming experience of the respondents                                        | 31    |
| 3.6.2.5     | Innovativeness of the respondents                                            | 31    |
| 3.6.2.6     | Farm size of the respondents                                                 | 32    |
| 3.6.2.7     | Annual family income of the respondents                                      | 33    |
| 3.6.2.8     | Extension media contact of the respondents                                   | 34    |
| 3.6.2.9     | Organizational participation of the respondents                              | 34    |
| 3.6.2.10    | Cosmopolitaness of the respondents                                           | 35    |
| 3.6.2.11    | Knowledge of the respondents on vermicompost                                 | 36    |
| 3.6.2.12    | Training experience of the respondents on vermicompost                       | 37    |
| 3.7         | Extent of adoption of vermicompost (Dependent variable)                      | 37    |
| 3.8         | Problem confrontation                                                        | 38    |
| 3.8.1       | Measurement of Problem Confrontation Index (PCI) in adoption of vermicompost | 39    |
| 3.9         | Statistical analysis                                                         | 39    |
| Chapter IV  | RESULTS AND DISCUSSION                                                       | 40-58 |
| 4.1         | Selected characteristics of the respondents                                  | 40    |
| 4.1.1       | Age of the respondents                                                       | 40    |
| 4.1.2       | Educational qualification of the respondents                                 | 41    |
| 4.1.3       | Family size of the respondents                                               | 41    |
| 4.1.4       | Farming experience of the respondents                                        | 42    |
| 4.1.5       | Innovativeness of the respondents                                            | 43    |
| 4.1.6       | Farm size of the respondents                                                 | 44    |
| 4.1.7       | Annual family income of the respondents                                      | 45    |
| 4.1.8       | Extension media contact of the respondents                                   | 45    |
| 4.1.9       | Organizational participation of the respondents                              | 46    |
| 4.1.10      | Cosmopolitaness of the respondents                                           | 47    |
| 4.1.11      | Knowledge of the respondents on vermicompost                                 | 47    |
| 4.1.12      | Training experience of the respondents on vermicompost                       | 48    |
| 4.2         | Extent of adoption of vermicompost                                           | 48    |
| 4.3         | Problem confrontation                                                        | 49    |

|           |                                                                                                                     |       |
|-----------|---------------------------------------------------------------------------------------------------------------------|-------|
| 4.3.1     | Comparative problem confrontation of farmers regarding individual statement related to problem of vermicompost      | 50    |
| 4.4       | Relationship between the selected characteristics of the respondents and their extent of adoption of vermicompost   | 50    |
| 4.4.1     | Functional relationship between the characteristics of the respondents and their extent of adoption of vermicompost | 53    |
| Chapter V | SUMMARY, CONCLUSION AND RECOMMENDATIONS                                                                             | 59-63 |
| 5.1       | Summary of findings                                                                                                 | 59    |
| 5.1.1     | Selected characteristics of the respondents (Independent variables)                                                 | 59    |
| 5.1.2     | Extent of adoption of vermicompost (Dependent variable)                                                             | 62    |
| 5.1.3     | Problem confrontation                                                                                               | 62    |
| 5.1.4     | Relationship between the selected characteristics of the respondents and their extent of adoption of vermicompost   | 62    |
| 5.2       | Conclusion                                                                                                          | 63    |
| 5.3       | Recommendations                                                                                                     | 63    |

REFERENCES

64-69

APPENDIX I Interview Schedule

70-74



## LIST OF TABLES

| Table no. | Table title                                                                                                  | Page no. |
|-----------|--------------------------------------------------------------------------------------------------------------|----------|
| 2.1.      | Relationships of age of the farmers with their adoption of agricultural innovations                          | 11       |
| 2.2.      | Relationships of educational qualification of the farmers with their adoption of agricultural innovations    | 13       |
| 2.3.      | Relationships of family size of the farmers with their adoption of agricultural innovations                  | 14       |
| 2.4.      | Relationships of farming experience of the farmers with their adoption of agricultural innovations           | 15       |
| 2.5.      | Relationships of educational innovativeness of the farmers with their adoption of agricultural innovations   | 16       |
| 2.6.      | Relationships of farm size of the farmers with their adoption of agricultural innovations                    | 18       |
| 2.7.      | Relationships of annual family income of the farmers with their adoption of agricultural innovations         | 19       |
| 2.8.      | Relationships of extension media contact of the farmers with their adoption of agricultural innovations      | 21       |
| 2.9.      | Relationships of organizational participation of the farmers with their adoption of agricultural innovations | 23       |
| 2.10.     | Relationships of cosmopolitaness of the farmers with their adoption of agricultural innovations              | 24       |
| 2.11.     | Relationships of knowledge of the farmers with their adoption of agricultural innovations                    | 25       |
| 2.12.     | Relationships of training experience of the farmers with their adoption of agricultural innovations          | 26       |
| 3.1.      | Categories of the respondents according to their age                                                         | 30       |
| 3.2.      | Categories of the respondents according to their educational qualification                                   | 30       |
| 3.3.      | Categories of the respondents according to their family size                                                 | 31       |
| 3.4.      | Categories of the respondents according to their farming experience                                          | 31       |
| 3.5.      | Categories of the respondents according to their innovativeness                                              | 32       |
| 3.6.      | Categories of the respondents according to their farm size                                                   | 33       |
| 3.7.      | Categories of the respondents according to their annual family income                                        | 34       |
| 3.8.      | Categories of the respondents according to their extension media contact                                     | 34       |
| 3.9.      | Categories of the respondents according to their organizational participation                                | 35       |
| 3.10.     | Categories of the respondents according to their cosmopolitaness                                             | 36       |
| 3.11.     | Categories of the respondents according to their knowledge on vermicompost                                   | 36       |
| 3.12.     | Categories of the respondents according to their training experience                                         | 37       |
| 3.13.     | Categories of the respondents according to their adoption score                                              | 38       |
| 3.14.     | Categories of the respondents according to their problem confrontation score                                 | 38       |

|       |                                                                                                                                                                |    |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 4.1.  | Distribution of the respondents according to their age                                                                                                         | 40 |
| 4.2.  | Distribution of the respondents according to their educational qualification                                                                                   | 41 |
| 4.3.  | Distribution of the respondents according to their family size                                                                                                 | 42 |
| 4.4.  | Distribution of the respondents according to their farming experience                                                                                          | 42 |
| 4.5.  | Distribution of the respondents according to their innovativeness in using vermicompost                                                                        | 43 |
| 4.6.  | Distribution of the respondents according to their farm size                                                                                                   | 44 |
| 4.7.  | Distribution of the respondents according to their annual family income                                                                                        | 45 |
| 4.8.  | Distribution of the respondents according to their extension media contact                                                                                     | 46 |
| 4.9.  | Distribution of the respondents according to their organizational participation                                                                                | 46 |
| 4.10. | Distribution of the respondents according to their cosmopolitaness                                                                                             | 47 |
| 4.11. | Distribution of the respondents according to their knowledge on vermicompost                                                                                   | 47 |
| 4.12. | Distribution of the respondents according to their training experience on vermicompost                                                                         | 48 |
| 4.13. | Distribution of respondents according to their extent of adoption vermicompost                                                                                 | 49 |
| 4.14. | Distribution of respondents according to problem confrontation                                                                                                 | 49 |
| 4.15. | Relative position (rank order) of the statements related to problem regarding using of vermicompost                                                            | 50 |
| 4.16. | Computed coefficient of correlation ( $r$ ) and spearman rank correlation between the selected characteristics of the respondents and their extent of adoption | 51 |

## LIST OF FIGURES

| Figure<br>no. | Figure title                                                                                                        | Page<br>no. |
|---------------|---------------------------------------------------------------------------------------------------------------------|-------------|
| 2.1.          | Conceptual framework of the study                                                                                   | 27          |
| 4.1.          | Adopter categories based on innovativeness                                                                          | 44          |
| 4.2.          | Functional relationship between educational qualification of the respondents and their extent of adoption           | 53          |
| 4.3.          | Functional relationship between extension media contact of the respondents and their extent of adoption             | 54          |
| 4.4.          | Functional relationship between cosmopolitaness of the respondents and their extent of adoption                     | 55          |
| 4.5.          | Functional relationship between knowledge on vermicompost of the respondents and their extent of adoption           | 55          |
| 4.6.          | Functional relationship between training experience on vermicompost of the respondents and their extent of adoption | 56          |
| 4.7.          | Functional relationship between age of the respondents and their extent of adoption                                 | 57          |
| 4.8.          | Functional relationship between family size of the respondents and their extent of adoption                         | 57          |
| 4.9.          | Functional relationship between farming experience of the respondents and their extent of adoption                  | 58          |

## ACRONYMS

|      |                                        |
|------|----------------------------------------|
| AEO  | : Agriculture Extension Officer        |
| DAE  | : Department of Agricultural Extension |
| PCI  | : Problem Confrontation Index          |
| NGO  | : Non- Government Organization         |
| NS   | : Non Significant                      |
| RO   | : Rank Order                           |
| SAAO | : Sub Assistant Agriculture Officer    |
| Sd   | : Standard deviation                   |
| TV   | : Television                           |
| UAO  | : Upazila Agriculture Officer          |



## CHAPTER I

### INTRODUCTION

#### 1.1 Background of the study

Vermicompost is the product of the composting process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a heterogeneous mixture of decomposing vegetable or food waste, bedding materials and vermicast also called worm castings. Worm humus or worm manure, is the end-product of the breakdown of organic matter by an earthworm. These castings have been shown to contain reduced levels of contaminants and a higher saturation of nutrients than do organic materials before vermicomposting. Containing water-soluble nutrients, vermicompost is an excellent, nutrient-rich organic fertilizer and soil conditioner. This process of producing vermicompost is called vermicomposting (Ndegwa *et al.*, 1998).

Vermicomposting is the biological degradation and stabilization of organic waste by earthworms and microorganisms to form vermicompost (Garg *et al.*, 2006a; Suthar and Singh, 2008). This is an essential part in organic farming today. It can be easily prepared, has excellent properties, and is harmless to plants. The earthworms fragment, the organic waste substrates, stimulate microbial activity greatly and increase rates of mineralization. These rapidly convert the waste into humus-like substances with finer structure than thermophilic composts but possessing a greater and more diverse microbial activity. Vermicompost being a stable fine granular organic matter, when added to clay soil loosens the soil and improves the passage for the entry of air. The mucus associated with the cast being hygroscopic absorbs water and prevents water logging and improves water holding capacity. The organic carbon in vermicompost releases the nutrients slowly and steadily into the system and enables the plant to absorb these nutrients. The soil enriched with vermicompost provides additional substances that are not found in chemical fertilizers (Kale, 1998). The actions of earthworms in the vermicomposting include substrate aeration, mixing, grinding, fragmentation, enzymatic digestion and microbial digestion in intestines of earthworms (Sharma *et al.*, 2005; Sinha, *et al.*, 2010).



The practice of vermiculture is at least a century old but it is now being received worldwide with diverse ecological objectives such as waste management, soil detoxification, regeneration and sustainable agriculture (Chauhan and Joshi, 2010).

The growth of industries and ever increasing human population has led to an increased accumulation of waste materials (Joshi and Chauhan, 2006).

Recycling of vegetable wastes through vermitechnology reduces the problem of waste management in urban areas. Vermicompost may be used as the alternative to chemical fertilizers which improve the soil health and condition. This compost is an excellent material to enhance the crop production without polluting the environment (Bakthvathsalam and Ramakrishnan, 2004). Under the present condition of environmental degradation 'vermicomposting' technology offers recovery of valuable resources like 'manure' from such biodegradable waste. Recycling of wastes through vermitechnology reduces the problem of dumping of huge quantities of wastes and vermicompost has higher economic value compared with compost derived from traditional methods (Chauhan *et al.*, 2010).

Studies have also shown that vermicomposting of organic waste accelerates organic matter stabilization (Neuhauser *et al.*, 1998) and gives chelating and phyto-hormonal elements (Tomati *et al.*, 1995) which have a high content of microbial matter besides stabilized humic substances. During vermicomposting process the important plant nutrients such as nitrogen, potassium, phosphorus and calcium present in feed material are converted into forms that are much more soluble and available to the plants than those in the parent substrate (Ndegwa and Thompson, 2001).

Garg *et al.*, (2006b) also reported increase in nitrogen, phosphorous and potassium contents during vermicomposting. Since the intestine of earthworm harbors wide range of microorganisms, enzymes and hormones, these half-digested substrate (parent substrate) decomposes rapidly and is transformed into a form of 'vermicompost' within a short time (Lavelle, 1988).

By using vermicompost farmers' can get safe foods as the vegetable and fruit in our market are not always safe for our health. It can play a great role to our economy. At present time farmers'



of rural area of Bangladesh are also eager to use vermicompost. Farmer of all ages can start this work at their farm. So it can be said that vermicompost can play an important role in our agriculture. Provided these beneficial effects of vermicompost but we don't know the adoption status of the technology at farmers level.

According to Sinha *et al.*, (2010) vermicomposting is “economically viable” (affordable by all nations), “environmentally sustainable” (friendly to the environment-flora, fauna, soil, air and water, with no adverse effect on them) and “socially acceptable” (beneficial to the society with no adverse effect on human health) technology.

Considering these above facts the present investigation has been designed to study the following objectives.

### **1.2 Objectives of the Study**

Followings are the specific objectives of the study:

1. To determine and describe the selected characteristics of the vermicompost users.
2. To determine the extent of adoption of vermicompost by the vermicompost users.
3. To identify the problems confronted by the vermicompost users in adoption of vermicompost.
4. To explore the relationships between selected characteristics of the vermicompost users and their extent of adoption of vermicompost.

### **1.3 Statement of the problem**

With a view to have an understanding on the extent of adoption of vermicompost by the farmers, the researcher undertook a research study entitled “Extent of Adoption of Vermicompost by the Farmers’ of Bathiaghata Upazila Under Khulna District”. Among all other agricultural technology only vermicompost has been taken as present research topic. Farmers have opportunity to increase the adoption level in vermicompost. This adoption will help to decrease the dependency on chemical fertilizer. Some farmers have realized these benefits and responded very positively to adopt this

technology. They were very much keen to get along with the adoption of vermicompost. This study is, therefore, designed to making an in-depth analysis of the extent of adoption of vermicompost by the farmers. No research has been conducted to examine the extent of adoption of vermicompost in Bangladesh.

