

**PREFERENCE OF ICT TOOLS BY THE FARMERS IN RECEIVING
AGRICULTURAL INFORMATION**

**A Thesis
By**

**Student No. 1705233
Session: 2017-18
Semester: July-December/2018**

**MASTER OF SCIENCE
IN
AGRICULTURAL EXTENSION**

**Department of Agricultural Extension
Hajee Mohammad Danesh Science and Technology University Dinajpur**

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**Submitted to the
Department of the Agricultural Extension
In partial fulfillment of the requirements for the degree of**

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ABSTRACT

The main purpose of the study was to determine the preference of ICT tools by the farmers for field crop cultivation. The study was conducted in five out of 17 villages of Dhamair union of Birol upazila under Dinajpur district. An updated list of 1007 farmers was collected from the local NGOs. From this list 103 farmers were selected at randomly as sample for this study. Data were collected during 15 September to 14 October 2018 by using an interview schedule. Each of the selected nine characteristics of the farmers namely age, education, family size, farming experience, annual income, organizational participation, cosmopolitaness, attitude towards ICT tools and innovativeness constituted the causal factors, while preference of ICT tools was the focus issue variable. The focus issue was determined by extent of contact with ICT tools and usefulness of ICT tools in receiving agricultural information. On the other hand, ten ICT tools were considered to determine the preference of ICT tools for field crop cultivation. Rank order for each of the ICT tools was computed by using preference of information and communication tools index (PICI). Pearson's product moment correlation coefficient (r) was used to explore the relationship between the focus issue and selected characteristics of the farmers. The highest proportion (61.17 percent) of respondents had medium preference of information and communication tools while 20.38 percent had high and only 18.45 percent had low preference. In contrast, mobile phone was mentioned by majority of respondents (PICI=482) as the most preferred ICT tool in receiving agricultural information, and computer or laptop occupied the last position in the ranking of the least preferred ICT tools (PICI=105). Out of nine independent variables; education, annual income, cosmopolitaness and innovativeness showed significant positive relationship while age and farming experience of the farmers showed significant but negative relationship with the dependent variable. The rest of the characteristics viz. family size, organizational participation and attitude of the farmers did not show any relationship with their preference of ICT tools.

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CHAPTER 1

INTRODUCTION

1.1. General Background

The agriculture information is vast, interdisciplinary and specific to different agro-climatic zones and needs a proper information dissemination system for its effective use. Hence, agriculture information resources should be significantly organized and processed to disseminate right information to the right user at the right time. Communication is recognized as an important input for development to disseminate and create dialogue among different stakeholders about the technologies and issues of agriculture, environment and sustainable development. Recent developments in the field of communication and information technology are indeed revolutionary in nature. Information and knowledge are expanding in quantity and accessibility. In such fields as agriculture, health, education, human resources and environmental management, the consequences really could be revolutionary. Communication and information technology have enormous potential especially for developing countries and furthering sustainable development (Annan, 1997).

Information Communication Technology (ICT) is not the technology as such, but it's enabling function in access to knowledge, information and communications, which are important elements in today's economic and social interactions. ICT, particularly the internet is transforming all human activities dependent on information, including rural development and in other areas. Internet is cost effective, powerful, decentralized and it is in the hands of civil society who can share knowledge and produce information. The farmers are least equipped with proper tools for knowledge and information access to operate efficiently in a dynamic global environment. Strong dependence of agriculture on monsoon makes this sector yet more vulnerable to the vagaries of the climate change. Moreover, globalization of agriculture would demand existing systems to be more efficient and effective in harnessing the latest technologies. Also, the dynamics of market forces affecting agriculture is expected to become more and more significant in future. Therefore, immediate efforts to overcome the concerns of digital divide.

The existing transfer of technology mechanisms and extension programs mostly government run are either slow or ineffective in bridging the linkages between the research community and the farmers. This is partly due to inadequate exploitation of new means of knowledge and information dissemination by these agencies. To partially fill the gap, lately some private initiatives have come up, however, the primary motivation behind these initiatives is mostly

the facilitation of commercial transactions in rural areas rather than knowledge/ technology dissemination. ICT can't only strengthen the traditional channels of information dissemination but also create new ones that allow localization of content-rich information products and services and their real-time delivery through multiple channels. However, like any other technology, ICT has a cost associated with it such as the cost of building infrastructure - modems, connectivity, bandwidth and user training, the cost of developing the technology, the cost of maintaining the systems and of course the problem of obsolescence. It needs to be deliberated as to whether the ICT is sustainable for the rural development and for the resource of farmers.

The cyber extension is not for replacing the existing systems of communication. ICTs will augment in big way, the reach and two-way interaction among the key stakeholders. The new technology offers new opportunities like it will add more interactivity, speed, two-way communication widening age and also more in-depth messaging, widening the scope of extension and also improve quality. It will subtract costs and reduce time. It will reduce dependency on so many actors in the chain of extension system, and likely to change the whole method of extension in coming decade. The continuing rapid development of telecommunications and computer-based information technology (IT) is probably the biggest factor for change in extension, one which will facilitate and reinforce other changes. There are many possibilities for the potential applications of the technology in agricultural extension (Zijp, 1994).

Information technology (IT) will bring new information services to rural areas which farmers as users, will have much greater control than over current information channels. Even if every farmer does not have a computer terminal, these could become readily available at local information resource centers, with computers carrying expert systems to help farmers to make decisions. However, it will not make extension worker redundant. Rather, they will be able to concentrate on tasks and services where human interaction is essential in helping farmers individually and in small groups to diagnose problems, to interpret data and to apply their meaning. The packaging of research recommendation has to be done in more participative way with the help of ICT. The extension functionaries at district level could be taken in to confidence before final packaging of the 'Practices' or 'Technologies' for each crop. The experiences and results of various trails could also be indicated in the proposed package of practices. The extension functionaries may then keep the concerned researchers informed on the field feedback electronically. This way the ICTs will help both the researchers and farming community to talk to each other on regular basis.

Advancement in scientific research has given rise to the most sophisticated new technology in information and communication fields that are now drastically changing the concept of a large size, diversified world to a global village. Internet plays a vital role in exchanging the information through e-mail, chat etc. Farmers can get the improved information services through the creative use of the information technology. Agricultural issues are being covered by national media like Radio, TV and Newspapers only at macro level due to time constraint. But internet can go an extra mile by providing the information round the clock in local language. In a developed country like U.S.A. most of the big farmers are using the internet to get information, to communicate and for buying inputs or selling outputs.

1.2 Statement of the Problem

A prominent change has already taken place in the advanced nations marked by the importance of information as a vital element in the new society that has emerged. The distinct feature of the information society is in the composition of the work force. Information workers are individuals, whose main activity is producing, processing, or distributing information, and producing information technology (Rogers, 1983). These changes and the observed transition to an information society formed the basis for this study. A need was felt to determine how farmer preference of the communication sources presently for their agricultural crop cultivation.

Farmers may be the key operators of the livestock production and they are actively involved in the field of agriculture. They can contribute in both livestock production and field cropping. It is expected that the participation of farmers in development process could attribute significantly in the balanced socioeconomic growth and development of the country. Existing social system, illiteracy and limited facilities for improving knowledge and skills of the farmers along with inadequate employment opportunities have blocked them in the participation of development activities. As a result, it is essential to provide them adequate knowledge and training in order to provide them to perform their job in a better way in the various field of development activities especially increasing field crop cultivation. Very few researchers have as far been conducted on the preference of communication sources of farmers in Bangladesh. But there are urgent needs to identify the preference of communication sources by the farmers regarding field crop cultivation. Thus, the present study mainly deals with the farmers' preference of information and communication sources for field crop cultivation for observe the answers to the following questions:

- What characteristics of the farmers were related with their preference of information and communication sources for field crop cultivation?
- What are the preferences of farmers towards ICT tools for agricultural information?

- What are the relationship between farmers selected characteristics with their preference towards ICT tools?

For getting clarification of the above questions the researched undertook a study ‘preference of ICT tools by the farmers in receiving agricultural information.’

1.3 Objectives of the Study

The study was designed to determine the preference of ICT tools by the farmers of Birol upazila under Dinajpur district. This is why a problem entitled ‘Preference of ICT tools by the farmers in receiving agricultural information’ was undertaken with the following specific objectives:

- 1) To determine and describe the selected characteristics of the farmers. The selected characteristics are:
 - i. Age
 - ii. Education
 - iii. Family size
 - iv. Farming experience
 - v. Annual income
 - vi. Organizational participation
 - vii. Cosmopoliteness
 - viii. Attitude towards ICT tools, and
 - ix. Innovativeness
- 2) To determine preference of farmers towards ICT tools for agricultural information.
- 3) To explore the relationship between farmers’ selected characteristics with their preference towards ICT tools.

1.4 Justification of the Study

The advancements in ICT can be utilized for providing accurate, timely, relevant information and services to the farmers, there by facilitating better adoption of these technologies to make agricultural profitable. However, all the ICT initiatives are not uniform with disparities between regions, level and quality of telecommunications, information and the effort of individuals, public and private organizations and differentiated nature of demand of the farmers in different areas. As a result, there have many successes and failures lessons learnt and also experience gained, so far. The common problems in adoption of ICT are low literacy, availability of relevant and localized contents in their own language, lack of operational skills, easy and affordable accessibility of ICT tools and other issues such as awareness and willingness for adoption of new technologies. The proposed research study will be of immense utility to the extension personnel, researchers, administrators and policy makers to formulate and execute suitable strategies enhancing the use of ICT tools in transfer of technology. Particularly it will be helpful to give a detailed account of knowledge and attitude of farmers about ICT tools, their socio-economic profile, extent of utilization and limitations in using ICT tools among farming community, which will help to evolve suitable strategies to enhance its utility.

1.5 Scope of the Study

Findings of the study will be particularly applicable to the Birol Upazilla of Dinajpur district. However, the findings may also have applications for other areas of Bangladesh having conditions similar to the study area. In Bangladesh few researchers have so far conducted studies on the farmers' preference of ICT tools in receiving agricultural information. But a little work has been conducted in this regard. Consequently, there is a dearth of information, needed for planning and executions of the program of extension services of Department of Agricultural Extension and other related development agencies. The present study may have a considerable scope in such a situation.

1.6 Limitations of the Study

The present study was conducted to have an understanding about farmers' preference of ICT tools in receiving agricultural information. But considering time, money and necessary resources available, the study was conducted with the following limitations:

- 1) The study was confined to five villages of Dhamoir Union of Birol Upazila under Dinajpur District.
- 2) The respondents for data collection were kept limited within only the literate farmers.
- 3) Characteristics of farmers were many and varied but in the present study, only nine characteristics were selected for investigation.
- 4) The investigator depends on the data furnished by the selected farmers during their interview.
- 5) There are many ICT tools from where farmers receive information for their agricultural activities. But only ten ICT tools were selected for this study.