The purpose of the study was to determine the extent of adoption of vermicompost and also to ascertain the relationships of the selected characteristics of the vermicompost users with their adoption in farming area. This was done by seeking answer to the following questions:

1. What are the characteristics of the farmers?
2. What are the extent of adoption of vermicompost by the farmers?
3. What problems the vermicompost users usually encounter in adoption the vermicompost?
4. What are the relationships of the selected characteristics of the farmers with their adoption of vermicompost?

#### **1.4 Assumptions of the study**

“An assumption is the supposition that an apparent fact or principle is true in the light the available evidence” (Goode and Hatt, 1952). During conducting the researcher, the following assumptions were kept in mind.

1. The respondents were qualified to satisfy the queries designed by the researcher in the interview schedule.
2. The information furnished by the respondents was reliable and valid.
3. Views and opinions furnished by the respondents included in the sample were the represented views and opinions of the population of farmers in the study area.

#### **1.5 Limitation of the study**

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



1. The study was confined only to Raingamari, Shacibunia Dorgatola, Mathavanga and Jhorvanga villages of Jalma union in Bathiaghata upazila under Khulna district.
2. Sample size of the study was limited.
3. The investigator was dependent on the data furnished by the selected respondents during their interview.

#### **1.6 Definitions of some terms related to this study**

Certain terms used throughout the study are defined and interpreted below for clear understanding.

##### **Respondent**

Farmers who answer questions these were asked by the interviewer for a social survey are called respondents. They are the people from whom a social research worker usually gets most data required for his research. In this study, the farmers who responded to the questions during interview conducted by researcher himself were considered as respondents.

##### **Age**

Age of an individual respondent was defined as the period of time in years from birth to their time of interview.

##### **Educational qualification**

Education referred to the development of desirable knowledge, skill and attitude in the individual through reading, writing, and other related activities. It is measured in terms of years of schooling of individual respondent.

##### **Farming experience**

It was the period of involvement of a respondent to agricultural practices.



### **Innovativeness**

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

### **Family size**

The total number (all dependents) of members of a respondent in his family (including himself) during the interview period constitute the family size.

### **Farm size**

The area of land possessed by the respondent and his family members in hectare was the farm size.

### **Annual family income**

Annual income of the respondents refers to total yearly earnings from agriculture and other source (if any) including him and other family member(s).

### **Extension media contact**

This referred to an individual's contact with different information sources and personalities being used for technology dissemination among the farmers.

### **Organizational participation**

It refers to the involvement of the respondent in any type of formal and social organizations.

### **Cosmopoliteness**

It refers to the orientation or exposure or frequency of visit of an individual respondent outside of his own social system.

### **Knowledge on vermicompost**

Knowledge on vermicompost refers to the extent of basic understanding of the respondents in different aspects of vermicompost.

### **Training experience on vermicompost**

It refers to the total number of days attended by the farmers in his/her life to the training on vermicompost related subject matter.

### **Adoption**

It is the implementation of a decision to continue the use of an innovation. According to Rogers (1995), "Adoption is a decision to make full use of an innovation as the best course of action available." When an individual takes up a new idea as the best course of action and practices it the phenomenon is known as adoption (Ray, 1991). In this study, adoption was defined as the phenomenon of taking up a new idea (vermicompost) and put it into practice by the vermicompost users.

### **Problem confrontation**

Problem faced by the farmers in this study was defined as the extent of difficulties faced by vermicompost growers in the way of adoption of vermicompost.

## CHAPTER II

### REVIEW OF LITERATURE

The purpose of this study was to have an understanding of the farmers' extent of adoption of vermicompost and exploring the relationship with their selected characteristics. But unfortunately none of these studies were related to the study of extent of adoption of vermicompost by the farmers'. However, the researcher came across with sonic expert's opinions about the concept of adoption as well as some studies that dealt with the relationship of the characteristics of individuals with their adoption.

#### 2.1 Conceptual issues about adoption

It is necessary to be clearly acquainted with the term of adoption to formulate the conceptual framework of the study. This section deals with a succinct discussion on the theoretical aspect of adoption.

##### 2.1.1 Concept of Adoption

Adoption is an individual process detailing the series of stages one undergoes from first hearing about a product to finally adopting it. The diffusion process, however, signifies a group of phenomena, which suggests how an innovation spreads among consumers. Overall, the diffusion process essentially encompasses the adoption process of several individuals over time. Rogers and Shoemaker (1971) stated the adoption process as – the traditional view of the innovation decision process, called “adoption process” was postulated by a committee of rural sociologists in 1955 as consisting of five stages:

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

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

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

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

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

## **2.2 Studies related to adoption**

Ahmed (2006) studied on the extent of adoption of selected wheat varieties by the farmers. The study revealed that the majority (55 percent) of the respondents had medium adoption of selected wheat varieties.

Aurangojeb (2002) studied on the extent of adoption of integrated farming technology by the rural women in RDRS. He observed that the highest percent of rural women (64%) used high level, (28%) of the women used medium level and only 8% used low level integrated homestead farming technologies.

Hossen (2013) stated that majority (82.9 percent) of the growers had low adoption while 15.4 percent had medium adoption and 1.7 percent had high adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

Hussen (2001) conducted an investigation on adoption of modern sugarcane cultivation practices by the farmers of Dewanganj Upazila in Jamalpur district. The study revealed that about most (91 percentage) of the farmers had medium adoption compared to 7 percent having low adoption and only 2 percentage having high adoption of modern sugarcane cultivation practices.

Islam (2002) observed a study on adoption of modern agricultural technologies by the farmers of Sandwip. The study revealed that 69 percent of the farmers had medium adoption while 13 percent had low adoption and 18 percent had high adoption of modern agricultural technologies.

Sadekuzzaman (2007) concluded that a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that more than three-fourth (77 percent) of the respondents had low to medium adoption of intercropping in sugarcane.

Squire (2000) studied on factors influencing traditional farmers to adopt improved food crop production technologies in BO district of Southern Sierra Leone. He found that agricultural



technology communication media (other farmers (54%); characteristics of the arable crops (good to excellent eating quality of the improved crop varieties (53%); artificial fertilizers (55%); mechanical technology (65%); draught animal technology (59%); pest and disease control technologies (increase in crop yield (61%); and row planting technologies (easy to weed(53%).

Rahman (2001) conducted an investigation on knowledge, attitude and adoption of Aalok-6201 hybrid rice by the farmers of Sadar Upazila in Mymensingh district. The study revealed that the majority (75 percent) of the farmers had medium adoption while 18 percent and 7 percent had high and low adoption in Aalok-6201 hybrid rice cultivation respectively.

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

### **2.3 Studies regarding relationship between selected characteristics of the farmers and their adoption**

#### **2.3.1 Age and adoption**

Ahmed (2006) found in his study that age of the respondents had no significant relationship with their adoption of selected wheat varieties.

Aurangozeb (2002) observed that there was significant negative relationship between age and use of integrated homestead farming technologies. The interpretation is that with increased age level of the respondents there was a corresponding decrease of the adoption of homestead farming technologies.

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that age of the respondents had negatively significant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

Hossen (2013) concluded that age of the farmers had no significant relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

Islam (2005) reported a study on adoption of pashu pusti in cattle rearing at farmers' level. He observed that age of the respondents had insignificant relationship with their extent of adoption of pashu pusti in cattle rearing at farmers' level.

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

Sadekuzzaman (2007) conducted a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that age of the farmers had significant relationship on their adaption of intercropping in sugarcane.

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

Relationships of age of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.1. Relationships of age of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year) | Relationship   |                      |                      |
|----------------------|----------------|----------------------|----------------------|
|                      | No significant | Significant positive | Significant negative |
| Ahmed (2006)         | ✓              |                      |                      |
| Aurangozeb(2002)     |                |                      | ✓                    |
| Haque (2003)         |                |                      | ✓                    |
| Hossen (2013)        | ✓              |                      |                      |
| Islam (2005)         | ✓              |                      |                      |
| Mahmud (2006)        | ✓              |                      |                      |
| Sadekuzzaman (2007)  |                | ✓                    |                      |
| Sardar (2002)        |                | ✓                    |                      |

Data presented in Table 2.1. indicate that, out of 8 studies, researchers of two studies found negative significant and researchers of other two studies positive significant relationship between

age and their adoption. From the studies it could be conducted that the selection of age as a characteristics was justified for the present study.

### **2.3.2 Educational qualification and adoption**

Ahmed (2006) found in his study that education of the respondents had no significant relationship with their adoption of selected wheat varieties.

Aurangozeb (2002) observed that there was positive relationship between education and adoption of integrated homestead farming technologies. The educated women were more interested in adoption of integrated homestead farming technologies than the illiterate women.

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

Hossen (2013) observed that education of the farmers had significant positive relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

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

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

Sardar (2002) concluded a study on adoption of IPM practices by the farmers under PETRRA projects of RDRS. He found that education of the farmers had a positive significant relationship with their adoption of IPM practices.

Sadekuzzaman (2007) conducted a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that education of the farmers had significant positive relationship on their adoption of intercropping in sugarcane.

Relationships of educational qualification of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.2. Relationships of educational qualification of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year)   | Relationship   |                      |                      |
|------------------------|----------------|----------------------|----------------------|
|                        | No significant | Significant positive | Significant negative |
| Ahmed (2006)           | ✓              |                      |                      |
| Aurangozeb(2002)       |                | ✓                    |                      |
| Hossain (2003)         |                |                      | ✓                    |
| Hossen (2013)          |                | ✓                    |                      |
| Hussen (2001)          |                | ✓                    |                      |
| Islam (2002)           |                | ✓                    |                      |
| Sarder (2002)          |                | ✓                    |                      |
| Sadekuzzaman<br>(2007) |                | ✓                    |                      |

Data presented in Table 2.2. demonstrate that, out of 8 studies, researchers of six studies found significant positive relationship between education and their adoption and another researcher found significant negative relationship. From the studies, it could be conducted that the selection educational qualification as one of the characteristics of the respondents under present study was justified.

### **2.3.3 Family size and adoption**

Bashar (1993) reported that family labour had a significant positive relation with the adoption of intercropping in sugarcane.

Muhammad (1974) found that there is no relationship between family labour of the farmers and their adoption of insect control measures.



Sadekuzzaman (2007) conducted a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that family size of the farmers had no significant relationship on their adaption of intercropping in sugarcane.

Wilkening *et al.* (1962) provided little evidence to the effect of labour force upon practice adoption. None of the practice scores were significantly associated with a number of men on the farm.

Relationships of family size of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.3. Relationships of family size of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year)              | Relationship   |                      |                      |
|-----------------------------------|----------------|----------------------|----------------------|
|                                   | No significant | Significant positive | Significant negative |
| Bashar (1993)                     |                | ✓                    |                      |
| Muhammad (1974)                   | ✓              |                      |                      |
| Sadekuzzaman (2007)               | ✓              |                      |                      |
| Wilkening <i>et al.</i><br>(1962) | ✓              |                      |                      |

Data presented in Table 2.3. reveal that, out of 4 studies, researcher of one study found significant positive relationship between family size and their adoption. From the studies it could be conducted that the selection of family size as one of the characteristics of the respondents under present study was justified.

#### **2.3.4 Farming experience and adoption**

Alam (1996) in his study observed that there was no relationship between the fanning experience of the farmers and their awareness regarding homestead deforestation.

Hoque (1993) in his study found that farming experiences had negative significant relationship with their adoption of improved practices in sugarcane cultivation.

Khan (1996) reported insignificant relationship between rice farming experience and (a) initial rice knowledge, (b) final rice knowledge and (c) knowledge gain respectively.

Sarker (1995) in his study observed that farming experience had no relationship with their use of communication media for receiving agricultural information.

Sarker (1997) found that farming experience of potato growers had no significant relationship with their adoption of improved potato cultivation practices.

Relationships of farming experience of the farmers with their adoption of agricultural innovations have been presented below in tabular form :

**Table 2.4. Relationships of farming experience of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year) | Relationship   |                      |                      |
|----------------------|----------------|----------------------|----------------------|
|                      | No significant | Significant positive | Significant negative |
| Alam (1996)          | ✓              |                      |                      |
| Hoque (1993)         |                |                      | ✓                    |
| Hoque (1993)         | ✓              |                      |                      |
| Khan (1996)          | ✓              |                      |                      |
| Sarker (1995)        | ✓              |                      |                      |
| Sarker (1995)        | ✓              |                      |                      |

Data presented in Table 2.4. indicate that, out of 6 studies, researcher of one study found significant negative relationship between farming experience and their adoption. From the studies, it could be conducted that selection of farming experience as one of the characteristics of the respondents under present study was justified.

### **2.3.5 Innovativeness and adoption**

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

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

Hossen (2013) concluded that innovativeness of the farmers had significant positive relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

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

Islam (2007) observed a study on adoption of recommended potato cultivation practices. The study revealed that innovativeness of the farmers had significant positive relationship on their extent adoption of recommended potato cultivation practices.

Podder (1999) conducted a research study on adoption of mehersagar banana by the farmers of Gazaria union under Shakhipur thana of Tangail district. He observed that innovativeness of the farmers had significant relationship with their adoption of mehersagar banana.

Relationships of innovativeness of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.5. Relationships of innovativeness of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year) | Relationship   |                      |                      |
|----------------------|----------------|----------------------|----------------------|
|                      | No significant | Significant positive | Significant negative |
| Aurangozeb (2002)    |                | ✓                    |                      |
| Hossain (1999)       |                | ✓                    |                      |
| Hossen (2013)        |                | ✓                    |                      |
| Islam (2002)         |                | ✓                    |                      |
| Islam (2007)         |                | ✓                    |                      |
| Podder (1999)        |                | ✓                    |                      |

Data presented in Table 2.5. indicate that, the researchers of all of the six studies found significant positive relationship between farming innovativeness and their adoption. From the studies it could be conducted that, selection of innovativeness selected as one of the characteristics of the respondents under present study was justified.

### **2.3.6 Farm size and adoption.**

Aurangozeb (2002) observed that there was no relationship between homestead area and adoption of integrated homestead farming technologies.

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that farm size of the respondents had insignificant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

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

Hossen (2013) concluded that farm size of the farmers had significant positive relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

Hussen (2001) found that the farm size had positive significant relation with their adoption of modern sugarcane cultivation practices.

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that farm size of the farmers had a positive significant relationship with their adoption of modern agricultural technologies. Sardar (2002) found that the farm size of the farmers had significant positive relationship with their adoption of IPM practices.