1.7 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence. The researcher had the following assumption in mind while conducting this study:

- 1) The respondents included in the sample were capable of furnishing proper responses to the questions included in the interview schedule.
- 2) The researched who acted as interviewer was well adjusted to the social environment of the study area. Hence, the data collected by him from the respondents were free from bias.
- 3) The information provided by the respondents was reliable.
- 4) The views and opinion furnished by the farmer representative views and opinions of all the farmers of the study area.
- 5) The communication sources in the study were known to the respondents.

- 6) The findings of the study will have general application to other parts of the country with similar physical, socio-economic and cultural conditions of the study area.
- 7) The communication sources preferred by the farmers are linearly related with their selected characteristics.

1.8 Definitions of Terms

For clarify of understanding, certain terms used thought the study are defined as follows:

Preference: In economics and other social sciences, preference refers to the set of assumptions related to ordering some alternatives, based on the degree of happiness, satisfaction, gratification, enjoyment, or utility they provide, a process which results in an optimal 'choice'. Although economists are usually not interested in choices or preferences in themselves, they are interested in the theory of choice because it serves as a background for empirical demand analysis.

Farmer means the principal decision maker involved in the management of a farm, not always be the head of the farm-household (Khan, 2004).

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

Education refers to the development of desirable knowledge, skills and attitude in the individual through reading, writing and other related activities. It was measured in terms of the number of years of schooling completed by a respondent.

Family size referred to actual number of permanent members in a subject's family who live in a fixed dwelling unit and eat from the same cooking arrangement.

Farming experience refers to the total number of years that a respondent had received training in her/his entire life from any organizations under different training programs.

Annual income referred to total earning of a respondent him/herself and other members of his/her family from agricultural sector and non-agricultural sector during one year previous to data collection. It was expressed in Taka.

Organizational participation of a farmer referred to his/her taking part in different social organizations either as an ordinary member, executive committee member or an officer (President/Secretary) along with duration.

Cosmopolitaness was defined as the orientation of an individual external to his/her own social system. Empirically it referred to the number of times a person played his/her visit to places other than his/her own locality.

Attitude towards ICT tools refers to the belief, feeling and action tendencies of the respondents towards ICT tools activities.

Innovativeness is the degree to which an individual is relatively earlier in adopting agricultural innovation, new ideas, practices and things than the other members of a social system (Rogers, 2003). This was comprehended by the quickness of accepting innovations by an individual in relation to others and was measured on the basis of time dimension.

CHAPTER 2

REVIEW OF LITERATURE

The reviews are conveniently presented based on the major objectives of the study. Little work had been done in Bangladesh in this matter. The author of this study had come across related studies conducted in other countries. However, the Chapter was divided into three sections. First section deals with general reviews on preference of ICT tools and the second section deals with the relationships between selected characteristics of the farmers with their preference towards ICT tools. The third section deals with the conceptual model of the study.

2.1 Reviews on Preference of ICT Tools

Tegegn and Dafisa (2017) in their study reported that main factors that influence the use of mobile phone as: high cost of available technologies, inadequate infrastructure and low ICT skills, poor and expensive connectivity, inappropriate ICT policies, language barriers, low bandwidth, inadequate and/or inappropriate credit facilities and systems. The ministry agriculture when designing strategies for effective and efficient use of mobile phone for disseminating agricultural information, they have to consider those identified factors of mobile phone usage.

Freeman and Mubichi (2017) in their study indicated that the characteristics of ICTs explain why cell phone and radio use is prevalent, while access to television remains limited. The type of information accessed also varied by ICT type, implying that innovation characteristics affect not only their diffusion, but practical use.

Ali (2015) reported that the highest proportion (72.11 percent) of respondents had medium preference of communication source while 17.31 percent had low and only 10.58 percent had high preference.

Kabir and Roy (2015) in their study showed that the highly preferred ICT tools by the UAOs is cell phone (1.76) and the second highly preferred tool is tab with the mean value 1.74, and on the other hand, internet (1.31) is the least preferred tools by the respondents.

Kumbahare *et al.* (2015) in their study reported that a majority (52.67 percent) of the respondents were the daily listeners of community radon program followed by weekly 30 percent and fortnightly 17.33 percent.

Begum (2017) found that the highest proportion (39.8 percent) of the women had medium use of information channel compared to 37.3 percent had high use and 22.9 percent had low use. The findings revealed that more than three-fourths (77.1 percent) of the farmers had medium to high use of information channel in receiving agricultural information.

Dissanayeke and Wanigasundera (2014) observed that the access to mobile phone was considerable higher among the study group. A considerable number of farmers used the mobile phones to contact input suppliers, buyers, agriculture extension officers and other farmers in the area, mostly those who represent community based organizations.

Jayade *et al.* (2014) published an article entitled as “Study of Information Communication Technology in Agriculture in Vidarbha Region of Maharashtra State of India.” and concluded that ICT has improved the economic condition of the farmers in Vidarbha Region of Maharashtra state; ICT is advanced tools to disseminate the modern agricultural knowledge to the farmers and it plays an important role for the development of economy by enhancing the effectiveness of agricultural market, productivity and competitiveness in Vidarbha region of Maharashtra state. ICT and Mobile technology not only improved the package of practices but also improved the agriculture through knowledge dissemination by agriculture but also reduced the gap among agricultural scientists, extension worker and farmers.

Mehta (2013) conducted a study by using field Survey method to explores the socioeconomic impact of mobile phone usage in rural areas of the two Indian States such as Punjab and Bihar and the survey revealed that, mobile phones have reduced the cost of accessing information and helped users to make communication with their relatives and migrant family members and to gather timely information related with agricultural and non-agricultural purposes.

Saghir *et al.* (2013) in their study unfold that in the 29 context of availability of information sources TV stood first then came the mobile phone, telephone and radio, respectively. Really Old ICTs (print media) got very less position as compared to old ICTs (TV, radio and telephone) with regard to utility of ICTs.

Grimshaw and Kala (2011) reported that ICTs in facilitating rural development by providing agricultural extension services, current market price information, connecting rural laborers with wage-earning opportunities, etc.

Islam (2011) focused on mobile phone based agricultural market information services for farmers in Bangladesh. Mobile phone is the widely available new technology among farmers but is largely limited to making and receiving voice calls. The researcher found nine irrelevant set of factors influencing the adoption of mobile phones by the farmers.

Okwu and Daudu (2011) observed that interpersonal communication channels were generally found to be more available, accessible and used by the farmers than the mass media to obtain information on improved farm technologies. Television was mentioned by the farmers as the most preferred interpersonal channel and mass medium respectively.

Gakuru *et al.* (2009) reported that over the past 10 years, there has been a remarkable progress in the use of ICTs in African agriculture, especially in the area of farmer access to market information. Various projects have been developed that integrate ICTs into the dissemination of agricultural information to farmers. Farmer information services at both the national and regional level are a promising new field of research and application in the emerging field of e-agriculture. They also discussed a number of innovative projects that utilize ICTs in delivering information to farmers, focusing its analysis largely on mobile, telephone which has become more widespread in recent years as a means of disseminating agricultural information to farmers and offers various means of providing agricultural information in areas where internet infrastructure is limited and unreliable.

Okwu *et al.* (2007) in their study reported that 66 percent of the respondents listen to agricultural programs offered on radio Benue and 42 percent of the listeners indicated that the programs were relevant to their agricultural information needs. Majority of the respondents admitted that they gained some new knowledge through listening to the programs.

Shukla and Gautam (2008) made a study to examine digital divide in rural areas of Uttar Pradesh. According to the authors the presence of newer ICTs such as e-mail or the Internet was less compared to older ICTs like radio, television and landline phone.

Sharma and Aravind (2007) made an inquiry on information needs and sharing pattern among rural women of Madhya Pradesh state. Analysis of data reveals that 93.7 percent women are getting information through television. All women are familiar with telephone while only 33.79 percent women used Telephone facility, and 2.75 percent rural women are familiar with internet.

Prathap and Ponnusamy (2006) found that all of the respondents had gained 'adequate' knowledge after exposure to television and Internet, while 97 percent of those exposed to radio had gained adequate knowledge after exposure. Television was found to be the most effective treatment, followed by internet and radio.

Orin *et al.* (2005) conducted a study on impact of information and communication technologies on agriculture Estonia and found that 95.8 percent of the farmers use mobile phone in receiving farm information.

Bordoloi *et al.* (2003) in their study observed that farmers in the progressive district perceived the agricultural scientist, radio and television as the most credible information sources; while farmers in the non-progressive district placed highest credibility to the agricultural scientist, demonstration and radio.

Ekoja (2002) in his study observed that agricultural extension agents and contact farmers were the most preferred sources of communication, followed by radio, farmers' field days and extension publications were third and fourth, respectively, in terms of preference, while television and film shows were the least preferred medium of communication. This low rating could be attributed primarily to the relative unavailability of television in rural areas. It was predicted that this medium would gain in popularity as a source of communication once farmers were empowered economically and the infrastructure needed to receive television transmissions in their settlements was provided.

Egbule and Njoku (2001) found that greatest percentage of rural farmers receives information on modern agricultural practices from radio, although they prefer television.

2.2 Relationships between Selected Characteristics of the Farmers with their preference

This section focuses on the linkage of farmer's characteristics usually vary from one person to another and those as variables play vital role in making difference regarding preference of ICT tools in receiving agricultural information by the farmers. The previous relationships between farmer's characteristics and the preference of ICT tools are discussed below.

2.2.1 Age and preference

Begum (2017) observed that age of the women beneficiaries of BRAC had no relationship with their use of communication channel.

Ali (2015) found that age of the rural women showed significant but negative relationship with their preference of communication sources.

Kabir and Roy (2015) in their study showed that age, job duration, showed significant relationship with the preferences of ICT tools by the UAOs.

Kamruzzaman *et al.* (2013) in their study found that age had no association with their use of communication sources.

Rashid (2012) reported that age of the women beneficiaries had no relationship with their use of ICT tools.

Hossain (2010) found that age of the farmers had a significant negative relationship between their extent of use of communication media.

Islam (2005) found that age of the farmers had no significant relationship with the effectiveness of printed materials by the farmers in receiving farm information.

Alam (2004) observed that age of the farmers had negative and significant relationship with their opinion of the farmers on effectiveness of printed materials in getting farm information.

Khatun (2004) reported that a significant positive relationship existed between farmers's age and their extent of use of information sources on sustainable livelihood.

Nuruzzaman (2003) found that age of the farmers had negative and significant relationship with effectiveness of mass media in receiving agricultural information.

Anisuzzaman (2003) observed that age of the farmers had no significant relationship with the communication media like Radio, TV in adoption of improved rice production technologies.

2.2.2 Education and preference

Begum (2017) observed that educational qualification of the women beneficiaries of BRAC showed significant positive relationship with their use communication channel.

Ali (2015) found that education of the rural women showed significant positive relationship with their preference of communication source.

Kamruzzaman *et al.* (2013) in their study found that level of education of the rural women had significant positive relationship with their use of ICT tools in agricultural activities.

Ali (2013) observed that education of the farmers had positive and significant relationship with the use of ICT tools in receiving agricultural information.

Rashid (2012) reported that education of the women beneficiaries showed positive relationship with their use of ICT tools.

Okwu and Daudu (2011) observed that there is significant relationship between frequency of communication channels use by farmers and their educational level.

Ko and kim (2008) found that the RTV ratings of the respondents were not significantly related to their educational background. However, older watchers indicated a greater tend to watch RTV programs.

Khan (2006) observed that education had positive significant relationship with the effectiveness of group approach in dissemination of farm information to the farmers.

Islam (2005) found that education of the farmers had positive and highly significant relationship with their effectiveness of printed materials in receiving farm information.

Farouque (2004) revealed that the educational qualification of the farmers had positive and significant relationship with use of different extension media in receiving information for livestock management.

Alam (2004) found that education of the farmers had positive and highly significant relationship with their opinion of the farmers on effectiveness of printed materials in getting farm information.

2.2.3 Family size and preference

Begum (2017) observed that family size of the women beneficiaries of BRAC had no relationship with their use of communication channel.

Ali (2015) found that family size of the rural women did not show relationship with their preference of communication source.

Kamruzzaman *et al.* (2013) in their study found that family size of the rural women had significant positive relationship with their use of ICT tools in agricultural activities.

Rashid (2012) reported that family size of the women beneficiaries had no relationship with their use of ICT tools.

Hossain (2007) observed that there was no significant relationship between family size of the farmers and their opinion on the effectiveness of Hridoye Mati-O-Manush Television program in disseminating agricultural information.

Karim (2005) found that family size of the farmers had no significant relationship with the use of ICT tools.

Alam (2004) revealed that family size of the farmers had no significant relationship with the use of ICT tools.

Anisuzzaman (2003) observed that family size of the farmers had no significant relationship with the communication media like Radio and TV in adoption of improved rice production technologies.

2.2.4 Farming experience and preference

Ali (2013) observed that farming experience of the farmers had negative and significant relationship with the use of communication media in receiving agricultural information.

Kamruzzaman *et al.* (2013) in their study found that farming experience of the rural women had significant negative relationship with their use of communication sources in agricultural activities.

Okwu and Daudu (2011) observed that there was significant relationship between frequency of communication channels use by farmers and their farming experience.

Hossain (2007) observed that there was significant relationship between farming experience of the farmers and their opinion on the effectiveness of Hridoye Mati-O-Manush Television program in disseminating agricultural information.

Islam (2005) found that farming experience of the farmers had no significant relationship with their use of printed materials by the farmers in receiving farm information.

Haque *et al.* (2004) revealed that farming experience of the respondents had negative and significant relationship with the extent of use of information sources in producing modern variety of rice.

Anisuzzaman (2003) observed that farming experience of the farmers had no significant relationship with the ICT tools like Radio, TV and Newspaper in adoption of improved rice production technologies.

2.2.5 Annual income and preference

Begum (2017) observed that annual income of the women beneficiaries of BRAC had positive relationship with their preference of communication channel.

Ali (2015) found that annual income of the rural women shows positive relationship with their preference of communication source.

Sharmin (2013) found that annual income had positive significant relationship with the use of ICT tools.

Kamruzzaman *et al.* (2013) in their study found that annual income of the rural women had significant positive relationship with their use of ICT tools in agricultural activities.

Rashid (2012) reported that annual income of the women beneficiaries showed positive relationship with their use of ICT tools.

Islam (2005) found that annual income of the farmers had no significant relationship with effectiveness of printed materials in receiving farm information.

Alam (2004) found that annual family income of the farmers had positive and highly significant relationship with their opinion of the farmers on effectiveness of printed materials in getting farm information.

Anisuzzaman (2003) observed that annual income of the farmers had no significant relationship with the communication media like Radio and TV in adoption of improved rice production technologies.

2.2.6 Organizational participation and preference

Ali (2015) found that organizational participation of the rural women showed significant relationship with their preference of communication source.

Kamruzzaman *et al.* (2013) in their study found that organizational participation of the rural women had significant positive relationship with their use of ICT tools in agricultural activities.

Sharmin (2013) found that organizational participation had no relationship with the use of ICT tools.

Khan (2006) observed that organizational participation had positive significant relationship with the effectiveness of group approach in dissemination of farm information to the farmers.

Islam (2005) found that organizational participation of the farmers had positive and highly significant relationship with their use of printed materials by the farmers in receiving farm information.

Alam (2004) found that organizational participation of the farmers had no significant relationship with their opinion of the farmers on effectiveness of printed materials in getting farm information.

Anisuzzaman (2003) observed that organizational participation of the farmers had a significant relationship with the ICT tools in adoption of improved rice production technologies.

2.2.7 Cosmopolitaness and preference

Islam *et al.* (2017) revealed that cosmopolitaness of the farmers had positive significant relationship with their use of mass.

Rahman (2017) found that the cosmopolitaness of the farmer had significant positive relationship with their preferred ICT tools.

Ali (2015) found that cosmopolitaness of the rural women did not show any relationship with their preference of ICT communication source.

Sajesh (2013) in his study concluded that cosmopolitaness had positively significant relationship with the factors discriminating the effectiveness of women's joint liability groups in agriculture and factors affecting effectiveness of collective farming.

Hossain (2007) observed that there was no significant relationship between cosmopolitaness of the farmers and their opinion on the effectiveness of 'Hridoye Mati-O-Manush' television program in disseminating agricultural information.

Karim (2005) found that cosmopolitaness of the farmers had no significant relationship with the use of ICT tools.

Alam (2004) revealed that cosmopolitaness of the farmers had positive significant relationship with the use of ICT tools.

2.2.8 Attitude toward ICT tools and preference

Shah *et al.* (2016) observed that between communications exposure of the farmers had significant relationship with their attitudes towards hybrid rice.

Asmaul-Husna (2014) revealed that the attitude towards pesticide risk reduction of the respondents had positive and significant relationship with their information transfer.

Parul (2014) observed that attitude towards RDRS activities showed a significant relationship with their participation in agricultural activities.

Khan (2012) revealed that the attitude towards jujube cultivation of the farmers had positive and significant relationship with their extension media contact.

Sufian (2012) observed that attitude towards NGOs of the Saotal farmers had no significant relationship with their extension communication exposure.

2.2.9 Innovativeness and preference

Reza (2017) observed that innovativeness of the farmers had positive and significant relationship with the preferences of ICT tools in receiving agricultural information.

Begum *et al.* (2017) found that the training received by the women beneficiaries had significant positive relationship with their use of ICT tools.

Ali (2015) reported that innovativeness of the farmers had positive and significant relationship with the preference of ICT tools in receiving agricultural information.

Sharmin (2013) found that innovativeness had no relationship with the use of ICT tools.

Sajesh (2013) in his study concluded that innovativeness had positively significant relationship with the factors discriminating the effectiveness of women's joint liability groups in agriculture and factors affecting effectiveness of collective farming.

Khan (2006) observed that innovativeness had positive significant relationship with the effectiveness of group approach in dissemination of farm information to the farmers.

Islam (2005) found that innovativeness of the farmers had positive and significant relationship with effectiveness of printed materials in receiving farm information.

Farouque (2004) revealed that the innovativeness of the respondents had positive and significant relationship with use of different extension media in receiving information for livestock management.

Anisuzzaman (2003) observed that innovativeness of the farmers had a positive and significant relationship with the information and communication tools in adoption of improved rice production technologies.

2.3 Conceptual Framework of the Study

The concept of ‘preference’ of ICT is of great importance because the knowledge of it will provide keys for understanding and predicting outcomes of communication process. Contact to various communication channels is a precondition for any effect of media content on people to occur. It seems right to state that the influence of any medium on the message depends not only on the type of media but also on how it is used (Okwu and Daudu, 2011).

Conceptual framework is the foundation for understanding the research issue and linkage among the different variables. It helps as a guiding principle for analyzing the research issues. In this Chapter farmers’ preference of ICT tools and establishes its relationship with their selected characteristics.

The conceptual framework was kept in mind forming the structural arrangement for the dependent and independent variables. This study was concerned with farmers’ preference of ICT tools is the focus issue and the nine selected characteristics of the farmers as independent variables. The focus issue was measured on two dimensions (extent of contact and usefulness), and hence ten ICT tools were included in this study. Based on these discussion and review of literature, the conceptual framework of this study has been formulated (Figure 2.1).