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



Sadekuzzaman (2007) observed a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that farm size of the farmers had significant positive relationship on their adaption of intercropping in sugarcane.

Relationships of farm size of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.6. Relationships of farm size of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year)   | Relationship   |                      |                      |
|------------------------|----------------|----------------------|----------------------|
|                        | No significant | Significant positive | Significant negative |
| Aurangozeb (2002)      | ✓              |                      |                      |
| Haque (2003)           | ✓              |                      |                      |
| Hossain (2003)         |                | ✓                    |                      |
| Hossen (2013)          |                | ✓                    |                      |
| Hussen (2001)          |                | ✓                    |                      |
| Islam (2002)           |                | ✓                    |                      |
| Sarder (2002)          |                | ✓                    |                      |
| Rahman (2001)          |                | ✓                    |                      |
| Sadekuzzaman<br>(2007) |                | ✓                    |                      |

Data presented in Table 2.6. indicate that, out of 9 studies, researchers of seven studies found significant positive relationship between farm size and their adoption. From the studies it could be conducted that the selection of farm size as one of the characteristics of the respondents under present study was justified.

### **2.3.7 Annual family income and adoption**

Ahmed (2006) found in his study that annual family income of the respondents had no significant relationship with their adoption of selected wheat varieties.

Aurangozeb (2002) in his study found a positive significant relationship between annual income and adoption of integrated homestead farming technologies.

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that annual income of the respondents had insignificant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

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

Hossen (2013) concluded that family income of the farmers had significant positive relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

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

Islam (2002) reported a study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that annual income of the farmers had a positive significant relationship with their adoption of modern agricultural technologies.

Sadekuzzaman (2007) revealed a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that family income of the farmers had significant positive relationship on their adoption of intercropping in sugarcane.

Sardar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He found that the annual income of the farmers had no significant relationship with their adoption of IPM practices.

Relationships of annual family income of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.7. Relationships of annual family income of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year)   | Relationship   |                      |                      |
|------------------------|----------------|----------------------|----------------------|
|                        | No significant | Significant positive | Significant negative |
| Ahmed (2006)           | ✓              |                      |                      |
| Aurangozeb(2002)       |                | ✓                    |                      |
| Haque (2003)           | ✓              |                      |                      |
| Hossain (2003)         |                | ✓                    |                      |
| Hossen (2013)          |                | ✓                    |                      |
| Hussen (2001)          |                | ✓                    |                      |
| Islam (2002)           |                | ✓                    |                      |
| Sadekuzzaman<br>(2007) |                | ✓                    |                      |
| Sarder (2002)          | ✓              |                      |                      |

Data presented in Table 2.7. indicate that, out of 9 studies, researchers of the six studies found significant positive relationship between annual income and their adoption. From the studies, it could be conducted that the selection of annual income as one of the characteristics of the respondents under present study was justified.

### **2.3.8 Extension media contact and adoption**

Ahmed (2006) found in his study that communication behaviour of the respondents had significant positive relationship with their adoption of selected wheat varieties.

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

Hossen (2013) concluded that extension media contact of the farmers had no relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

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

Rahman (2001) found that extension contact of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Sadekuzzaman (2007) conducted a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that extension media contact of the farmers had no relationship on their adoption of intercropping in sugarcane.

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

Relationships of extension media contact of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.8. Relationships of extension media contact of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year)   | Relationship   |                      |                      |
|------------------------|----------------|----------------------|----------------------|
|                        | No significant | Significant positive | Significant negative |
| Ahmed (2006)           |                | ✓                    |                      |
| Aurangozeb(2002)       |                | ✓                    |                      |
| Hossen (2013)          | ✓              |                      |                      |
| Hussen (2001)          |                | ✓                    |                      |
| Rahman (2001)          |                | ✓                    |                      |
| Sadekuzzaman<br>(2007) | ✓              |                      |                      |
| Sarder (2002)          |                | ✓                    |                      |

Data presented in Table 2.8. show that, out of 7 studies, researcher of five studies found significant positive relationship between extension and their adoption. From the studies it could be concluded that selection of extension media contact as one of the characteristics of the respondents under present study was justified.

### **2.3.9 Organizational participation and adoption**

Hossain (2003) concluded that organizational participation of the farmers had no significant relationship with their adoption of modern Boro rice cultivation.

Hossain (2006) revealed that organizational participation of the farmers had no significant relationship with their adoption of HYV rice.

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

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

Sadekuzzaman (2007) observed a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that organizational participation of the farmers had significant positive relationship on their adoption of intercropping in sugarcane.

Sardar (2002) concluded a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He observed that organizational participation of the farmers had no significant relationship with their adoption of IPM practices.

Relationships of organizational participation of the farmers with their adoption of agricultural innovations have been presented below in tabular form:



**Table 2.9. Relationships of organizational participation of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year)   | Relationship   |                      |                      |
|------------------------|----------------|----------------------|----------------------|
|                        | No significant | Significant positive | Significant negative |
| Hossain (2003)         | ✓              |                      |                      |
| Hossain (2006)         | ✓              |                      |                      |
| Hussen (2001)          |                | ✓                    |                      |
| Rahman (2001)          |                | ✓                    |                      |
| Sadekuzzaman<br>(2007) |                | ✓                    |                      |
| Sarder (2002)          | ✓              |                      |                      |

Data presented in Table 2.9. show that, out of 6 studies, researchers of three studies found significant positive relationship between organizational participation and their adoption. From the studies it could be conducted that selection of organizational participation as one of the characteristics of the respondents under present study was justified.

### **2.3.10 Cosmopoliteness and adoption**

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

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) found a study on farmer's adoption of modern 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.

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

Hossen (2013) concluded that cosmopolitaness of the farmers had significant positive relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazilla under Mymensingh district.

Hussen (2001) found that the cosmopolitaness had positive significant relationship with their adoption of modern sugarcane cultivation practices.

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

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

Relationships of cosmopolitaness of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.10. Relationships of cosmopolitaness of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year) | Relationship   |                      |                      |
|----------------------|----------------|----------------------|----------------------|
|                      | No significant | Significant positive | Significant negative |
| Ahmed (2006)         |                | ✓                    |                      |
| Aurangozeb(2002)     |                | ✓                    |                      |
| Haque (2003)         | ✓              |                      |                      |
| Hossain (2003)       |                | ✓                    |                      |
| Hossen (2013)        |                | ✓                    |                      |
| Hussen (2001)        |                | ✓                    |                      |
| Islam (2002)         |                | ✓                    |                      |
| Sarder (2002)        |                | ✓                    |                      |

Data presented in Table 2.10. indicate that, out of 8 studies, researchers of seven studies found significant positive relationship between cosmopolitaness and their adoption. From the studies, it

could be conducted that selection of cosmopolitaness as one of the characteristics of the respondents under present study was justified.

### 2.3.11 Knowledge and adoption

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

Alam (1997) observed that agricultural knowledge of the rice growers had significant relationship with their use of farm practices in rice cultivation.

Sadekuzzaman (2007) conducted a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that knowledge of the farmers had significant positive relationship on their adaption of intercropping in sugarcane.

Sardar (2002) studied adoption of IPM practices by the farmers under PETRRA Project of BDRS. He found that agricultural knowledge had positive significant relationship with their adoption of IPM practices.

Sarkar (1997) found that potato production knowledge of potato growers had a positive and significant relationship with their adoption of improved potato cultivation practices.

Relationships of knowledge of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.11. Relationships of knowledge of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year) | Relationship   |                      |                      |
|----------------------|----------------|----------------------|----------------------|
|                      | No significant | Significant positive | Significant negative |
| Ahmed (2006)         |                | ✓                    |                      |
| Alam (1997)          |                | ✓                    |                      |
| Sadekuzzaman (2007)  |                | ✓                    |                      |
| Sardar (2002)        |                | ✓                    |                      |
| Sarkar (1997)        |                | ✓                    |                      |

Data presented in Table 2.11. show that, the researchers of all of the studies, found significant positive relationship between knowledge and their adoption. From the studies it could be

conducted that selection of knowledge as one of the characteristics of the respondents under present study was justified.

### 2.3.12 Training experience and adoption

Ahmed (2006) found in his study that training received of the respondents had significant positive relationship with their adoption of selected wheat varieties.

Haque (2003) reported that training received of the respondent had positive significant relationship with their practices in farmers' adoption of modern maize cultivation technologies.

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.

Sadekuzzaman (2007) concluded a study on adoption of intercropping in sugarcane by the farmers. In his study he determined that training exposure of the farmers had significant relationship on their adaption of intercropping in sugarcane.

Relationships of educational training of the farmers with their adoption of agricultural innovations have been presented below in tabular form:

**Table 2.12. Relationships of training of the farmers with their adoption of agricultural innovations**

| Researcher<br>(Year) | Relationship   |                      |                      |
|----------------------|----------------|----------------------|----------------------|
|                      | No significant | Significant positive | Significant negative |
| Ahmed (2006)         |                | ✓                    |                      |
| Haque (2003)         |                | ✓                    |                      |
| Islam (2005)         | ✓              |                      |                      |
| Sadekuzzaman (2007)  |                | ✓                    |                      |

Data presented in Table 2.12. indicate that, out of 4 studies, researchers of three studies found significant positive relationship between training and their adoption. From the studies it could be



conducted that selection of training as one of the characteristics of the respondents under present study was justified.

From the review related to relationship between the selected characteristics and their adoption it could be concluded that selection of variables was justified as most of them showed either positive significant relationship or negative significant relation with adoption.

## 2.4 Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. The conceptual framework of Townsend, J. C. (1953) was kept in mind while framing the structural arrangement for the dependent and independent variables. The present study tried to focus on extent of adoption of vermicompost by the farmers'.

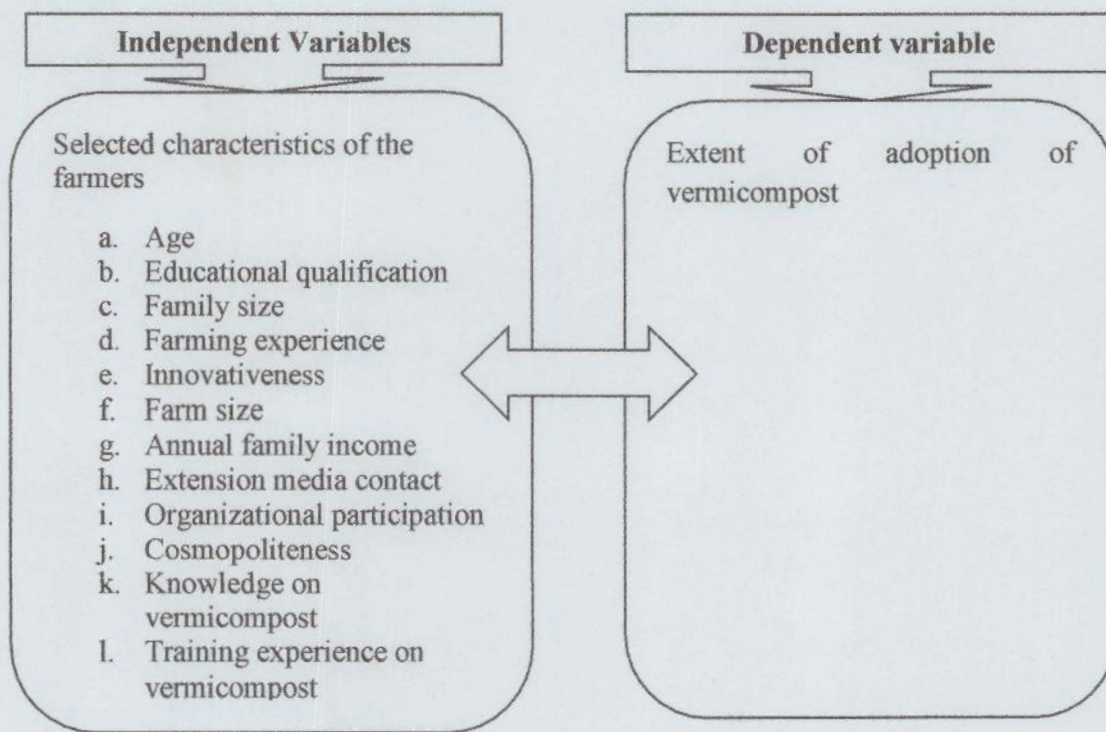


Figure 2.1. Conceptual framework of the study



## **CHAPTER III**

### **METHODOLOGY**

Methodology plays an important role in scientific research. Without an appropriate methodology the researcher is unable to collect valid and reliable information and to analyze that information properly in order to attain at correct conclusion.

Research methodology is a systematic way to solve a research problem. It may be understood as a science of studying how research is done (Kothari, 1990).

The purpose of the chapter is to give an experienced investigator enough information to replicate the study. A research design is used to structure the research and to show how all of the major parts of the research project, including the sample, measures, and methods of assignment, work together to address the central research questions in the study.

#### **3.1 Design of the study**

The present study was a social scientific survey. It was designed to study the extent of adoption of vermicompost in five selected villages of Jalma union.

#### **3.2 Locale of the study and sampling**

The study was conducted at five selected village at Bathiaghata upazila under Khulna district. The researcher deliberately selected five villages of Bathiaghata upazila under Khulna district namely Raingamari, sachibunia, Dorgatola, Jhorvanga and Mathavanga. A number of 160 vermicompost users from the study area taking 50 % users from each of the villages were selected. This 80 vermicompost users were treated as sample of the study.

#### **3.3 Preparation of interview schedule**

An interview schedule was used as the research instrument in order to collect relevant information from the respondents (vermicompost users). The interview schedule was prepared for data collection in Bangla keeping the objectives of the study in view. The interview schedule contained both simple and direct form of questions to collect data on the selected variables. The



interview schedule was pre-tested before final collection of data. After pre-test necessary correction, addition, alteration and rearrangements were made. The interview schedule was then multiplied in its final form for collection of data. English version of the same interview schedule has been presented in the Appendix I.

### **3.4 Data collection**

The researcher met the selected respondents and explained the purpose of the study and requested them to help and co-operate for collecting data for the study. Data were collected with the help of the interview schedule by the researcher himself. Interviews of the respondents were taken at their homes during leisure period. A good rapport was established with the respondents during interview. However, if any respondent failed to understand any question, the researcher took utmost care to explain the issue. Respondents were assured about the confidentiality of their information by the researcher. After completion of the interview, each statement was checked and verified to make sure that answer to each item had been properly recorded. Data were collected during 4 March to 6 April, 2018.

### **3.5 Data processing**

After completion of survey all the interview schedules were compiled for data processing. At first all the qualitative data were converted into quantitative form by means of suitable code and score whenever necessary. In several instances indices and scales were constructed through the simple accumulation of scores assigned to individual or pattern of attributes. Indices and scales are considered the efficient instrument for data reduction and analysis.

### **3.6 Selection and Measurement of variables**

#### **3.6.1 Selection of variables**

Twelve selected characteristics of the respondents were treated as independent variable for this study. The selected characteristics were age, educational qualification, family size, farming experience, innovativeness, farm size, annual family income, extension media contact, organizational participation, cosmopolitaness, knowledge on vermicompost and training on

vermicompost. Extent of adoption of vermicompost was considered as dependent variable of the study.

### 3.6.2 Measurement of variables

#### 3.6.2.1 Age of the respondents

The age of the respondents were measured in terms of actual years from their birth to the time of interview on the basis of their response to item number A.1 of the interview schedule (Appendix I). Based on age, the respondents were classified into following categories (Table3.1).

**Table 3.1. Categories of the respondents according to their age**

| Categories | Score ( Year) |
|------------|---------------|
| Young      | $\leq 35$     |
| Medium     | 36-50         |
| Old        | $>50$         |



#### 3.6.2.2 Educational qualification of the respondents

The educational qualification of the respondents was measured based on their year of schooling written specifically in the item number A.2 of the interview schedule (Appendix I). For example a score of 5 was given to the respondents who passed class v. A score of '0' and '1' also given to those who do not know reading and writing and can sign name respectively. The respondents were classified into following categories based on their educational qualification as shown in Table 3.2.

**Table 3.2. Categories of the respondents according to their educational qualification**

| Categories                                  | Score (Year of schooling) |
|---------------------------------------------|---------------------------|
| Illiteracy                                  | 0                         |
| Primary                                     | 1-5                       |
| Secondary                                   | 6-10                      |
| Higher secondary                            | 11-12                     |
| Above Higher Secondary ( Graduate or Above) | $>12$                     |



### 3.6.2.3 Family size of the respondents

The family size of a respondent was measured by the total number of family member who were eating and staying together. This variable has been shown in the question A.3 of the interview schedule (Appendix A). Based on family size, the respondents were classified into different categories as shown in Table 3.3.

**Table 3.3. Categories of the respondents according to their family size**

| Categories          | No. of family members |
|---------------------|-----------------------|
| Small sized family  | 1 - 4                 |
| Medium sized family | 5 -7                  |
| Large sized family  | >7                    |

### 3.6.2.4 Farming experience of the respondents

The experience of the respondents about farming was determined on the basis of the year that how long they have involved in farming activities. The question to measure the experience in farming of the respondents has been presented in the item number A.4 of the interview schedule (Appendix I). The respondents were classified into following categories Table 3.4.

**Table 3.4. Categories of the respondents according to their farming experience**

| Categories | Score (Year) |
|------------|--------------|
| Low        | ≤10          |
| Medium     | 11-20        |
| Large      | >20          |

### 3.6.2.5 Innovativeness of the respondents

Innovativeness is the degree to which an individual is earlier to adopt an innovation than other members of the social system. The innovativeness of the respondents about vermicompost using was determined on the basis of time required to adopt vermicompost from first hearing to final

adoption of it. The question to measure the innovativeness in using vermicompost of the respondents has been presented in the item number A.5 of the interview schedule (Appendix I). The respondents were classified into following categories Table 3.5.

**Table 3.5. Categories of the respondents according to their innovativeness in using vermicompost**

| Categories                                          | Score (Month) |
|-----------------------------------------------------|---------------|
| Innovator ( $< \bar{X} - 2Sd$ )                     | $< 0.8$       |
| Early Adopter ( $\bar{X} - 2sd$ to $\bar{X} - Sd$ ) | 0.8-6.5       |
| Early Majority ( $\bar{X} - Sd$ to $\bar{X}$ )      | 6.6-12.2      |
| Late majority ( $\bar{X}$ to $\bar{X} + Sd$ )       | 12.3-18.7     |
| Laggard ( $> \bar{X} + 2Sd$ )                       | $> 18.7$      |

Source: Rogers (1983)

### 3.6.2.6 Farm size of the respondents

Farm size was measured as the size of her farm on which rural women continued her farming operations during the period of study. It included the area of homestead, land cultivation under her or her family cultivation as well as those obtained from others as borga, lease and also given to others as borga.

The area was measured in terms of hectare. The farm size of a respondent was calculated by using the following formula:

$$FS = A + B + 1/2(C + D) + E$$

Where

FS = Farm size

A= Homestead area (including pond & garden)

B= Land under own cultivation

C= Land given to others on borga



D= Land taken from others on barga

E= Land taken from others on lease

Actual size of the farm was considered as the score of the farm size. For example if a respondent had 0.05 ha of land then his score was 0.05. The data were first recorded in local unit and then converted to hectare (question no. 6 of the interview schedule; Appendix I). Based on farm size, the respondents were classified into five categories as shown in Table 3.6.

**Table 3.6. Categories of respondents according to farm size**

| Categories       | Score (ha) |
|------------------|------------|
| Landless farmers | <0.02      |
| Marginal farmers | 0.02 -0.20 |
| Small farmers    | 0.21- 1.0  |
| Medium farmers   | 1.01-3.0   |
| Large farmers    | >3         |

Source: DAE (1999)

### **3.6.2.7 Annual income of the respondents**

Family income of a respondent was measured on the basis of total yearly earning from agriculture and his/her other sources (service, business, daily labor etc.) by the respondent and other family members. In calculating the family income of a respondent, income of that respondent as well as his/her family members (earned from different sources) in the year 2017 were added together to obtain total family income of a respondent. Data obtained in response to question A.7 of the interview schedule (Appendix I) were used to calculate the income score of a respondent. The respondents were classified into following categories according to annual income as shown in Table 3.7.

**Table 3.7. Categories of respondents according to annual family income**

| Categories    | Taka (BDT)    |
|---------------|---------------|
| Low income    | 35000 -75000  |
| Medium income | 75001 -150000 |
| High income   | Above 150000  |

#### **3.6.2.8 Extension media contact of the respondents**

In this study, the extension media contact score was computed for each respondent on the basis of the extent of his contact with selected media as ascertained from his responses to item number A.8 in the interview schedule (Appendix I). A number of 8 sources of agricultural information were included interview schedule. Each respondent was asked to indicate the extent of his contact as regularly, occasionally, rarely and not at all and a weight of 3, 2, 1 and 0 was assigned to these rating scales respectively.

Based on extension media contact score, the respondents were grouped into four categories as shown in Table 3.8.

**Table 3.8. Categories of the respondents according to their extension media contact**

| Categories | Score |
|------------|-------|
| No contact | 0     |
| Low        | 1-8   |
| Medium     | 9-16  |
| High       | 16-24 |

#### **3.6.2.9 Organizational participation of the respondents**

Organizational participation of a respondent was measured by the nature and duration of participation in selected organizations. The score of organizational participation for a particular organization was computed in the following manner: Organizational Participation Score =  $\Sigma OP \times N \times D$

Where, OP = Organizational Participation, N = Nature of participation, D = Duration.

#### **Nature of participation Score**

No participation = 0

Ordinary member = 1

Executive member = 2

Executive officer = 3

Duration of participation score was assigned in the following way:

#### **Duration of participation Score**

No participation 0

1 year of participation = 1

>1 years upto <3 years of participation = 2

≥3 years upto 6 years of participation = 3

>6 years of participation = 4

Organizational participation score of a respondent was obtained by adding his scores of participation in all the organizations. Based on organizational participation scores, the respondents were grouped into following categories as shown in Table 3.9.

**Table 3.9. Categories of the respondents based on organizational participation**

| <b>Categories</b>    | <b>Score(No. of organization )</b> |
|----------------------|------------------------------------|
| No Participation     | 0                                  |
| Low participation    | 1-3                                |
| Medium participation | 4-6                                |
| High participation   | >6                                 |

#### **3.6.2.10 Cosmopolitaness of the respondents**

Cosmopolitaness is measured by the following method. Cosmopolitaness of the respondent was measured by the frequencies of visit to the places external to his own social system. The respondent was asked to mention the number of visits made in five different places in terms of

frequently, occasionally, rarely and not at all and the assigned scores were 3, 2, 1 and 0 respectively. Cosmopolitanism scores of a respondent could scores ranged from 0-15. A score of 0 indicated no cosmopolitanism and 15 indicated very high cosmopolitanism. Cosmopolitanism of the respondents has been shown in the item A.10 in the interview schedule (Appendix I). The respondents were classified into the following categories based on the cosmopolitanism scores as shown in Table 3.10.

**Table 3.10. Categories of the respondents according to their cosmopolitanism**

| Categories             | Score |
|------------------------|-------|
| No cosmopolitanism     | 0     |
| Low cosmopolitanism    | 1-5   |
| Medium cosmopolitanism | 6-10  |
| Higher cosmopolitanism | >10   |

#### **3.6.2.11 Knowledge of the respondents on vermicompost**

To measure the knowledge of the respondent on vermicompost, ten questions were included in the item number A.11 of the interview schedule (Appendix I). Irrespective of difficulty of answer in the question, a score of 2 was assigned against each of the questions. Thus, the whole questions comprised of 20 marks. Based on accuracy of the answer, the respondents' were given marks. The total score of a respondent was determined by summing up all the scores obtained by the respondent against the selected ten questions. The possible score of knowledge of a respondent on vermicompost could range from 0 to 20, where 0 indicates no knowledge and 20 indicate highest knowledge. The respondents were categorized on the basis of their knowledge score on vermicompost as presented in Table 3.11.

**Table 3.11. Categories of the respondents according to their knowledge on vermicompost**

| Categories | Score |
|------------|-------|
| No         | 0     |
| low        | 1-7   |
| Medium     | 8-14  |
| High       | >14   |



### 3.6.2.12 Training experience of the respondents on vermicompost

The training experience score was determined based on the number of training received by the respondents considering duration of training. The score of training for vermicompost was computed in the following manner:

$$\text{Training Score} = \Sigma(N \times D)$$

Where, N = Number of training, D = Duration.

Duration of participation score was assigned in the following way:

#### Duration of participation Score

No training = 0

1 to 7 days of training = 1

8 to 15 days of training = 2

**Table 3.12. Categories of respondents according to their training experience**

| Categories                 | Score |
|----------------------------|-------|
| No training experience     | 0     |
| Low training experience    | 1-3   |
| Medium training experience | 4-6   |
| High training experience   | >6    |

### 3.7 Extent of adoption of vermicompost (Dependent variable)

The extent of adoption of vermicompost can be measured by percentage of area coverage by vermicompost by using the following formula:

$$\text{Extent of Adoption} = \frac{A_a}{P_a} \times 100$$

Where

$A_a$  = Actual area of adoption of vermicompost

$P_a$  = Potential area for adoption of vermicompost

Adoption of vermicompost was expressed in percentage. Based on the adoption score, the respondents were also classified into three categories as shown in the Table 3.13.

**Table 3.13. Categories of respondents according to their adoption score**

| Categories      | Score (%) |
|-----------------|-----------|
| Low adoption    | Upto 30   |
| Medium adoption | 31-60     |
| High adoption   | >60       |

### 3.8 Problem Confrontation

A number of 10 problem related vermicompost was included in the interview schedule (Item no. B.2; Appendix I). A 4-point scale such as highly severe, moderately severe, negligible, not at all was employed against each of the problem and a score of 3, 2, 1 and 0 was assigned against the rating scale respectively. Each of the respondents was asked to rate the extent of problem confrontation against each of the 10 problems. Thus, the problem confrontation score of a respondents could ranged from '0' to '30' where '0' indicate no problem confrontation and '30' indicate high problem confrontation. Based on problem confrontation scores, the respondents were classified into following categories as shown in table 3.13.

**Table 3.14. Categories of respondents according to their problem confrontation score**

| Categories                   | Score |
|------------------------------|-------|
| Low problem confrontation    | 1-10  |
| Medium problem confrontation | 11-20 |
| High problem confrontation   | 21-30 |

### **3.8.1 Measurement of Problem Confrontation Index (PCI) in adoption of vermicompost**

To compare among the statements related to problems about using of vermicompost a PCI was calculated. Problem Confrontation Index (PCI) was calculated by using the following formula:

$$PCI = N_1 \times 3 + N_2 \times 2 + N_3 \times 1 + N_4 \times 0$$

Where, PCI= Problem Confrontation Index

$N_1$  = No. of respondents rated the problems as highly severe

$N_2$  = No. of respondents rated the problems as moderately severe

$N_3$  = No. of respondents rated the problems as negligible

$N_4$  = No. of respondents rated the problems as not at all

Based on Problem Confrontation Index (PCI), the ten selected problem were ranked.

### **3.9 Statistical Analysis**

After collection, data were analyzed and tabulated for interpretation. Statistical treatments such as number, mean, standard deviation, range, rank order etc were used to interpret data. To explore relationship between any two variables Pearson's product correlation coefficient 'r', Spearman rank correlation and functional relationship were employed. For analysis of data Statistical Package for Social Science (SPSS) version 20 was used.

## CHAPTER IV

### RESULTS AND DISCUSSION

The findings of the study and interpretation of results with necessary discussion have been presented in this chapter. The results of this study have been presented according to the objectives. Firstly the selected characteristics of the respondents have been presented in section 4.1, the farmers' extent of adoption of vermicompost are presented in section 4.2, the problem confrontation of vermicompost is presented in section 4.3 and finally the relationships between the selected characteristics of the respondents and their extent of adoption of vermicompost are presented in section 4.4.

#### 4.1 Selected characteristics of the respondents

##### 4.1.1 Age of the respondents

The age of the respondents was markedly varied. Based on age, the respondents classified into three categories are shown in Table 4.1.