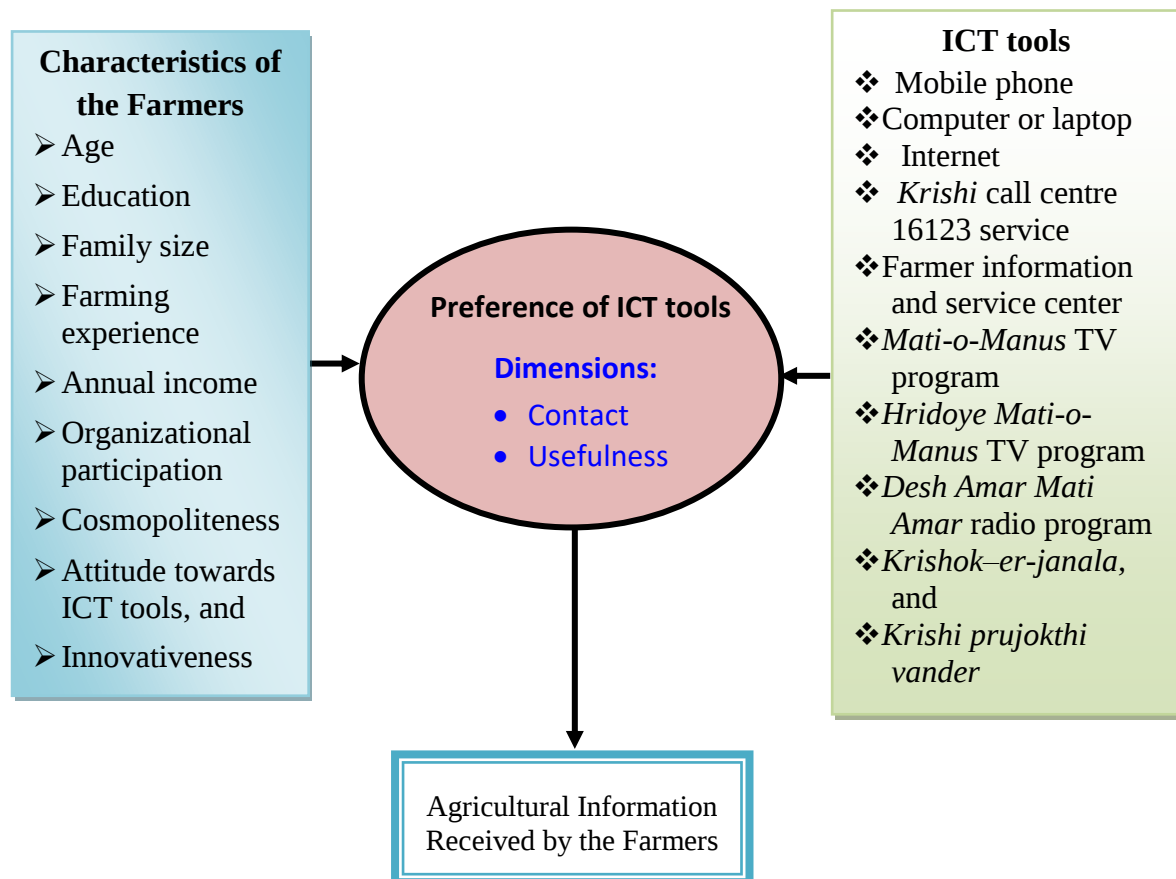


Figure 2.1 Conceptual framework of the study

CHAPTER 3

METHODOLOGY

Methodological issues are one of the prime considerations for conducting a research for yielding valid findings. In fact, it is the foundation on which the research process rests upon. However, appropriate methodologies were used in research to collect valid and reliable data and analyze the information to arrive at correct and meaningful conclusion. From this point of view, the researcher took almost care for using proper methods in all aspects of this investigation. Methods and procedures used in this study are discussed in this Chapter.

3.1 Locale of the Study

The present study was conducted in Dhamair union of Birol upazila under Dinajpur district. There are 13 Upazilas in Dinajpur district among them, Birol upazila is one of the agriculturally important upazila where rice, wheat, maize, litchi and vegetables are intensively cultivated. Most of the farmers of this area are directly or indirectly engaged in agricultural activities and a very few of them are service holders and businessman. The geographical location of the study area is at 25°31' to 25°46' north latitudes and 88°26' to 88°38' east longitudes.

3.2 Research Design of the Study

Research design means the plan, structure and strategy of investigation conceived so as to obtain answer to research question and control variance (Kerlinger, 1996). Designing the research for the study was taken in a scientific method. At first, researcher gathered and analyzed followed by research constraint formulation. Reviews were studies to choose appropriate variables and readiness of research instrument pretesting of the research instrument was done before ultimate data collection. Then the collected data was analyzed and report was done. The maps of the study place were depicted. A map of Dinajpur district and a map of Birol Upazila showing the study area are presented in Figure 3.1 and Figure 3.2, respectively.

3.3 Population and Sample of the Study

The researcher collected data from 103 farmers (respondents) as a sample around 10 percent of the total population (1007 farmers) of this study following random sampling procedure. Simultaneously a reserved list of 11 farmers was made in order to use in case of non-availability of sampled farmers.

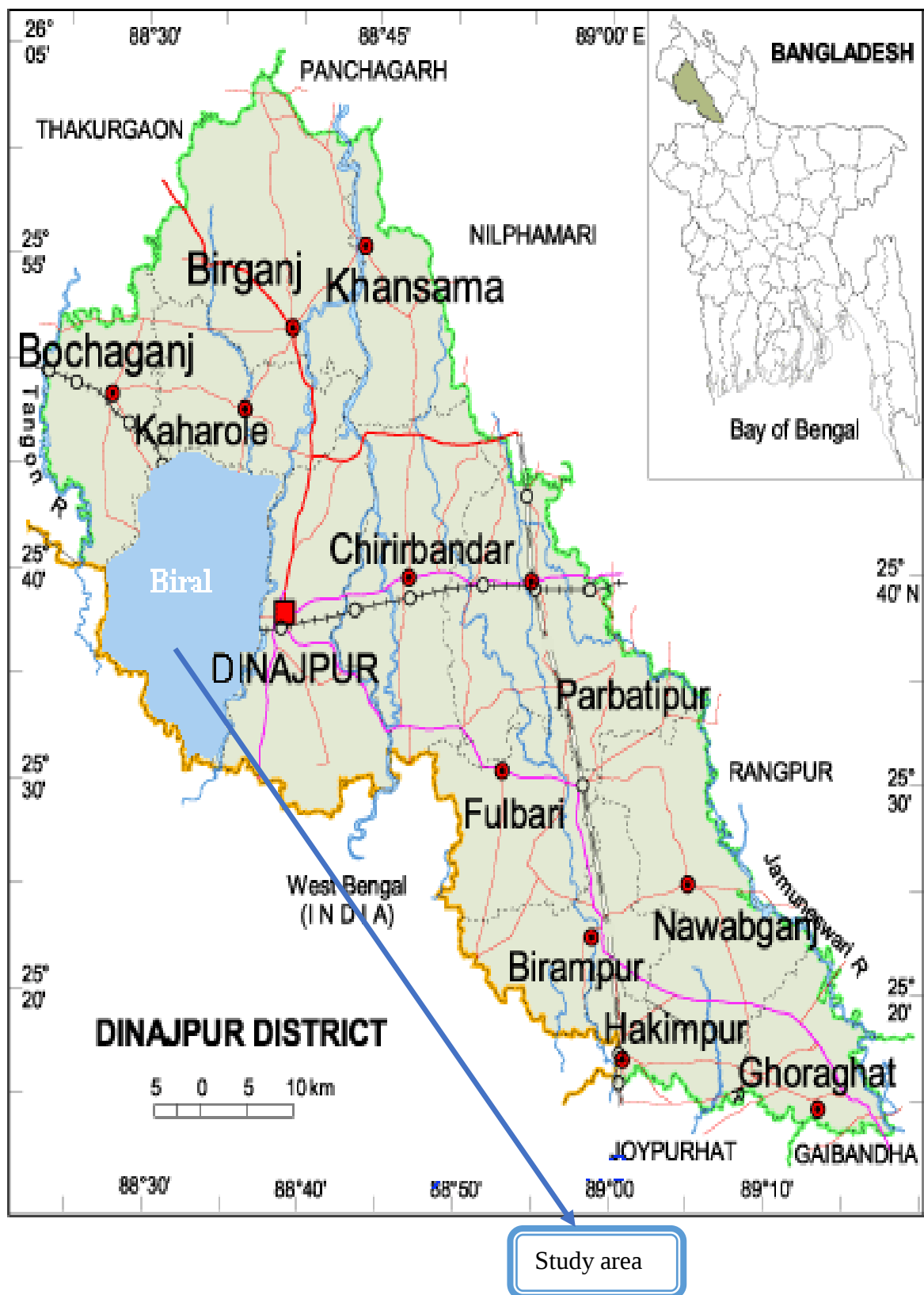


Figure 3.1 Map of Dinajpur district showing the Birol upazila (Bangladesh inset)

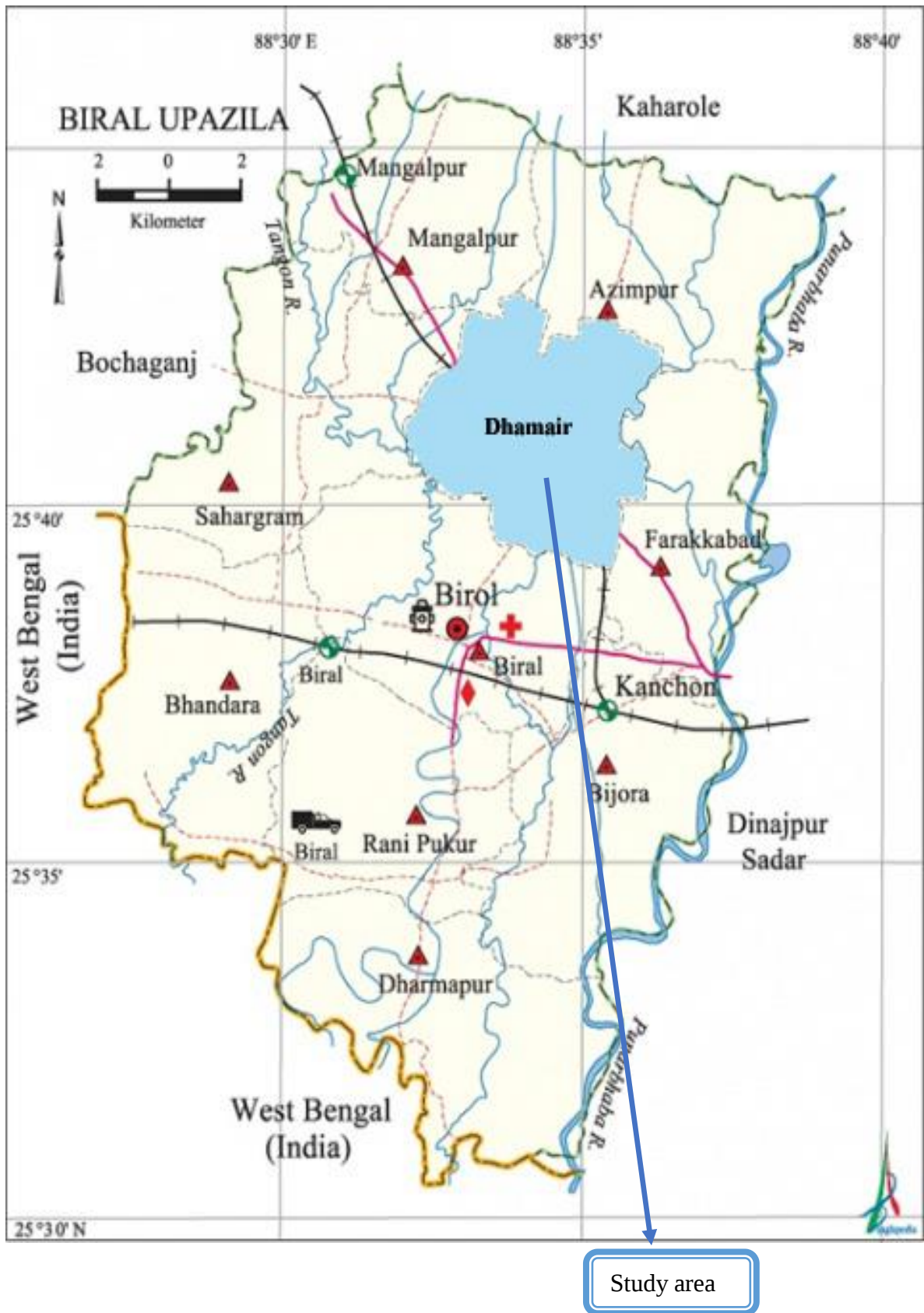


Figure 3.2 Map of Birol upazila showing the Dhamair union (Bangladesh inset)