**Table 4.1. Distribution of the respondents according to their age**

| Categories  | Score<br>( Year) | Respondent (N=80) |                   | Mean  | Sd   | Range |     |
|-------------|------------------|-------------------|-------------------|-------|------|-------|-----|
|             |                  | Number            | Percentage<br>(%) |       |      | Min   | Max |
| Young       | ≤ 35             | 39                | 48.8              | 37.89 | 9.42 | 20    | 65  |
| Middle aged | 36-50            | 36                | 45                |       |      |       |     |
| Old         | >50              | 5                 | 6.3               |       |      |       |     |
| Total       |                  | 80                | 100.00            |       |      |       |     |

Data furnished in the Table 4.1. reveal that the about half (48.8%) of the respondents were young as compared to 45% being middle aged and 6.3% old. It means that young aged as compared as middle aged people of that locality were more interested to use vermicompost in their field. The correlation coefficient (r) value also support the statement (Table 4.16).

#### 4.1.2 Educational qualification of the respondents

The educational qualification score of the respondents ranged from 0 to 18 with mean and standard deviation of 5.63 and 4.9, respectively. On the basis of education, the respondents were categorized into five categories as shown in Table 4.2.

**Table 4.2. Distribution of the respondents according to educational qualification**

| Categories        | Score<br>(Year of<br>schooling) | Respondent (N=80) |                   | Mean | Sd  | Range |     |
|-------------------|---------------------------------|-------------------|-------------------|------|-----|-------|-----|
|                   |                                 | Number            | Percentage<br>(%) |      |     | Min   | Max |
| Illiterate        | 0                               | 30                | 37.5              | 5.63 | 4.9 | 0     | 18  |
| Primary           | 1-5                             | 6                 | 7.5               |      |     |       |     |
| Secondary         | 6-10                            | 37                | 46.3              |      |     |       |     |
| Higher secondary  | 11-12                           | 3                 | 3.8               |      |     |       |     |
| Graduate or Above | >12                             | 4                 | 5                 |      |     |       |     |
| Total             |                                 | 80                | 100               |      |     |       |     |

Data presented in the Table 4.2 demonstrate that highest proportion (46.3%) of the respondents had secondary level of education followed by illiterate (37.5%), primary (7.5%), graduate or above (5%) and rest (3.8%) higher secondary. The respondents those who had higher level of education they are most interested to adopt vermicompost. The correlation coefficient (r) value also support the statement (Table 4.16).

#### 4.1.3 Family size of the respondents

Family size of the respondents ranged from 2 to 9, with a mean of 4.5 and standard deviation 1.66. Based on their family size scores, the respondents' families were classified into three categories. The distribution of the respondents according to their family size is shown in Table 4.3.



**Table 4.3. Distribution of the respondents according to their family size**

| Categories | Score (Year) | Respondent (N=80) |                | Mean | Sd   | Range |     |
|------------|--------------|-------------------|----------------|------|------|-------|-----|
|            |              | Number            | Percentage (%) |      |      | Min   | Max |
| Small      | Upto 4       | 51                | 63.8           | 4.5  | 1.66 | 2     | 9   |
| Medium     | 5-7          | 22                | 27.5           |      |      |       |     |
| Large      | >7           | 7                 | 8.8            |      |      |       |     |
| Total      |              | 80                | 100            |      |      |       |     |

Data presented in Table 4.3. show that majority (63.8 %) of the respondents belonged to the small sized family while (27.5%) and (8.8%) of the respondents belonged to medium size family and large size family respectively. The average family size (4.5) of the respondents is about similar to the national average (4.4; BBS, 2013).

#### 4.1.4 Farming experience of the respondents

The farming experience score of the respondents ranged from 2 to 50 with a mean and standard deviation of 16.39 and 9.67 respectively. Based on farming experience, the respondents were classified into low ( $\leq 10$ ), medium (11-20) and high ( $> 20$ ) categories as shown in Table 4.4.

**Table 4.4. Distribution of the respondents according to their farming experience**

| Categories        | Score (Year) | Respondent (N=80) |                | Mean  | Sd   | Range |     |
|-------------------|--------------|-------------------|----------------|-------|------|-------|-----|
|                   |              | Number            | Percentage (%) |       |      | Min   | Max |
| Low experience    | $\leq 10$    | 20                | 25             | 16.39 | 9.67 | 2     | 50  |
| Medium experience | 11-20        | 38                | 47.5           |       |      |       |     |
| High experience   | $> 20$       | 22                | 27.5           |       |      |       |     |
| Total             |              | 80                | 100            |       |      |       |     |

Table 4.4. indicate that highest proportion (47.5%) of the respondents were medium experienced in farming followed by high experience (27.5%) and one-fourth (25%) respondents had low

experience. The findings also indicate that three-fourth of the respondents (75%) has medium to high experience.

#### 4.1.5 Innovativeness of the respondents

The innovativeness score of the respondents ranged from 2 to 24 with mean and standard deviation of 12.2 and 5.7, respectively.

**Table 4.5. Distribution of the respondents according to their innovativeness in using vermicompost**

| Categories     | Score (Month) | Respondent (N=80) |                | Mean | Sd  | Range |     |
|----------------|---------------|-------------------|----------------|------|-----|-------|-----|
|                |               | Number            | Percentage (%) |      |     | Min   | Max |
| Innovator      | <0.8          | 0                 | 0              | 12.2 | 5.7 | 2     | 24  |
| Early Adopter  | 0.8-6.5       | 11                | 13.8           |      |     |       |     |
| Early Majority | 6.6-12.2      | 30                | 37.5           |      |     |       |     |
| Late Majority  | 12.3-18.7     | 31                | 38.8           |      |     |       |     |
| Laggard        | >18.7         | 8                 | 10             |      |     |       |     |
| Total          |               | 80                | 100            |      |     |       |     |

Table 4.5. and Figure 4.1. indicate that majority (51.3%) of the respondents were early adopter to early majority in adopting vermicompost followed by late majority (38.8%) and laggards (10%). None of the respondent were innovator. Though there was no innovator for adopting vermicompost but the number of early adopter, early majority and late majority were almost same as Rogers (1983) findings. Rogers (1983) found (2.5%), (13.5%), (34%) and (34%) of farmers' as innovator, early adopter, early majority and late majority respectively for adoption of an innovation. The percentage of laggard (10%) is less in this study area than that of Rogers (1983) findings (16%).

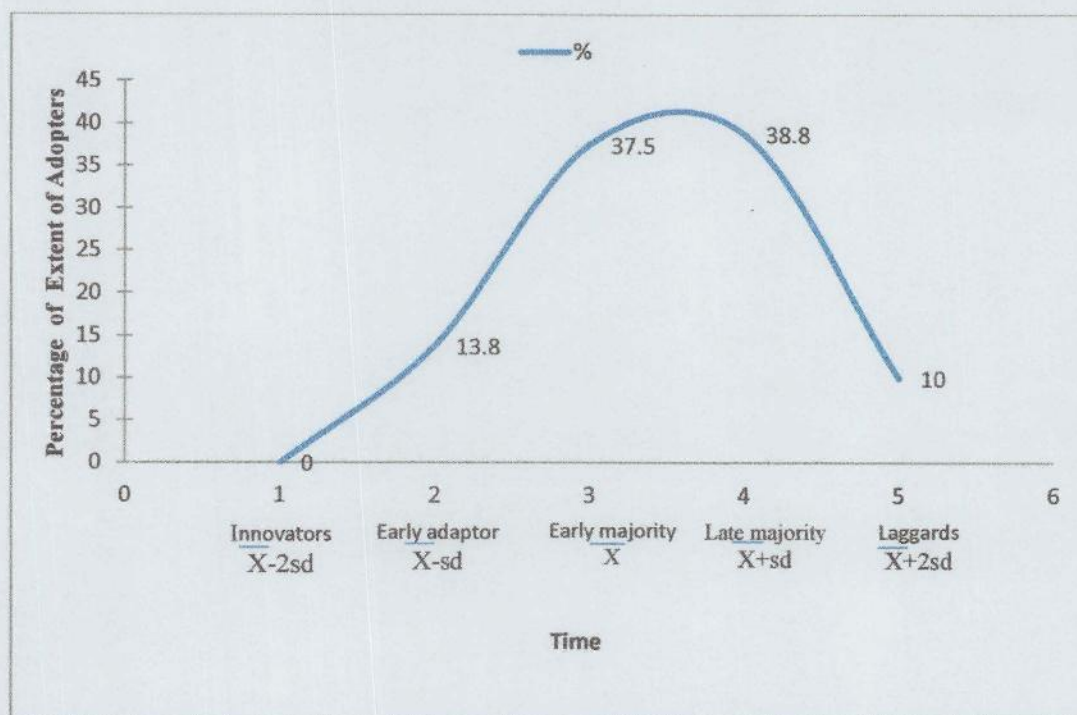


Figure 4.1: Adopter categories based on innovativeness

#### 4.1.6 Farm size of the respondents

The observed farm size scores of the respondents varied from 0.03 hectare to hectares 2.69. The average farm size was 0.57 hectares and the standard deviation was 0.55. The distribution of the respondents according to their farm size is shown in Table 4.6.

Table 4.6. Distribution of the respondents according to their farm size

| Categories | Score (ha) | Respondents (80) |                | Mean | SD   | Range |      |
|------------|------------|------------------|----------------|------|------|-------|------|
|            |            | Number           | Percentage (%) |      |      | Min   | Max  |
| Landless   | <0.02      | 0                | 0              | 0.57 | 0.55 | 0.03  | 2.69 |
| Marginal   | 0.02-0.20  | 17               | 21.3           |      |      |       |      |
| Small      | 0.21-1.00  | 52               | 65             |      |      |       |      |
| Medium     | 1.01-3.00  | 11               | 13.8           |      |      |       |      |
| Large      | >3.00      | 0                | 0              |      |      |       |      |
| Total      |            | 80               | 100            |      |      |       |      |



The findings show that majority (65%) of the respondents possessed small farm size compared to 21.3% and 13.8% of them having marginal and medium farm size respectively. None of the respondents belong to landless and large farm categories.

#### 4.1.7 Annual family income of the respondents

Annual family income of the respondents ranged from 51000 to 480000 with a mean of 125640 and standard deviation of 64490.90. The distribution of the respondents according to their annual family income is shown in Table 4.7.

**Table 4.7. Distribution of respondents according to annual income of their family**

| Categories    | Scores (Tk)  | Respondents (N=80) |                | Mean   | SD      | Range |        |
|---------------|--------------|--------------------|----------------|--------|---------|-------|--------|
|               |              | Number             | Percentage (%) |        |         | Min   | Max    |
| Low income    | ≤75000       | 10                 | 12.5           | 125640 | 64490.9 | 51000 | 480000 |
| Medium income | 75001-150000 | 55                 | 68.8           |        |         |       |        |
| High income   | >150000      | 15                 | 18.8           |        |         |       |        |
| Total         |              | 80                 | 100            |        |         |       |        |

Data presented in Table 4.7. reveal that the majority (68.8%) of the respondents had medium income while 18.8% had high income. Only 12.5% of the respondents had low income.

#### 4.1.8 Extension media contact of the respondents

The extension contact score of the respondents ranged from 3 to 18 with a mean and standard deviation of 11.63 and 2.48, respectively. The distribution of the respondents based on their extension contact is shown in Table 4.8.



**Table 4.8. Distribution of the respondents according to their extension media contact**

| Categories | Score | Respondent (N=80) |             | Mean  | Sd   | Range |     |
|------------|-------|-------------------|-------------|-------|------|-------|-----|
|            |       | Number            | Percent (%) |       |      | Min   | Max |
| No contact | 0     | 0                 | 0           | 11.63 | 2.48 | 3     | 18  |
| Low        | 1-8   | 10                | 12.5        |       |      |       |     |
| Medium     | 8-16  | 69                | 86.3        |       |      |       |     |
| High       | 17-24 | 1                 | 1.3         |       |      |       |     |
| Total      |       | 80                | 100.00      |       |      |       |     |

Most (86.3%) of the respondents had medium scale extension media contact followed by low scale extension media contact (12.5%) and high extension contact (1.3%). None of respondents belonged to no contact categories.

#### **4.1.9 Organizational participation of the respondents**

The observed organizational participation score of the respondents ranged from 0 to 8 with a mean of 1.75 and standard deviation of 2.1; respectively. The distribution of the respondents according to organizational participation their score is presented in Table 4.9.

**Table 4.9. Distribution of the respondents according to their organizational participation**

| Categories | Score | Respondent (N=80) |             | Mean | Sd  | Range |     |
|------------|-------|-------------------|-------------|------|-----|-------|-----|
|            |       | Number            | Percent (%) |      |     | Min   | Max |
| No         | 0     | 32                | 40          | 1.75 | 2.1 | 0     | 8   |
| Low        | 1-3   | 31                | 38.8        |      |     |       |     |
| Medium     | 4-6   | 13                | 16.3        |      |     |       |     |
| High       | >6    | 4                 | 5           |      |     |       |     |
| Total      |       | 80                | 100.00      |      |     |       |     |

Data contained in Table 4.9. indicate that majority (55.1%) of the respondents had low to medium level of organizational participation . On the other hand, two-fifths (40%) of the respondents had no organizational participation and only a few (5%) respondents having high organizational participation.



#### 4.1.10 Cosmopolitaness of the respondents

Cosmopolitaness of the respondents ranged from 2 to 8 with a mean of 4.35 and standard deviation of 1.54. The distribution of respondents according to their cosmopolitaness is shown in Table 4.10.

**Table 4.10. Distribution of respondents according to cosmopolitaness**

| Categories | Score | Respondent (N=80) |                | Mean | Sd   | Range |     |
|------------|-------|-------------------|----------------|------|------|-------|-----|
|            |       | Number            | Percentage (%) |      |      | Min   | Max |
| No         | 0     | 0                 | 0              | 4.35 | 1.54 | 2     | 8   |
| Low        | 1-5   | 57                | 71.2           |      |      |       |     |
| Medium     | 6-10  | 23                | 28.8           |      |      |       |     |
| High       | 11-15 | 0                 | 0              |      |      |       |     |
| Total      |       | 80                | 100.00         |      |      |       |     |

Data contained in Table 4.10 reveal that about three-fourth (73.2%) of the respondents had low cosmopolitaness compared to 28.8% had medium cosmopolitaness. None of respondents belonged to no to high contact categories.

#### 4.1.11 Knowledge of the respondents on vermicompost

The knowledge on vermicompost score of the respondents ranged from 7 to 16 with a mean and standard deviation of 11.85 and 1.93, respectively. The distribution of the respondents based on knowledge on vermicompost is shown in Table 4.11.