An up-to-date list of literate farmers was made from upazila agriculture office and local NGOs for constitute the population of the study. The detailed distribution of population and sample are showed in Table 3.1

Table 3.1 Distribution of population and sample of farmers of the selected union of Birol

Name of the union	Villages	Population	Sample	Reserve list
Dhamair	Daroil	295	30	3
	Keshobpur	86	9	1
	Baznahar	219	22	2
	Matian	253	26	3
	Giridhar pur	154	16	2
	Total	1007	103	11

3.4 Measurement of the selected characteristics of the respondents

The selected characteristics of the farmers were the causal factor of this study. To keep the study manageable, nine independent variables i.e. age, education, family size, farming experience, annual income, organizational participation, cosmopoliteness, attitude towards ICT tools and innovativeness of farmers were selected. The procedures of measurement of the selected profile characteristics were given below:

3.4.1 Age of the farmers was measured in terms of years from his birth to the time of interview and it was measured in terms of complete actual years (Appendix-A).

3.4.2 Education of a farmer was measured on the basis of his number of years of schooling in educational institutions. The education score was computed for each respondent by giving 1 (one) score for each year of successful schooling 2 for class II and so forth (Appendix-A).

3.4.3 Family size of a respondent was measured by the total number of members of a respondent including himself, his wife, children and other dependents (if any) who live in the same residence and eat together. The total number of the family members was considered as the family size score of a respondent. For example, if a respondent has 5 members in his family, then score of her family size was taken as 5 (Appendix-A).

3.4.4 Farming experience of the farmers was measured in terms of years since his took the responsibility of farming for his family (Appendix-A).

3.4.5 Annual income of a respondent's family was measured on the basis of yearly total earnings from farming, non-farming and other sources (if any). A score of one (1) was assigned for each of '000' taka for measuring the annual family income of a respondent (Appendix-A).

3.4.6 Organizational participation of a respondent referred to his taking part in different social organizations for sharing of ideas, views, and experiences with other members. The respondents possess the membership as a member or president/secretary and were measured on the basis of nature involvement. Organizational participation of a respondent was measured on the basis of sharing ideas, views, and experiences and to make decision with other members as a member or president/secretary in different organization. Participation scores were given for ‘no involvement’= 0, ‘ordinary member’ = 1, ‘executive member’ = 2, ‘secretary’ = 3, and ‘president’ = 4 (Rahman, 2002). Thus, if a respondent had membership in two or more organizations, his score was computed by adding the scores obtained from each organization according to the categories of his membership. Thus organizational participation score of a respondent could range from 0 to 24, where 0 indicating no participation and 24, maximum participation (Appendix-A).

3.4.7 Cosmopoliteness referred to the degree of an individual’s orientation to external or outside to his social system. The cosmopoliteness of a farmer was measured by computing his cosmopoliteness score on the basis of his frequency of visit to six selected places outside of his social system. The farmers were asked to indicate the numbers of his visit to the six selected places. The score obtained for visiting above mentioned places were added together to get the cosmopoliteness score of a farmer. The possible range of scores could vary from 0 to 18, where 0 indicates no cosmopoliteness and 18 indicates very high cosmopoliteness (Mondol, 2009). The variable appears in item no. 7 in the interview schedule (Appendix-A). The scale used for computing cosmopoliteness score was done in the following way:

Places of visit	Extent of visit	Weights
Visit to houses of friends or relatives (times/week)	Not at all	0
	1	1
	2-3	2
	≥ 4	3
Visit to local market or up office (times/month)	Do	Do
Upazila head quarter or market (times/3 month)	Do	Do
Visit to own district town (times/6 month)	Do	Do
Visit to other district town (times/year)	Do	Do
Division/capital city (times/year)	Do	Do

3.4.8 Attitude towards ICT tools of a farmer was measured by computing a ‘attitude towards ICT tools score’ on the basis of six item measuring scale, three of the items being stated positively and other three negatively. For computing the attitude towards ICT tools of the respondent against each item, a Likert scale was used as: ‘strongly agree’, ‘agree’,

‘undecided’, ‘disagree’ and ‘strongly disagree’. The weights assigned were 5, 4, 3, 2 and 1 respectively for positive statements and the order was reversed for negative statements. Each farmer indicated their agreement on the weighting scale and from these responses the total Attitude towards ICT tools score of a farmer was determined by adding the weights. Attitude towards ICT tools of a farmer could range from 0 to 30, 0 indicated no attitude towards ICT tools, whereas 30 indicated a very highest attitude towards ICT tools (Appendix-A).

3.4.9 Innovativeness of a farmer was measured by computing an innovativeness score on the basis of his adoption of ten selected modern agricultural technologies. Innovativeness sub-score was assigned on the basis of his duration of adoption and extent of adoption of a particular technology. Duration of adoption of a new technology was measured as ‘do not use’, ‘adoption after two years of hearing’, ‘adoption within two years’, ‘adoption within one year’ and score were assigned as 0, 1, 2, and 3 respectively. Thus, innovativeness score of a respondent could range from 0 to 30 where 0 indicated no innovativeness and 30 indicated highest innovativeness. The variable appears in item No. 9 in the interview schedule (Appendix-A).

3.5 Measurement of focus issue

Preference of ICT tools was the focus issue of this study. To measure the preference of ICT tools of a respondent ten ICT tools were identified during pre-testing of the interview schedule. To measure the preference of ICT tools two dimensions namely; (i) Preference to contact with ICT tools; and (ii) Preference to usefulness of ICT tools by the farmer in receiving agricultural information were studied.

3.5.1 Preference to contact with ICT tools of the farmers in receiving agricultural information was measured by computing the preference to contact sub-score (PCSS). The farmers were requested to indicate their contact with each of the selected ICT tools. A 4-point rating scale such as ‘not at all’, ‘rarely’, ‘occasionally’, and ‘frequently’ were used and weights assigned to these responses were 0, 1, 2 and 3 respectively. Thus, a respondent’s extent of contact score was obtained by adding the weights for his responses to all the ten ICT tools incorporated in the questionnaire and hence, the PCSS of a respondent in receiving agricultural information could range from 0 to 30, where 0 indicated never contact and 30 indicated regular contact with the ten ICT tools.

3.5.2 Preference to usefulness of ICT tools for delivery of information was calculated by usefulness sub-score (PUSS) for each of the respondent. The respondents were asked to mention the nature of usefulness of those sources for providing information. The USS was also determined by a 4-point rating scale such as ‘not useful’, ‘somewhat useful’, ‘useful’,

and ‘very useful’ were used and weights assigned to these responses were 0, 1, 2 and 3 respectively. Thus, the PUSS of a respondent could range from 0 to 30, where 0 indicating not useful and 30 indicating very useful. Finally, overall preference of ICT tools by the farmers was determined by summing up the PCSS and PUSS. Therefore, the overall preference of ICT tools of a respondent could range from 0 to 30, where 0 indicating not useful and 30 indicating very useful.

3.5.3 Preference of ICT tools index: Preference of ICT tools was determined by summing up the PCSS and PUSS scores. For clear understanding and comprehensively analysis of preference of a respondent to ICT tools, rank order for each of the source was computed by using the following formula (Kabita, 2014):

$$PICTI = P_{hp} \times 3 + P_{mp} \times 2 + P_{lp} \times 1 + P_{np} \times 0$$

Where,

PICTI = Preference of ICT tools index

P_{hp} = Respondent with high preference

P_{mp} = Respondent with moderate preference

P_{lp} = Respondent with low preference

P_{np} = Respondent with no preference

Thus, the possible value of PICTI could range from 0 to 618, where 0 indicating no preference and 618 indicating high preference.

3.6 Research Instrument

An interview schedule was prepared mostly with close form questions. Simple questions and statements were included in the schedule to obtain information regarding the research topic. Scales were developed for suitable scores in farmer’s preference on ICT tools in receiving agricultural information and also characteristics of the farmers namely age, education, family size, farming experience, annual income, organizational participation, cosmopolitaness, attitude towards ICT tools and innovativeness. The schedule was translated in Bengali for clarification to the respondents. The schedules were pre-tested in actual field situation before using the same for final collection of data among 15 respondents of the study area. Necessary correction, additions and alternations were made in the interview schedule on the basis of results of pre-test.

3.7 Methods and Procedures of Data collection

In the survey, data were collected through face to face survey by the researcher himself. All possible efforts were made to explain the purpose of the study to the respondents in order to

get valid and relevant information from the respondents. Before going to the respondents for interview, appointments were made earlier so that they could be available at their homes on the schedule date and time. For data collection, interviews were conducted with the respondents at their homes during their leisure period. While interviewing a farmer, the researcher took all the possible care to establish rapport with the farmers so that he did not hesitate to furnish proper responses to the questions, statements in the schedule. The researcher obtained co-operation from the respondents, union parishad members, SAAOs, and NGOs. The total data collection process took 30 days from 15 September to 14 October, 2018.

3.8 Data Processing and Analysis

Data obtained from the respondents were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. Qualitative data were converted to quantitative data by means of suitable scoring to facilitate analysis and interpretation. The responses to the questions in the interview schedules were transferred to a master sheet to facilitate tabulation. For describing different characteristics, the respondents were classified into several categories. These categories were developed by considering the nature of distribution of data, general understanding prevailing in the social system and possible scores system. The procedures for categorization of data in respect of different variables have been elaborately discussed while describing those variables in Chapter 4.

The analysis was performed using Statistical Package for Social Science (SPSS) computer package. Descriptive analysis such as range, number, percentage, mean, standard deviation and rank order were used whenever necessary. For clarity of understanding tables were also used for presenting the data. Pearson's Product Moment Correlation Co-efficient (r) was used to examine the relationships between independent variables with the dependent variable. At least 5 percent ($P=0.05$) level of probability was used as a basis for rejection of the null-hypotheses throughout the study.