**Table 4.11. Distribution of respondents according to knowledge on vermicompost**

| Categories | Score | Respondent (N=80) |                | Mean  | Sd   | Range |     |
|------------|-------|-------------------|----------------|-------|------|-------|-----|
|            |       | Number            | Percentage (%) |       |      | Min   | Max |
| No         | 0     | 0                 | 0              | 11.85 | 1.93 | 7     | 16  |
| Low        | 1-7   | 1                 | 1.25           |       |      |       |     |
| Medium     | 8-14  | 71                | 88.75          |       |      |       |     |
| High       | >14   | 8                 | 10             |       |      |       |     |
| Total      |       | 80                | 100.00         |       |      |       |     |

Data presented in Table 4.11. indicate that most (88.75%) of the respondents had medium knowledge followed by high knowledge (10%) and only one (1.25%) respondent had low of knowledge.

#### 4.1.12 Training experience of the respondents

Training experience scores of the respondents ranged from 0 to 2 with an average score of 0.73 and standard deviation being 0.60. Based on the number of training received, the respondents were grouped into four categories as shown in Table 4.12.

**Table 4.12. Distribution of the respondents according to their training experience on vermicompost**

| Categories      | Score | Respondent (N=80) |                | Mean | Sd   | Range |     |
|-----------------|-------|-------------------|----------------|------|------|-------|-----|
|                 |       | Number            | Percentage (%) |      |      | Min   | Max |
| No training     | 0     | 27                | 33.75          | 0.75 | 0.60 | 0     | 2   |
| Low training    | 1-3   | 53                | 66.25          |      |      |       |     |
| Medium training | 4-6   | 0                 | 0              |      |      |       |     |
| High training   | >6    | 0                 | 0              |      |      |       |     |
| Total           |       | 80                | 100.00         |      |      |       |     |

Analysis of data presented in Table 4.12. show that about one-third (33.75%) of the respondents had no training on vermicompost. However, about two-third (66.25%) of the respondents had low training on vermicompost. None of the respondent had medium and high training experience on vermicompost.

#### 4.3 Extent of adoption of vermicompost

The extent of adoption score of the respondent varied from 2.5% to 87.86% with a mean and standard deviation of 23.46 and 18.63, respectively. On the basis of extent of adoption score the respondents were classified into three categories which is presented in Table 4.13.



**Table 4.13. Distribution of respondents according to their extent of adoption vermicompost**

| Categories      | Score   | Respondent (N=80) |                | Mean  | Sd    | Range |       |
|-----------------|---------|-------------------|----------------|-------|-------|-------|-------|
|                 |         | Number            | Percentage (%) |       |       | Min   | Max   |
| Low adoption    | Upto 30 | 55                | 68.8           | 23.46 | 18.63 | 2.50  | 87.86 |
| Medium adoption | 31-60   | 21                | 26.3           |       |       |       |       |
| High adoption   | >60     | 4                 | 5              |       |       |       |       |
| Total           |         | 80                | 100.00         |       |       |       |       |

It was revealed from the study that majority (68.8%) of the respondents had low adoption followed by medium (26.3%) and high adoption (5%). The findings of the study also indicate that most (95.1%) of the respondents had low to medium level of adoption. This might be due to that vermicompost is introduced very recently in the study area. The findings of the study have almost harmony with the findings of Islam (2007). He found that most (91%) of the respondent had low to medium adoption and only a few (9%) respondents having high adoption. The present findings quite similar to the findings of Islam (2007) adoption of mixed cropping.

### 4.3 Problem Confrontation

Problem confrontation score of the respondents ranged from 9 to 20 with a mean of 14.46 and standard deviation of 2.6. The distribution of respondents according to their problem confrontation score is shown in Table 4.14.

**Table 4.14. Distribution of respondents according to problem confrontation**

| Categories                   | Score | Respondent (N=80) |                | Mean  | Sd  | Range |     |
|------------------------------|-------|-------------------|----------------|-------|-----|-------|-----|
|                              |       | Number            | Percentage (%) |       |     | Min   | Max |
| Low problem confrontation    | 1-10  | 3                 | 3.75           | 14.46 | 2.6 | 9     | 20  |
| Medium problem confrontation | 11-20 | 77                | 96.25          |       |     |       |     |
| High problem confrontation   | 21-30 | 0                 | 0              |       |     |       |     |
| Total                        |       | 80                | 100.00         |       |     |       |     |

Data presented in Table 4.14. indicate that most (96.25%) of the respondents had medium problem confrontation followed by low (3.75%) problem confrontation. None of respondents belonged to high problem confrontation categories.

#### 4.3.1 Comparative problem confrontation of farmers regarding individual statement related to problem of vermicompost

Based on the Problem Confrontation Index (PCI) score, the statements were also arranged in rank order as shown in the Table 4.15.

**Table 4.15. Relative position (rank order) of the statements related to problem regarding using of vermicompost**

| Sl. no | Statement                                                             | PCI | Rank             |
|--------|-----------------------------------------------------------------------|-----|------------------|
| 1      | An unpleasant odor comes from the bin                                 | 30  | 10 <sup>th</sup> |
| 2      | It requires high maintenance than that of traditional compost process | 103 | 6 <sup>th</sup>  |
| 3      | High price of worm                                                    | 97  | 7 <sup>th</sup>  |
| 4      | Dying of worm                                                         | 132 | 3 <sup>rd</sup>  |
| 5      | Lack of knowledge on vermicompost                                     | 188 | 2 <sup>nd</sup>  |
| 6      | Unavailability of worm                                                | 88  | 9 <sup>th</sup>  |
| 7      | Scarcity of vermicompost supply in time                               | 94  | 8 <sup>th</sup>  |
| 8      | Lack of training in adoption of vermicompost                          | 205 | 1 <sup>st</sup>  |
| 9      | Non availability of printed materials about vermicompost              | 120 | 4 <sup>th</sup>  |
| 10     | Unavailability of food for worm                                       | 110 | 5 <sup>th</sup>  |

\*PCI= Problem Confrontation Index

Data presented in Table 4.15. indicate that the farmers' had high problem confrontation regarding 'Lack of training in adoption of vermicompost' followed by 'Lack of knowledge on vermicompost', 'Dying of worm' etc. The farmers' also expressed their least severe problem confrontation regarding 'an unpleasant odor comes from the bin'.

#### 4.4 Relationship between the selected characteristics of the respondents and their extent of adoption of vermicompost

This section deals with the relationship between twelve selected characteristics of the vermicompost users (farmers') and their extent of adoption of vermicompost. To explore the relationships between the selected characteristics of the respondents and their extent of adoption Pearson's product Moment co-efficient of correlation (  $r$  ) as well as Spearman rank correlation

Coefficient were used. The relationship of the selected characteristics of the respondents with their extent of adoption appears in Table 4.16.

**Table 4.16. Computed coefficient of correlation ( r ) and spearman rank correlation between the selected characteristics of the respondents and their extent of adoption**

| Characteristics<br>(Independent variable) | Dependent variable | Correlation<br>coefficient | Remark |
|-------------------------------------------|--------------------|----------------------------|--------|
| Age                                       | Extent of adoption | -0.335**                   | PPCC   |
| Educational qualification                 |                    | 0.267*                     | PPCC   |
| Family size                               |                    | -0.262*                    | PPCC   |
| Farming experience                        |                    | -0.275*                    | PPCC   |
| Innovativeness                            |                    | -0.87                      | PPCC   |
| Farm size                                 |                    | 0.095                      | PPCC   |
| Annual family income                      |                    | 0.075                      | PPCC   |
| Extension media contact                   |                    | 0.348**                    | PPCC   |
| Organizational participation              |                    | 0.162                      | SRCC   |
| Cosmopoliteness                           |                    | 0.233*                     | SRCC   |
| Knowledge on vermicompost                 |                    | 0.365**                    | PPCC   |
| Training on vermicompost                  |                    | 0.374**                    | SRCC   |

NS= Non-significant \*\*. Correlation is significant at the 0.01 level (2-tailed) \* Correlation is significant at the 0.05 level (2-tailed). PPCC = Pearson's Product Moment co-efficient of correlation. SRCC = Spearman Rank Correlation Coefficient.

Data presented in Table 4.16. show that among 12 selected characteristics of the respondents' educational qualification, extension contact, cosmopoliteness, knowledge on vermicompost and training experience on vermicompost of the respondents showed a significant positive relationship with their extent of adoption. It means that with the increase of education, extension contact, cosmopoliteness, knowledge and training experience extent of adoption increases significantly. Hossain (2003) concluded that education of the farmers had a significant and positive relationship with their adoption and modern Boro rice cultivation practices. Sardar (2002) concluded that the extension contact had positively significant relationship with their adoption of IPM practices. Ahmed (2006) found in his study that communication behaviour of the respondents had significant positive relationship with their adoption of selected wheat varieties.



The findings of the study about cosmopolitaness have harmony with the findings of Ahmed (2006). He found that the cosmopolitaness of the farmers had significant positive relationship with their adoption of selected wheat varieties.

Sardar (2002) studied adoption of IPM practices by the farmers under PETRRA Project of BDRS. He concluded that agricultural knowledge had positive significant relationship with their adoption of IPM practices. Ahmed (2006) observed in his study that knowledge on wheat cultivation of the respondents had significant positive relationship with their adoption of selected wheat varieties.

Ahmed (2006) found in his study that training received of the respondents had significant positive relationship with their adoption of selected wheat varieties. Haque (2003) found a positive relationship with training experience and adoption of modern technology. The findings of the study about training have harmony with the findings.

Age, family size and farming experience showed a significant negative relationship with their extent of adoption. It means that with the increases of age, family size and farming experience extent of adoption decreases significantly. The findings of the study about age have harmony with the findings of Haque (2003). He conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that age of the respondents had negatively significant relationship with their extent of farmer's adoption of modern maize cultivation technologies. The findings of the study about age also have similarity with the findings of Islam (1996). He carried out a research study on growers' use of Indigenous Technical Knowledge (ITK), in the context of sustainable agricultural development. He found that age of the respondent growers had significant negative relationship with their extent of use of ITK.

The findings of the study about family size have harmony with the findings of Haque (2003). He conducted a study on farmers' adoption of improved practices of sugarcane and observed that family size of the respondent had significant negative relationship with their extent of adoption of sugarcane.

Hoque (1993) in his study concluded that farming experiences had negative significant relationship with their adoption of improved practices in sugarcane cultivation. The rest characteristics did not show any significant relationships with adoption.

#### 4.4.1 Functional relationship between the characteristics of the respondents and their extent of adoption of vermicompost

This section deals with the functional relationship between the significant characteristics of the vermicompost users (farmers') and their extent of adoption of vermicompost. A regression analysis was done for this purpose. The relationship of the significant characteristics of the respondents with their extent of adoption presented below:

##### Educational qualification of the respondents and their extent of adoption

Educational qualification of the respondents showed a significant positive relationship with their extent of adoption. The findings of the study about educational qualification have harmony with the findings of regression analysis because in regression analysis it shows that with the increases of education extent of adoption increases.  $R^2$  value (0.071) indicated that there was only 7.1% contribution of education in adopting vermicompost.

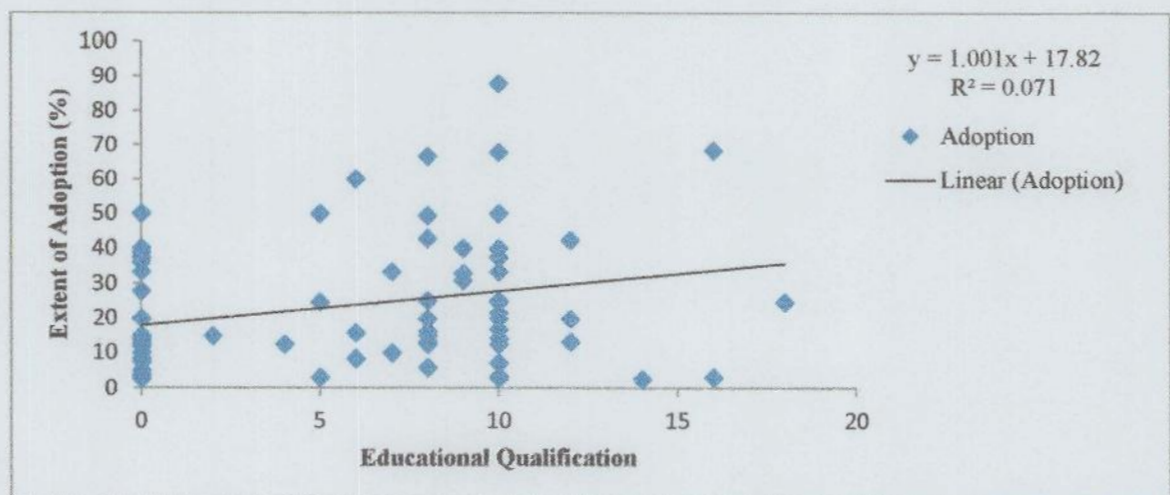


Figure 4.2.: Functional relationship between educational qualification of the respondents and their extent of adoption

### Extension media contact of the respondents and their extent of adoption

It was observed in the study area that the more the extension media contact of the farmers, the higher the adoption of vermicompost. It means that increasing extension contact farmers become aware and motivated to adopt new technology like vermicompost. There was 12.1% contribution of extension media contact in adopting vermicompost according to  $R^2$  value.

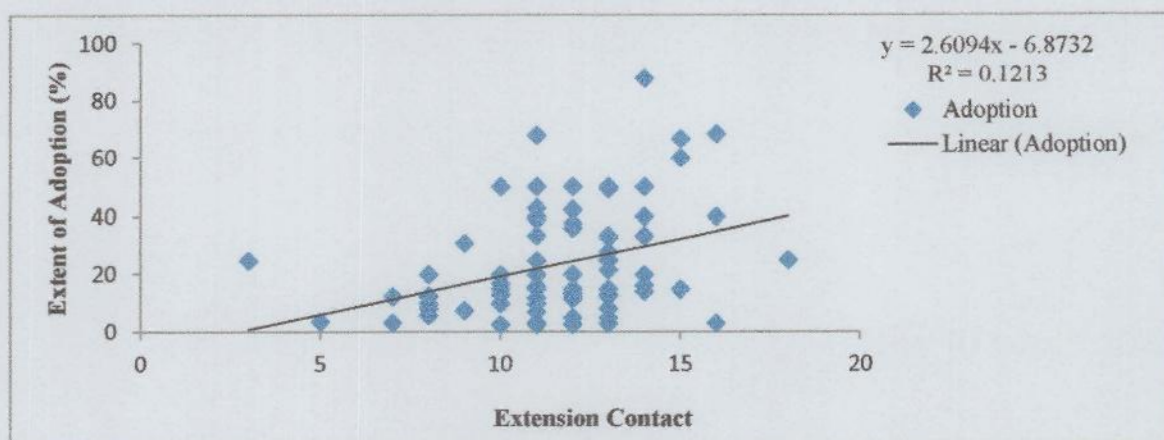


Figure 4.3.: Functional relationship between extension contact of the respondents and their extent of adoption

### Cosmopoliteness of the respondents and their extent of adoption

The finding implies that cosmopoliteness of the vermicompost users had significant relationship with their extent of adoption of vermicompost. It means that farmers with higher cosmopoliteness were more likely to adopt new technology like vermicompost. The regression analysis shows similar result between cosmopoliteness of the respondents and their extent of adoption of vermicompost.  $R^2$  value indicate that there was 1.1% of contribution of cosmopoliteness.