3.9 Statement of Hypothesis

Hypothesis is a tentative answer to research question or a statement of the relationship among the variables that a research intends to study (Voght, 1999). Hypotheses are of two types-null hypotheses and research hypothesis. Null hypothesis suggests that there is no relationship among the variables under consideration. It is denoted by H_0 . Research hypothesis describes relationship between variables under consideration. It is denoted by H_a . The broad research hypothesis for this are given below:

3.9.1 Research hypothesis: Research hypothesis (H_a) states anticipated relationships between concerned variables. Based on review of literature and development of conceptual framework, the research hypothesis was ‘there were relationships between age, education, family size, farming experience, annual income, organizational participation, cosmopolitaness, attitude towards ICT tools and innovativeness of the farmers with their preference of ICT tools.

3.9.2 Null hypothesis: Null hypothesis (H_o) states that there is no relationship between the concerned variables. Therefore, the null hypothesis developed for this study was ‘there were no relationships between age, education, family size, farming experience, annual income, organizational participation, cosmopolitaness, attitude towards ICT tools and innovativeness of the farmers with their preference of ICT tools.

CHAPTER 4

RESULTS AND DISCUSSION

The findings of this study and their logical interpretations have been systematically presented in different sections in this Chapter according to the objectives of the study. This Chapter deals with three sections. First section deals with the description of the characteristics of the farmers. Preference of ICT tools by the farmers in receiving agricultural information has been discussed in the second section. Relationships between the focus issue and the selected characteristics of the farmers have been described in the third section.

4.1 Selected Characteristics of the Farmers

In total nine characteristics of the farmers were selected for this study. The selected characteristics of the farmers included; age, education, family size, farming experience, annual income, organizational participation, cosmopolitaness, attitude towards ICT tools and innovativeness. Data contained in the Table 4.1 reveal the selected characteristics of the farmers in order to have an overall picture of these characteristics at a glance.

4.1.1 Age

The age of the farmers ranged from 24 to 65 years with a mean of 43.63 and standard deviation of 9.94. Based on the age scores, the respondents were classified into three categories following legislative standard (Hasan *et al.*, 2018) such as ‘young’ (≤ 35), ‘middle aged’ (36-50) and ‘old’ (> 50) as shown in Table 4.1.

Data presented in Table 4.1 indicated that little more than half (51.46 percent) of the respondents belonged to the middle aged category compared to 30.18 percent were in the old aged and 21.36 percent young aged category. The result indicated that 72.82 percent of the respondents were young to middle aged category. Young and middle aged peoples are generally become more innovative, energetic and can take any decision easily. They have broader outlook and have much social participation as well as high use of ICT tools.

4.1.2 Education

Education helps the farmers to broaden their outlook and expand their horizon of knowledge. An educated farmer can be considered as rational in his thinking and evaluation. Hence, it is expected that education is one of the most important determining factors in the use of ICT tools by the farmers (Mondol, 2009). Exposure to formal education is very important for shaping-up the behavior of an individual. Education compels an individual to seek, accumulate as well as assimilate knowledge for appropriate uses.

Table 4.1 Salient features of the selected characteristics of the farmers (N=103)

Characteristics	Scoring method	Range	Categories	Respondents		Mean	SD
		Observed (Possible)		No.	%		
Age	No. of year	24-65 (Unknown)	Young (≤ 35)	22	21.36	43.63	9.94
			Middle aged (36-50)	53	51.46		
			Old (> 50)	28	30.18		
Education	Year of schooling	4-18 (Unknown)	Primary (1-5)	04	03.88	10.34	2.89
			Secondary (6-10)	63	61.17		
			Above secondary (> 10)	36	34.95		
Family size	No. of member	3-10 (Unknown)	Small family (up to 4)	28	27.18	5.57	1.63
			Medium family (5-7)	65	63.11		
			Large family (> 7)	10	9.71		
Farming experience	Year of farming	3-40 (Unknown)	One decade (< 10)	22	21.36	19.74	9.57
			Two decades (11 to 20)	39	37.86		
			Three decades (21 to 30)	30	29.13		
			Four decades (31 to 40)	12	11.65		
Annual income	('000' Tk.)	100-530 (Unknown)	Low (Up to 243)	30	29.13	239.46	97.85
			Medium (244-387)	34	33.01		
			High (> 387)	39	37.87		
Organizational participation	Score	0-24 (0-24)	No (0)	02	01.94	4.08	2.25
			Low (1-3)	40	38.84		
			Medium (4-6)	47	45.63		
			High (> 6)	14	13.59		
Cosmopoliteness	Score	4-16 (0-18)	Low (≤ 7)	15	14.56	9.75	2.32
			Medium (8-12)	79	76.70		
			High (> 12)	09	08.74		
Attitude towards ICT tools	Score	15-30 (0-30)	Less favorable (≤ 23)	38	36.89	24.9	2.20
			Moderately favorable (24-27)	60	58.25		
			Highly favorable (> 27)	05	04.86		
Innovativeness	Score	2-13 (0-30)	Low (≤ 5)	11	10.68	7.52	2.06
			Medium (6-9)	76	73.79		
			High (> 9)	16	15.53		

The educational qualification scores of the farmers ranged from 4 to 18, the mean being 10.34 and standard deviation is 2.89. Based on the education scores, the respondents were classified into three categories following legislative standard (Hasan *et al.*, 2018). The three

categories were ‘primary level’ (1-5), ‘secondary level’ (6-10) and ‘above secondary level’ (>10) as presented in Table 4.1.

Data presented in Table 4.1 indicated that little more than three-fifths (61.17 percent) of the farmers had secondary education, 34.95 percent of the farmers had above secondary education and 3.88 percent had primary education level. Education helps the farmers obtaining useful information related to information collection. The study revealed that there were no illiterate farmers in the study area. But the literacy rate of our country is about 72.3 percent (BBS, 2017). It has been stated earlier that the present study was carried out only the literate farmers. For this reason, the education of the farmers may be higher than national average literacy rate.

4.1.3 Family size

High population density was a normal feature in Bangladesh, but at present the large families are going to be broken and small families getting priority. The family size scores of the farmers ranged from 3 to 10. The average family size was 5.57 with a standard deviation of 1.63. Based on the family size scores, the respondents were classified into three categories following social standard. The three categories were ‘small family’ (up to 4), ‘medium family’ (5-7) and ‘large family’ (>7) are presented in Table 4.1.

The data furnished in the Table 4.1 revealed that a little more than three-fifths (63.11 percent) of the respondents had medium family size, 27.18 percent had small family size and 9.71 percent had large family. The national average family size in Bangladesh is 4.06 (BBS, 2016) which is less than the mean value of the present study (5.57). Almost similar result was found in the study of Noman (2012), Huda (2011), Akanda (2005), Miah (2002) and Haider (2001). It is quite logical that prevalence of joint family system in the study area might have also contributed to the large family size.

4.1.4 Farming experience

The farming experience score of the farmers ranged from 3 to 40 years with a mean of 19.74 and standard deviation of 9.57. Based on farming experience score, the respondents were classified into four categories considering mean and standard deviation ways of quantitative classification (Hasan *et al.*, 2018). The four categories were: ‘one decade’ (<10 years), ‘two decades’ (11-20 years), ‘three decades’ (21-30 years) and ‘four decades’ (31-40 years). The distribution of the farmers according to their farming experience is presented in Table 4.1.

Data contained in Table 4.1 indicates that 21.36 percent of the respondents had less than one decade farming experience while 37.86 percent, 29.13 percent and 11.65 percent of them had

two decades, three decades and four decades farming experience respectively. Farmers having high farming experience need less information than the farmers who are less experienced in farming activities. Hence ICT tools can be effective sources of information to the less experienced farmers and can help increase their crop production.

4.1.5 Annual income

The subsistence farmers do not consider farming as a business. As their farms are not commercial in nature, they do not seriously think about profit and loss. Existence farming is labor intensive and the farmers usually invest their own labor through the year. At the end of the season they are happy if they have some surplus products.

The family income scores of the farmers ranged from 100 to 530 with a mean of 239.46 and standard deviation of 97.85. Based on annual income score, the respondents were classified into three categories considering observed score ways of quantitative classification (Hasan *et al.*, 2018). The three categories were ‘low income’ (≤ 243), ‘medium income’ (244-387), ‘high income’ (>387) as shown in Table 4.1.

Data furnished in Table 4.1 indicate that the highest proportion of the farmers (37.86 percent) under high income group compared to 29.13 percent under low income and 33.01 percent had medium income group. However, the national average family income is Tk.195.20 thousand (BBS, 2016), but average annual income of the study area was found Tk. 239.46 thousand. Thus it can be said that the annual income of the farmers was stronger than the others people of Bangladesh, because the respondents are educated and their annual income was quite high. An almost similar result was found by Talukder (2013).

4.1.6 Organizational participation

An individual comes into contact with other people, new ideas new ways of doing things through participation in organization. It is, therefore, likely that organizational participation may help individual to assess the potentiality of individuals, things and programs. Such consideration indicates that organizational participation may also help the farmers in receiving farm information.

The farmer’s organizational participation scores ranged from 0 to 9, against a possible range of 0 to 24 with an average being 4.08 and standard deviation of 2.25. Based on organizational participation score, the respondents were classified into four categories considering observed score ways of quantitative classification (Hasan *et al.*, 2018). The four categories were ‘no’ (0), ‘low’ (1-3), ‘medium’ (4-6) and ‘high’ (>6) as shown in Table 4.1.

Data contained in Table 4.1 revealed that less than half (45.63 percent) of the farmers had medium organizational participation compared to 38.84 percent had low and 13.59 percent had high and a negligible proportion (1.94 percent) had no organizational participation. This finding indicates that 98.06 percent of the farmers had organizational participation. The findings may be due to the reason that the study area is located near the Dinajpur district town where the transport facilities are well and hence the large number of farmers to participate in different organization.

4.1.7 Cosmopolitaness

Cosmopolitaness means farmers movement outside of his own farm. When a farmer moved frequently outside of his own area makes his attitude positive towards ICT tools. Cosmopolitaness scores of the respondents ranged from 4 to 16, against a possible range of 0 to 18 with an average of 9.75 and standard deviation of 2.32. Based on cosmopolitaness score, the respondents were classified into three categories considering mean and standard deviation ways of quantitative classification (Hasan *et al.*, 2018). The three categories were 'low' (≤ 7), 'medium' (8-12) and 'high' (> 12) (Table 4.1).

Data presented in Table 4.1 indicates that almost three-fourths (76.70 percent) of the farmers fell in the medium cosmopolitaness category, compared to 14.56 percent had low cosmopolitaness category and only 8.74 percent of them fell in high cosmopolitaness category. Mortuza (2015) reported similar result in his study.

4.1.8 Attitude towards ICT tools

Attitude towards ICT tools score of the farmers ranged from 15 to 30, against a possible range of 0 to 30 with a mean and standard deviation of 24.9 and 2.20 respectively. Based on attitude towards ICT tools score, the respondents were classified into three categories considering mean and standard deviation ways of quantitative classification (Hasan *et al.*, 2018). The three categories were 'less favorable' (≤ 23), 'moderately favorable' (24-27) and 'highly favorable' (> 27) attitude toward ICT tools (Table 4.1).

The result shows that a little less than three-fifths (58.25 percent) of the farmers had moderately favorable attitude towards ICT tools compared to 36.89 percent less favorable and only 4.86 percent had highly favorable attitude towards ICT tools. The findings show that a good number (63.11 percent) of the farmers had moderately to highly favorably attitude towards ICT tools in the study area. Therefore, attitude towards ICT tools of the farmers were satisfactory to some extent. This might be due to the sample farmers of the study area.

4.1.9 Innovativeness

Innovativeness is a desirable characteristic for a farmer that helps him to consider and except new technologies earlier than other members of his society. Proper extension contact of the farmers provides evidences in favor of the innovations. The acceptance and adoption of an idea/innovation is the ultimate goal of ICT campaign sponsored by ICT tools. The farmer who has low innovativeness is likely to face difficulty in making positive decision about an innovation as well as its adoption to the real situation.

The innovativeness scores of the farmers ranged from 2 to 13, against the possible score of 0 to 30. The mean and standard deviation were 7.52 and 2.06 respectively. Based on innovativeness score, the respondents were classified into three categories considering mean and standard deviation ways of quantitative classification (Hasan *et al.*, 2018). The three categories were 'low' (2-5), 'medium' (6-9), 'high' (>9) as shown in Table 4.1.

A little less than three-fourths (73.79 percent) of the farmers had medium innovativeness compared to 10.68 percent had low and 15.53 percent had high innovativeness. Thus the overwhelming majority (84.47 percent) of the respondents of the study area were medium to low innovativeness category. Therefore, innovativeness for adoption of new agricultural technologies was satisfactory in the study area. However, these farmers may be helped to improve their outlook towards sustainable agricultural development by making them aware of the information dissemination of friendly innovations through their higher use of various information sources. Findings of the study had almost similarity with the study of Mondol (2009) and Nuruzzaman (2003).

4.2 Preference of ICT tools

This section deals with preference of ICT tools in receiving agricultural information by the farmers. Preference of ICT tools was determined mainly by two dimensions i.e. extent of contact and usefulness of the selected ICT tools in receiving agricultural information. In this regard, preference to contact sub-score (PCSS) and preference to usefulness sub-score (PUSS) were calculated and finally preference of ICT tools was determined by summing up the scores of ESCC and USS.

4.2.1 Preference to contact with ICT tools

The range of preference to contact with the ICT tools by the farmers was ranged from 7 to 20 against the possible range of 0 to 30 with an average of 13.19 and standard deviation of 2.84. The farmers were classified into three categories on the basis of mean and standard deviation of their extent of contact score (Table 4.2).

Table 4.2 Distribution of the farmers according to their preference to contact with ICT tools

Categories	Farmers		Observed range	Mean	SD
	Number	Percent			
Low contact (up to10)	21	20.39	7-20	13.19	2.84
Medium contact (11-16)	67	65.05			
High contact (>16)	15	14.56			
Total	103	100.00			

Data furnished in Table 4.2 indicates that 65.05 percent of the respondents had medium contact compared to 20.39 percent had low and 14.56 percent had high contact with ICT tools. The overwhelming majority of the farmers (85.44 percent) felt under low to medium contact category. Therefore, they may need considerable contact with different ICT tools through increasing efficiency of those tools.

4.2.2 Preference to usefulness of ICT tools

The range of preference to usefulness of ICT tools score of the farmers was ranged from 3 to 25 against the possible range of 0 to 30 with an average of 11.06 and standard deviation of 3.75. The farmers were classified into three categories on the basis of mean and standard deviation of their usefulness score (Table 4.3).

Table 4.3 Distribution of the farmers according to their usefulness of ICT tools

Categories	Farmers		Observed range	Mean	SD
	Number	Percent			
Low useful (up to7)	17	16.51	3-25	11.06	3.75
Medium useful (8-15)	77	74.75			
Very useful (>15)	09	8.74			
Total	103	100.00			

Data furnished in Table 4.3 pointed out that three-fourths (74.75 percent) of respondents mentioned medium useful of ICT tools in receiving agricultural information while 16.51 percent low and only 8.74 percent very useful. Thus, the overwhelming majority (91.26 percent) of farmers had low to medium useful of ICT tools in receiving their agricultural information.

4.2.3 Overall preference of ICT tools

The preference of ICT tools by the farmers in receiving information was examined on the basis of their overall preference scores. The preference scores of the respondent ranged from 14 to 35, against the possible range of 0 to 60 with an average of 24.25, and standard deviation of 4.88. The respondents were classified into three categories on the basis of mean and standard deviation of their preference score as shown in Table 4.4.

Table 4.4 Distribution of the respondents according to their overall preference of ICT tools

Categories	Farmers		Observed range	Mean	SD
	Number	Percent			
Low preference (up to 19)	19	18.45	14-35	24.25	4.88
Medium preference (20-29)	63	61.17			
High preference (>29)	21	20.38			
Total	103	100.00			

The data contained in the Table 4.4 indicate that the highest proportion (61.27 percent) of respondents had medium preference of ICT tools while 20.38 percent had high and 18.45 percent had low preference. The finding implies that about four-fifths (79.62 percent) of the respondents had low to medium preference of ICT tools. This means that the preference of ICT tools by the farmers in receiving agricultural information was moderately satisfactory. Ali (2015) also found that majority of the respondents had medium preference of communication sources.

On the other hand, in total ten ICT tools were considered to determine the preference of ICT tools for agricultural information. For clear understanding and comprehensive analysis of preference of ICT tools of the respondent rank order for each of the ICT tools was computed by using preference of information and communication tools index (PICTI). The PICTI for each ICT tools scores could range from 105 to 482 against the possible range of 0 to 624 as shown in Table 4.5.

Mobile phone was mentioned by majority of respondents (PICTI=482) as the most preferred source of information. This might be due to availability and easily operate this device by the farmers. Farmer information and service center occupied the second position in the ranking of the most preferred tools with PICTI=380. The reason for the higher position of preference of this too may be due to easily access to the tool by the farmers.

Mati-o-Manus TV program came next with PICTI=286 of the respondents indicating it as their 3rd most preferred tools. This might be due to the popularly and very reliable of the TV program which was running from several past years.

Hridoye Mati-o-Manus TV program was mentioned by considerable amount of respondents (PICTI=269) as the preferred source of information and occupied the 4th position in the ranking. Channel eye displayed this agricultural program weekly among the farmers and thus it is popular among them. The 5th preferred information source is *Krishi* call centre 16123 service (PICTI=238). This may be due to the availability of mobile phone and lower call rate.

Table 4.5 Rank order of ICT tools depending upon farmers preference

Sl. No.	ICT tools	PICTI	Rank order
1.	Mobile phone	482	1 st
2.	Computer or laptop	105	10 th
3.	Internet	222	6 th
4.	<i>Krishi</i> call centre 16123 service	238	5 th
5.	Farmer information and service center	380	2 nd
6.	Watch <i>Mati-o-Manus</i> TV program	286	3 rd
7.	Watch <i>Hridoye Mati-o-Manus</i> TV program	269	4 th
8.	Listen <i>Desh Amar Mati Amar</i> radio program	186	7 th
9.	<i>Krishok-er-janala</i> (times/session)	182	8 th
10.	<i>Krishi prujokthi vander</i> (times/session)	136	9 th

Computer or laptop occupied the last position in the ranking of the most preferred channels (PICTI=105). This may be due to the reason that the farmers are not practiced in receiving agricultural information through computer.

4.3 Relationships between Selected Characteristics of the Farmers and their preference of ICT tools

The purpose of this section was to explore the relationship between the selected characteristics of the farmers with their preference of ICT tools in receiving agricultural information. Pearson's Product Moment Correlation Coefficient (r) was used to test the concerned null hypothesis in exploring relationship between the concerned variables. The summary of the results of correlation test is presented in Table 4.6 and the correlation matrix appears in the Appendix-B.

Data in Table 4.6 revealed that education, annual income, cosmopolitaness and innovativeness showed significant positive relationship while age and farming experience of the respondents showed significant but negative relationship with their preference of ICT tools. The rest of the characteristics viz. family size, organizational participation and attitude towards ICT tools of the farmers did not show any relationship with their preference of ICT tools. The results of all correlations have been discussed as follows:

4.3.1 Age and preference of ICT tools by the farmers

The computed value of 'r' between age of the respondents and their preference of ICT tools was -0.273** with 101 df at 0.01% level of probability (Table 4.6). Therefore, the relationship between the concern variables was significant and the null hypothesis was rejected.

Based on the above findings, the researcher concludes that age of the farmers had a significant negative relationship with their preference of ICT tools in receiving agricultural information. The result implies that with increased age of the farmers there was a corresponding decrease in preference of ICT tools in receiving agricultural information. The finding had consistency with Nuruzzaman (2003).

Table 4.6 Relationships between the focus issue and selected characteristics of the farmers

Focus issue	Selected characteristics	Computed values of 'r' with 101 df
Preference of farmers towards ICT tools	Age	-.273**
	Education	.413**
	Family size	-.114
	Farming experience	-.240*
	Annual income	.270**
	Organizational participation	-.024
	Cosmopolitaness	.336**
	Attitude towards ICT tools	-.030
	Innovativeness	.321**

**, significant at 1 percent level of significance *; significant at 5 percent level of significance;

4.3.2 Education and preference of ICT tools by the farmers

The computed value of 'r' between education of the respondents and their preference of ICT tools was 0.413** with 101 df at 0.01% level of probability (Table 4.6). Therefore, the relationship between the concern variables was significant and positive. As a result, the null hypothesis was rejected.