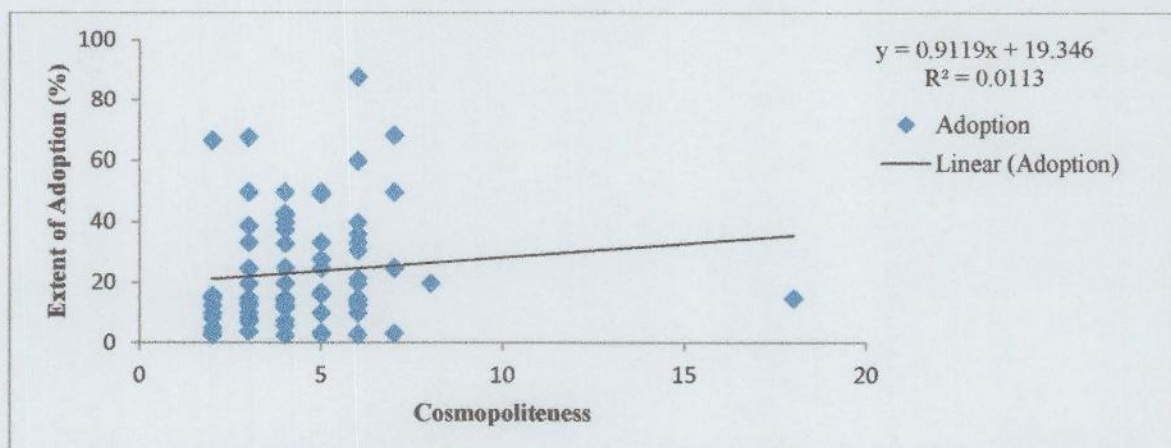


Figure 4.4.: Functional relationship between cosmopolitanness of the respondents and their extent of adoption

#### Knowledge on vermicompost and their extent of adoption

Knowledge on vermicompost showed positive relationship with their extent of adoption in regression analysis. This finding indicates that adoption of vermicompost increases with increase of knowledge of the users.  $R^2$  value indicate that there was 13.3% of contribution of knowledge.

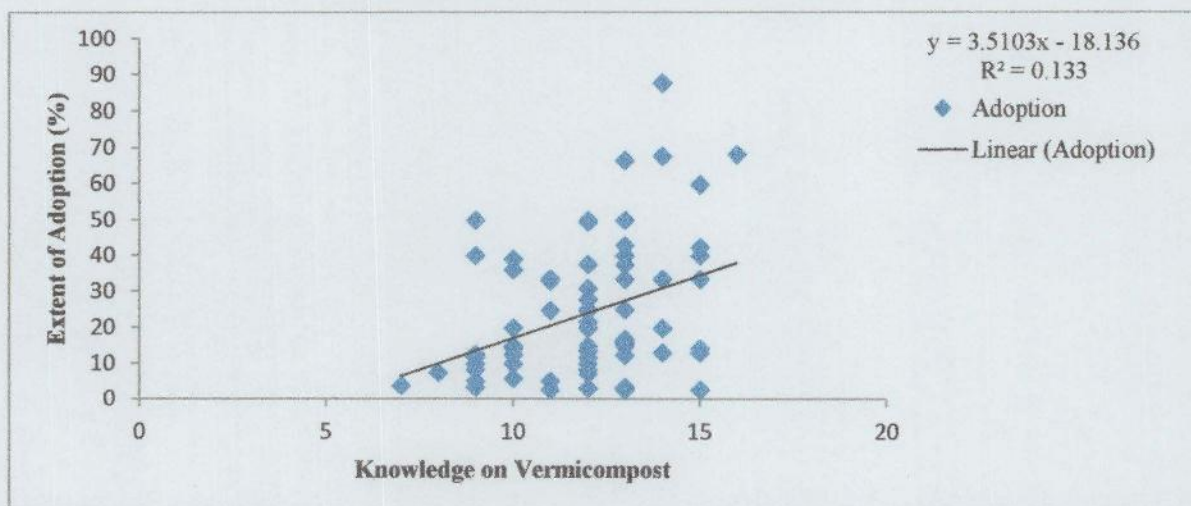


Figure 4.5.: Functional relationship between knowledge on vermicompost of the respondents and their extent of adoption



### Training experience on vermicompost and their extent of adoption

The finding implies that the training on vermicompost users had positive relationship with their extent of adoption in regression analysis. It was found in the study area that people receiving more training had higher adoption of vermicompost.  $R^2$  value (0.177) indicate that training contribute 17.7 % in adopting vermicompost.

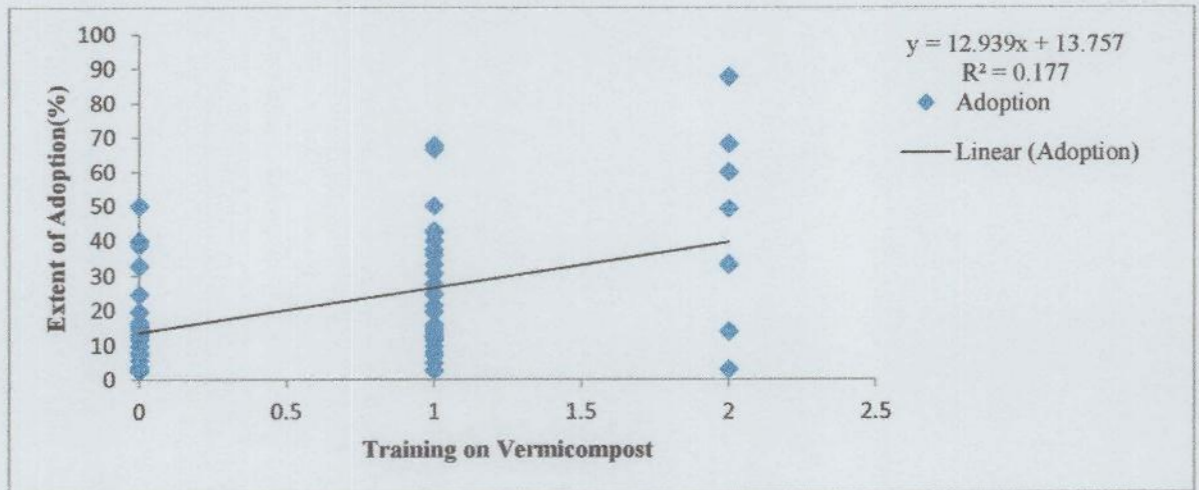


Figure 4.6.: Functional relationship between training experience on vermicompost of the respondents and their extent of adoption

### Age of the respondents and their extent of adoption

Age of the respondents showed a significant negative relationship with their extent of adoption. It means that with the increases of age extent of adoption decreases significantly.  $R^2$  value (0.112) indicates that age contribute only 11.2 % in adopting vermicompost.

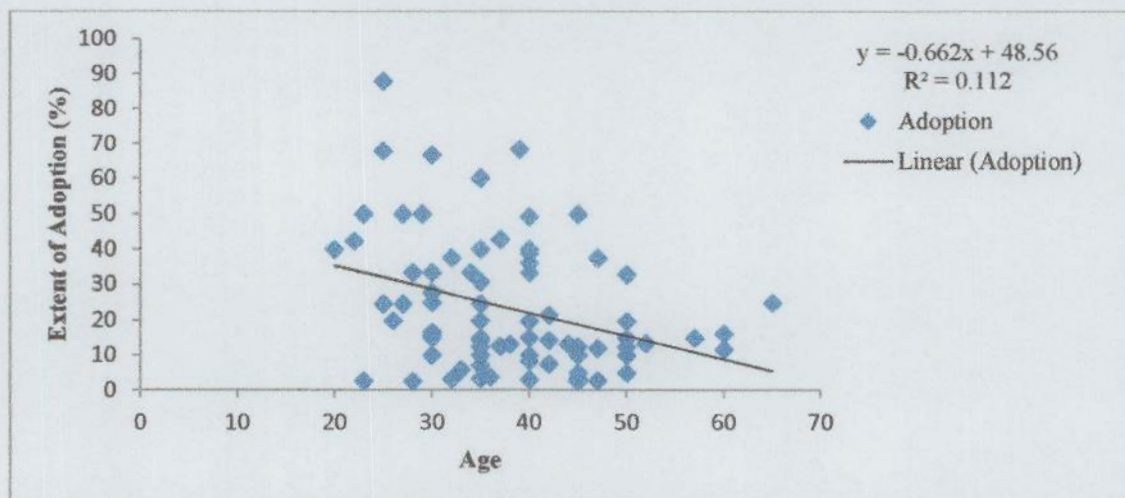


Figure 4.7.: Functional relationship between age of the respondents and their extent of adoption

#### Family size of the respondents and their extent of adoption

Functional relationship between family size of the respondents and their extent of adoption of vermicompost supported the result of correlation between family size respondents and their extent of adoption. It indicates that with the increases of family members decreases the extent of adoption of vermicompost. There was only 6.8% contribution of family size in adopting vermicompost.

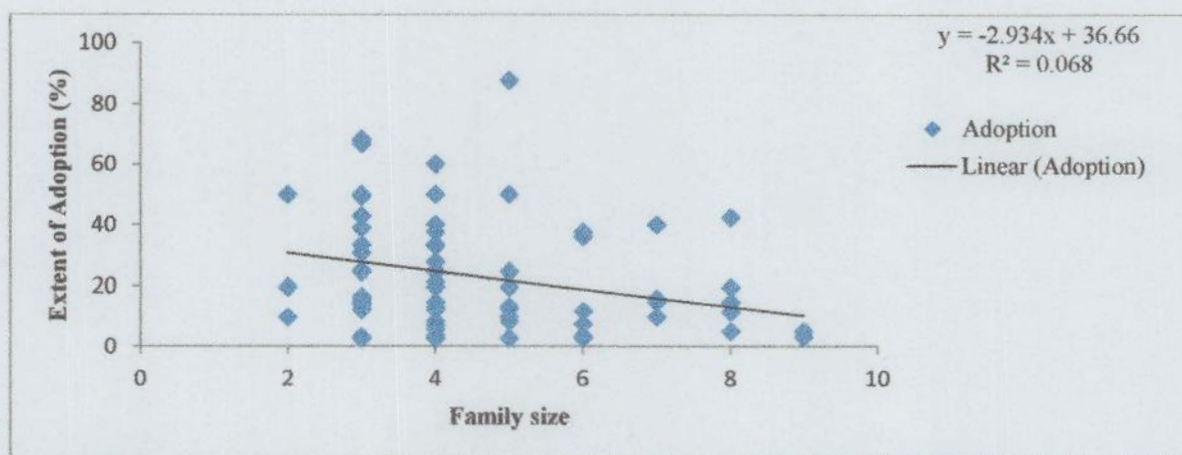


Figure 4.8.: Functional relationship between family size of the respondents and their extent of adoption



### Farming experience of the respondents and their extent of adoption

Farming experience of the respondents showed negative relationship with their extent of adoption in regression analysis. It means that with the increases of farming experience extent of adoption decreases. There was only 7.5% contribution of family size in adopting vermicompost.

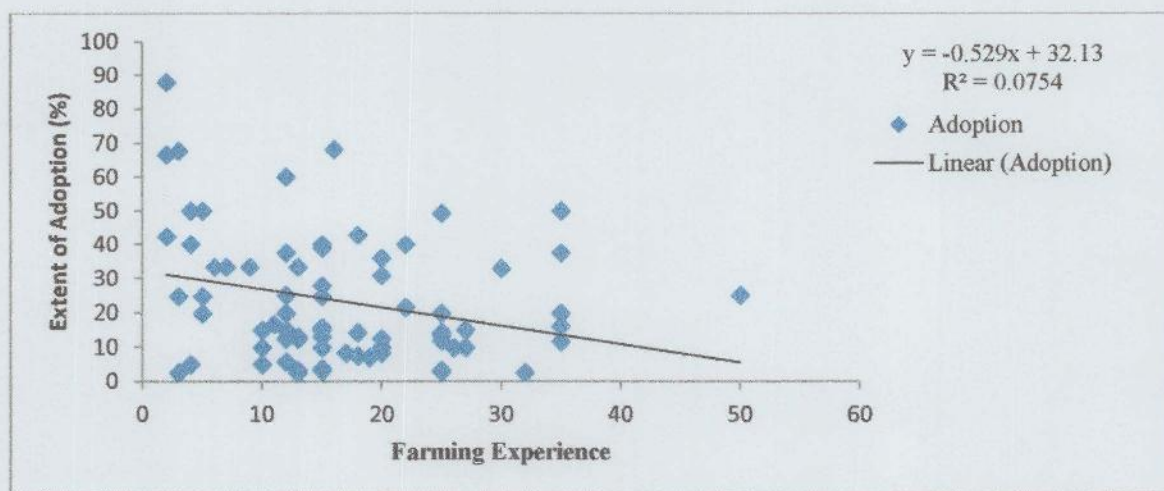


Figure 4.9.: Functional relationship between farming experience of the respondents and their extent of adoption

## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The study was conducted to have an idea about extent of adoption of vermicompost by the farmers. Data were collected from the vermicompost users of five villages namely Raingamari, Sachibunia, Dorgatola, Jhorvanga and Mathavanga of Jalma union of Bathiaghata upazila under Khulna district. A number of 160 vermicompost users from the study area taking 50 % users from each of Raingamari, sachibunia, Dorgatola, Jhorvanga and Mathavanga were selected. This 80 vermicompost users were treated as sample of the study. Data were collected from selected 80 respondents through interview method by the researcher himself using an interview schedule during 4 March to 6 April, 2018.

#### 5.1 Summary of Findings

##### 5.1.1 Selected characteristics of the respondents (Independent variable)

The major findings of the study are summarized below:

##### Age

Age of the farmers ranged from 26 to 65 years with the average of 41.30 years and the standard deviation was 8.98. About half (48.8%) of the respondents were young as compared to 45% being middle aged and 6.3% old. It means that yonng aged as compared as middle aged people of that locality were more interested to use vermicompost in their field.

##### Educational qualification

The educational qualification score of the respondents ranged from 0 to 18 with mean and standard deviation of 5.63 and 4.9, respectively. Highest proportion (46.3%) of the respondents had secondary level of education followed by illiterate (37.5%), primary (7.5%), graduate or above (5%) and rest (3.8%) higher secondary. The respondents those who had higher level of education they are most interested to adopt vermicompost.





### **Family size**

Family size of the respondents ranged from 2 to 9, with a mean of 4.5 and standard deviation 1.66. Majority (63.8 %) of the respondents belonged to the small sized family while (27.5%) and (8.8%) of the respondents belonged to medium size family and large size family respectively. The average family size (4.5) of the respondents is about similar to the national average (4.4; BBS, 2013).

### **Farming experience**

The farming experience score of the respondents ranged from 2 to 50 with a mean and standard deviation of 16.39 and 9.67 respectively. Highest proportion (47.5%) of the respondents were medium experienced in farming followed by high experience (27.5%) and one-fourth (25%) respondents had low experience. The findings also indicate that three-fourth of the respondents (75%) has medium to high experience.

### **Innovativeness**

The innovativeness score of the respondents ranged from 2 to 24 with mean and standard deviation of 12.2 and 5.7; respectively. Majority (51.3%) of the respondents were early adopter to early majority in adopting vermicompost followed by late majority (38.8%) and laggards (10%). None of the respondent were innovator.

### **Farm size**

The observed farm size scores of the respondents varied from 0.03 hectare to hectares 2.69. The average farm size was 0.57 hectares and the standard deviation was 0.55; respectively. Majority (65%) of the respondents possessed small farm size compared to 21.3% and 13.8% of them having marginal and medium farm size respectively. None of the respondents belong to landless and large farm categories.

### **Annual family income**

Annual family income of the respondents ranged from 51000 to 480000 with a mean of 125640 and standard deviation of 64490.90; respectively. Majority (68.8%) of the respondents had medium income while 18.8% had high income. Only 12.5% of the respondents had low income.

### **Extension media contact**

The extension contact score of the respondents ranged from 3 to 18 with a mean and standard deviation of 11.63 and 2.48, respectively. Most (86.3%) of the respondents had medium scale extension media contact followed by low scale extension media contact (12.5%) and high extension contact (1.3%). None of respondents belonged to no contact categories.

### **Organizational participation**

The observed organizational participation score of the respondents ranged from 0 to 8 with a mean of 1.75 and standard deviation of 2.1; respectively. Majority (55.1%) of the respondents had low to medium level of organizational participation. On the other hand, two-fifths (40%) of the respondents had no organizational participation and only a few (5%) respondents having high organizational participation.

### **Cosmopoliteness**

Cosmopoliteness of the respondents ranged from 2 to 8 with a mean of 4.35 and standard deviation of 1.54; respectively. About three-fourth (73.2%) of the respondents had low cosmopoliteness compared to 28.8% had medium cosmopoliteness. None of respondents belonged to no to high contact categories.

### **Knowledge on vermicompost**

The knowledge on vermicompost score of the respondents ranged from 7 to 16 with a mean and standard deviation of 11.85 and 1.93, respectively. Most (88.75%) of the respondents had medium knowledge followed by high knowledge (10%) and only one (1.25%) respondent had low of knowledge.

### **Training experience on vermicompost**

Training experience scores of the respondents ranged from 0 to 2 with an average score of 0.73 and standard deviation being 0.60; respectively. About one-third (33.75%) of the respondents had no training on vermicompost. However, about two-third (66.25%) of the respondents had low training on vermicompost. None of the respondent had medium and high training experience on vermicompost.

#### **5.1.2 Extent of adoption of vermicompost (Dependent variable)**

The extent of adoption score of the respondent varied from 2.5% to 87.86% with a mean and standard deviation of 23.46 and 18.63, respectively. Majority (68.8%) of the respondents had low adoption followed by medium (26.3%) and high adoption (5%). This might be due to that vermicompost is introduced very recently in the study area.

#### **5.1.3 Problem confrontation**

Problem confrontation score of the respondents ranged from 9 to 20 with a mean of 14.46 and standard deviation of 2.6. Most (96.3%) of the respondents had medium problem confrontation followed by low (3.8%) problem confrontation. None of respondents belonged to no to high problem confrontation categories.

#### **5.1.4 Relationship between the selected characteristics of the respondents and their extent of adoption of vermicompost**

Out of twelve independent variables educational qualification, extension contact, cosmopolitaness, knowledge on vermicompost and training experience of the respondents showed a significant positive relationship with their extent of adoption while age, family size and farming experience showed a significant negative relationship with their extent of adoption. The rest characteristics did not show any significant relationships with adoption.

## **5.2 Conclusions**

Based on result and its logical interpretation the following conclusions are drawn:

1. Majority of the respondents had low adoption followed by medium and high adoption of vermicompost.
2. Among 12 selected characteristics of the respondent's educational qualification, extension contact, cosmopolitaness, knowledge on vermicompost and training experience of the respondents showed a significant positive relationship with their extent of adoption while age, family size and farming experience showed a significant negative relationship with their extent of adoption. The rest characteristics did not show any significant relationships with adoption.

## **5.3 Recommendations**

1. Similar research should be conducted by the researchers in other areas of Bangladesh.
2. Majority of the respondents had low adoption of vermicompost. So in order to increase adoption it is necessary to motivate farmers through training and other extension approaches. Department of Agricultural Extension (DAE) along with experts NGO representatives, different social media and mass media can play a crucial role in this regard.



## **CHAPTER V**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

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Age of the farmers ranged from 26 to 65 years with the average of 41.30 years and the standard deviation was 8.98. About half (48.8%) of the respondents were young as compared to 45% being middle aged and 6.3% old. It means that young aged as compared as middle aged people of that locality were more interested to use vermicompost in their field.

##### **Educational qualification**

The educational qualification score of the respondents ranged from 0 to 18 with mean and standard deviation of 5.63 and 4.9, respectively. Highest proportion (46.3%) of the respondents had secondary level of education followed by illiterate (37.5%), primary (7.5%), graduate or above (5%) and rest (3.8%) higher secondary. The respondents those who had higher level of education they are most interested to adopt vermicompost.

### **Family size**

Family size of the respondents ranged from 2 to 9, with a mean of 4.5 and standard deviation 1.66. Majority (63.8 %) of the respondents belonged to the small sized family while (27.5%) and (8.8%) of the respondents belonged to medium size family and large size family respectively. The average family size (4.5) of the respondents is about similar to the national average (4.4; BBS, 2013).

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The observed organizational participation score of the respondents ranged from 0 to 8 with a mean of 1.75 and standard deviation of 2.1; respectively. Majority (55.1%) of the respondents had low to medium level of organizational participation. On the other hand, two-fifths (40%) of the respondents had no organizational participation and only a few (5%) respondents having high organizational participation.

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Cosmopoliteness of the respondents ranged from 2 to 8 with a mean of 4.35 and standard deviation of 1.54; respectively. About three-fourth (73.2%) of the respondents had low cosmopoliteness compared to 28.8% had medium cosmopoliteness. None of respondents belonged to no to high contact categories.

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The knowledge on vermicompost score of the respondents ranged from 7 to 16 with a mean and standard deviation of 11.85 and 1.93, respectively. Most (88.75%) of the respondents had medium knowledge followed by high knowledge (10%) and only one (1.25%) respondent had low of knowledge.

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Training experience scores of the respondents ranged from 0 to 2 with an average score of 0.73 and standard deviation being 0.60; respectively. About one-third (33.75%) of the respondents had no training on vermicompost. However, about two-third (66.25%) of the respondents had low training on vermicompost. None of the respondent had medium and high training experience on vermicompost.

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**APPENDIX I**  
**ENGLISH VERSION OF THE INTERVIEW SCHEDULE**  
**Agrotechnology Discipline**  
**Khulna University, Khulna-928**  
**Interview Schedule**

**EXTENT OF ADOPTION OF VERMICOMPOST BY THE FARMERS OF BATHIAGHATA  
UPAZILA UNDER KHULNA DISTRICT**

(Data provided by you will be used for research purpose. Your identity will be concealed and other research ethics will be maintained)

**Serial No:**

**Date:**     /     / 2018

**Name of the respondent:** .....

**Husband/ Father's Name:** .....

**Village:** .....

**Upazila:** .....

**Union:** .....

**District:** .....

**A. Socio-economic characteristics of the respondent**

A.1. Age ..... Years

A.2. Educational qualification

a. Don't read and Write. (    )

b. I have read up to class .....

A.3. Family Size ..... members (including yourself)

A.4. Farming experience ..... Years

A.5. Innovativeness

a. When have you heard first about vermicompost ----- month ----- year

b. When have you started first to use vermicompost ----- month -----year



A.6. Farm size:

According to use, please indicate the area of land that your family possess.

| Sl. No. | Type of land use                      | Area of land |         |
|---------|---------------------------------------|--------------|---------|
|         |                                       | Local Unit   | Hectare |
| 1.      | Homestead                             |              |         |
| 2.      | Own land under own cultivation        |              |         |
| 3.      | Own land given to others on barga     |              |         |
| 4.      | Land taken from other on barga        |              |         |
| 5.      | Land taken from others on lease       |              |         |
|         | Total= (FS = A + B + 1/2(C + D) + E ) |              |         |

A.7. Annual family income:

| Sl. No. | Sources            | Amount (Tk) |
|---------|--------------------|-------------|
| 1       | Agriculture (Crop) |             |
| 2       | Livestock Rearing  |             |
| 3       | Fisheries          |             |
| 4       | Day labor          |             |
| 5       | Services           |             |
| 7       | Business           |             |
| 6       | Other              |             |
|         | Total              |             |

A.8. Extension Media Contact:

| Extension Media              | Name of contact  |                     |               |                   |
|------------------------------|------------------|---------------------|---------------|-------------------|
|                              | Regularly<br>(3) | Occasionally<br>(2) | Rarely<br>(1) | Not at all<br>(0) |
| SAAO                         |                  |                     |               |                   |
| AEO                          |                  |                     |               |                   |
| UAO                          |                  |                     |               |                   |
| Radio                        |                  |                     |               |                   |
| TV                           |                  |                     |               |                   |
| Printed Materials            |                  |                     |               |                   |
| Model Farmer                 |                  |                     |               |                   |
| Neighbor, Friends, Relatives |                  |                     |               |                   |



A.9. Organizational participation:

Please indicate the nature of your present or past participation in the following organization.

| SL. No. | Name of organizations                 | Nature of participation (with duration) |                                   |                        |                     |                  |
|---------|---------------------------------------|-----------------------------------------|-----------------------------------|------------------------|---------------------|------------------|
|         |                                       | Executive committee officer<br>(3)      | Executive committee member<br>(2) | Ordinary member<br>(1) | Not Involved<br>(0) | Duration (years) |
| 1       | Farmers' cooperative committee        |                                         |                                   |                        |                     |                  |
| 2       | School committee                      |                                         |                                   |                        |                     |                  |
| 3       | Mosque/Mondir/Church/Pagoda committee |                                         |                                   |                        |                     |                  |
| 4       | NGO committee                         |                                         |                                   |                        |                     |                  |
| 6       | Union council                         |                                         |                                   |                        |                     |                  |
| 7       | Youth club                            |                                         |                                   |                        |                     |                  |
| 8       | Cricket/Football club                 |                                         |                                   |                        |                     |                  |
| 9       | KKS (BRDB)                            |                                         |                                   |                        |                     |                  |
| 10      | Others                                |                                         |                                   |                        |                     |                  |

A.10. Cosmopolitaness:

Please state your frequency of visits outside your own village to the following places:

| Sl. No. | Place of visits                                      | Extent of visit      |                      |                      |                    |
|---------|------------------------------------------------------|----------------------|----------------------|----------------------|--------------------|
|         |                                                      | Frequently (3)       | Sometimes (2)        | Rarely (1)           | Not at all (0)     |
| 1       | Visit to outside of your own village                 | 5-6 times /month ( ) | 3-4 times /month ( ) | 1-2 times /month ( ) | 0 times /month ( ) |
| 2       | Visit to own Upazilla town / District town           | 5-6 times /month ( ) | 3-4 times /month ( ) | 1-2 times /month ( ) | 0 times /month ( ) |
| 3       | Visit to other Upazilla town                         | 4-5 times /month ( ) | 2-3 times /month ( ) | 1 times /month ( )   | 0 times /month ( ) |
| 4       | Visit to other District town                         | 4 times / year ( )   | 3 times / year ( )   | 1-2 times / year ( ) | 0 times / year ( ) |
| 5       | Visit to Dhaka capital city or other Divisional town | 3 times / year ( )   | 2 times / year ( )   | 1 times / year ( )   | 0 times / year ( ) |

A.11. Knowledge on vermicompost

| Sl.No.      | Items                                                                          | Full Marks | Marks Obtained |
|-------------|--------------------------------------------------------------------------------|------------|----------------|
| 1           | What is vermicompost?                                                          | 2          |                |
| 2           | What are beneficial effects of vermicompost?                                   | 2          |                |
| 3           | What are the limitations of vermicompost?                                      | 2          |                |
| 4           | What are the nutrients available for plant in vermicompost?                    | 2          |                |
| 5           | Is there any effect of vermicompost on human health?                           | 2          |                |
| 6           | Is it environment friendly? and why?                                           | 2          |                |
| 7           | What is the accurate harvesting time accurate harvesting time of vermicompost? | 2          |                |
| 8           | Mention two major function of vermicompost.                                    | 2          |                |
| 9           | What are the Materials needed for vermicompost preparation?                    | 2          |                |
| 10          | Do you know proper method of application?                                      | 2          |                |
| Total marks |                                                                                | 20         |                |