This means that the farmers with higher level of education had more preference of ICT tools in receiving agricultural information. The education enables of an individual to attain knowledge and thus increases their power of understanding. Thus, involvement of farmers in field crop cultivation was higher among those farmers who had higher educational qualification. Parul (2014), Kabita (2014), Rashid (2012), Khatun (2006), Nuruzzaman (2003) and Rahman (2002_a) also found similar results in their respective studies.

4.3.3 Family size and preference of ICT tools by the farmers

The computed value of 'r' between family size of the respondents and their preference of ICT tools was -0.114 with 101 df at 0.05% level of probability (Table 4.6). Therefore, the relationship between the concern variables was not significant and the concerned null hypothesis could not be rejected.

Therefore, it could be concluded that family size of the farmers might not play any significant role on their preference of ICT tools in receiving agricultural information. The finding had consistency with Parul (2014), Kabita (2014), Rashid (2012), Khatun (2006), and Rahman (2002_a).

4.3.4 Farming experience and preference of ICT tools by the farmers

The computed correlation coefficient 'r' between farming experience of the respondents and their preference of ICT tools was -0.240* with 101 df at 0.05% level of significance (Table 4.4). On the basis of the above findings, null hypothesis was rejected.

Based on the above findings, the researcher concludes that farming experience of the farmers had a significant negative relationship with their preference of ICT tools in receiving agricultural information. The result implies that with increased farming experience of the farmers there was a corresponding decrease in preference of ICT tools in receiving agricultural information.

4.3.5 Annual income and preference of ICT tools by the farmers

The computed value of 'r' between annual income of the respondents and their preference of ICT tools was .270** with 101 df at 0.01% level of probability (Table 4.6). Therefore, the relationship between the concern variables was significant and positive. Hence, the concern null hypothesis was rejected.

Therefore, the researcher concluded that annual income of the farmer had significant relationship with their preference of ICT tools in receiving agricultural information. The finding had consistency with Sharmin (2017). Thus, it can be said that annual income of the farmers was important factor for the preference of ICT tools.

4.3.6 Organizational participation and preference of ICT tools by the farmers

The computed value of 'r' between organizational participation of the respondents and their preference of ICT tools was -0.024 with 101 df at 0.05% level of probability (Table 4.6). Therefore, the relationship between the concern variables was not significant and the concerned null hypothesis could not be rejected.

Therefore, it could be concluded that organizational participation of the farmers might not play any significant role on their preference of ICT tools in receiving agricultural information.

4.3.7 Cosmopoliteness and preference of ICT tools by the farmers

The computed value of 'r' between cosmopoliteness of the respondents and their preference of ICT tools was .336** with 101 df at 0.01% level of probability (Table 4.6). Therefore, the relationship between the concern variables was significant and positive. Hence, the concern null hypothesis was rejected.

Therefore, the researcher concluded that cosmopoliteness of the farmer had significant relationship with their preference of ICT tools in receiving agricultural information. Thus, it can be said that cosmopoliteness of the farmers was important factor for the preference of ICT tools. The finding had consistency with Sharmin (2017).

4.3.8 Attitude and preference of ICT tools by the farmers

The computed value of 'r' between attitude towards ICT tools of the respondents and their preference of ICT tools was -0.030 with 101 df at 0.05% level of probability (Table 4.6). Therefore, the relationship between the concern variables was not significant and the concerned null hypothesis could not be rejected.

Therefore, it could be concluded that attitude towards ICT tools of the farmers might not play any significant role on their preference of ICT tools in receiving agricultural information.

4.3.9 Innovativeness and preference of ICT tools by the farmers

The computed value of 'r' between innovativeness of the respondents and their preference of ICT tools was .321** with 101 df at 0.01% level of probability (Table 4.6). Therefore, the relationship between the concern variables was significant and positive. Hence, the concern null hypothesis was rejected.

Therefore, the researcher concluded that innovativeness of the farmer had significant relationship with their preference of ICT tools for field crop cultivation. Thus, it can be said that innovativeness of the farmers was important factor for the preference of ICT tools. The finding had consistency with Nur (2018).

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This Chapter presented summary of findings, conclusion and recommendations for the study:

5.1 Summary of the Findings

The major findings of the study have been summarized in the following sections.

5.1.1 Selected characteristics of the farmers

Age: Majority (51.46 percent) of the farmers belonged to the middle aged category compared to 21.36 percent young aged and 30.18 percent were in the old aged category.

Education: Majority (61.17 percent) of the farmers had secondary education, 3.88 percent had primary education and 34.95 percent of the farmers had above secondary education level.

Family size: Majority of the farmers (63.11 percent) of the respondents had medium family size, 27.18 percent had small family size and 9.71 percent had large family.

Farming experience: It is found that 21.36 percent of the respondents had less than one decade farming experience while 37.86 percent, 29.13 percent and 11.65 percent of them had two decades, three decades and four decades farming experience respectively.

Annual income: The highest proportion of the farmers (37.86 percent) under high income group compared to 29.13 percent had low income and 33.01 percent under medium income group.

Organizational participation: The highest portion (45.63 percent) of the farmers had medium organizational participation compared to 38.84 percent had low and 13.59 percent had high and a negligible proportion (1.94 percent) had no organizational participation. This finding indicates that 98.06 percent of the farmers had organizational participation.

Cosmopolitaness: The highest portion (76.70 percent) of the farmers fell in the medium cosmopolitness category, compared to 14.56 percent had low cosmopoliteness category and only 8.74 percent of them fell in high cosmopoliteness category.

Attitude towards ICT tools: Majority (58.25 percent) of the farmers had moderately favorable attitude towards ICT tools compared to 36.89 percent less favorable and only 4.86 percent had highly favorable attitude towards ICT tools.

Innovativeness: The highest portion (73.79 percent) of the farmers had medium innovativeness compared to 10.68 percent with low and 15.53 percent high innovativeness.

5.1.2 Preference of ICT tools: Preference of ICT tools was determined mainly by two dimensions namely preference to contact and preference to usefulness of the ICT tools in receiving information on vegetable cultivation.

Preference to contact with ICT tools: More than three-fifths (65.05 percent) of the respondents had medium contact compared to 20.39 percent had low and 14.56 percent had high contact with ICT tools.

Preference to usefulness of ICT tools: Three-fourths (74.75 percent) of respondent mentioned medium useful of ICT tools in receiving agricultural information while 16.51 percent low and only 8.74 percent very useful.

Overall reference of ICT tools: The highest proportion (61.27 percent) of respondents had medium preference of ICT tools while 18.45 percent had low and 20.38 percent had high preference. On the other hand, Mobile phone was mentioned by majority of respondents (PCTI=482) as the most preferred source of information. The less preferred ICT tools for agricultural information mentioned by the farmers were *krishok-er-janala*.

5.1.3 Relationships between selected characteristics of the farmers and their preference towards ICT tools

Based on the computed correlation coefficients (r) among the nine selected characteristics of the farmers education, annual income, cosmopolitaness and innovativeness showed significant positive relationship while age and farming experience of the respondents showed significant but negative relationship with their preference of ICT tools. The rest of the characteristics viz. family size, organizational participation and attitude of the farmers did not show any relationship with their preference towards ICT tools.

5.2 Conclusions

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

1. As majority of the farmers had medium preference towards ICT tools in receiving agricultural information, so it is concluded that farmers need more contact to useful and effective ICT tools in receiving agricultural information.
2. The highest proportion (62.14 percent) of the farmers had low to medium income. Therefore, it could be concluded that farmers need effective ICT tools in receiving appropriate information for increasing farming income.

3. Around more than three-fourth of the farmers had medium innovativeness and cosmopoliteness. Hence, it is concluded that farmers need effective ICT tools in receiving appropriate information for increasing innovativeness and cosmopoliteness.
4. As more than three-fourth farmers had low to medium organizational participation, so it could be concluded that farmers need appropriate motivation for increasing organizational participation.
5. The results also revealed that 'Mobile phone', 'Farmer information and service center', '*Mati-o-Manus* TV program', '*Hridoye Mati-o-Manus* TV program' etc. were the most preferred ICT tools in receiving agricultural information. It is concluded that interactive electronic media, electronic media are played more important role for disseminating agricultural information than print media.
6. Correlation test showed that education, annual income, cosmopoliteness and innovativeness of the farmers showed significant positive relationship with their preference of ICT tools. Therefore, it can be concluded that these characteristics of the farmers have good link in adoption of improved farming practices in crop cultivation.

5.3 Recommendations

Based on the findings and conclusions of the study, the following recommendations could be made:

5.3.1 Recommendations for policy implications

1. Necessary programs should be arranged to create farmers' awareness and preference regarding the benefits of ICT in providing agricultural information.
2. Government and non-government organizations should take proper actions for increasing farming or non-farming income generating activities in the study area.
3. The concern authorities (such as DAE and NGOs) should take necessary programs for increasing innovativeness, cosmopoliteness and organizational participation.
4. Majority of the farmers prefer ICT tools for obtaining agricultural information. Among the most preferred ICT tools 'Mobile phone', 'Farmer information and service center', '*Mati-o-Manus* TV program', '*Hridoye Mati-o-Manus* TV program', '*Krishi* call centre 16123 service' etc. were prominent who could be imparted training on various aspects of farming, so that the fellow farmers could make good use of these key informants.

5. The four influencing characteristics, namely, education, annual income, cosmopolitaness and innovativeness were positively related and had positive effect on the preference on ICT tools. Therefore, it is recommended that these characteristics might be considered while planning and executing farm information through ICT tools.

5.3.2 Recommendations for further study

Considering the scope and limitations of the study, the following recommendations are made for further study:

1. This study investigated the effects of nine characteristics of the farmers on their preference of ICT tools in receiving agricultural information. Therefore, it may conclude that further study should be conducted involving other characteristics of the farmers in this regard.
2. This study was conducted with the farmers of one union of Biral upazila under Dinajpur district. Similar study may be replicated in other parts of the country. In contrast, similar study may also be replicated in future for studying change of pattern regarding effectiveness of ICT tools among the same population of the present study area.
3. The preference of ICT tools by the farmers in receiving agricultural information has been investigated in this study. The farmers are the main potential force in agricultural activities. Considering the role of the farmers in agricultural activities, it is recommended that the similar study should be conducted to find out farmer's preference of ICT tools in receiving agricultural information.
4. The study was limited to crop cultivation; in future some other agricultural activities should be chosen to assess to farmer's preference of ICT tools.

APPENDIX-A
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An Interview Schedule on
Preference of ICT Tools by the Farmers in Receiving Agricultural Information

Name of Respondent - - - - - Father's Name - - - - -

Mobile no. - - - - - Village: - - - - - Union: - - - - -

(Please answer the following questions)

1. Age: How old are you? Years

2. Education: Please mention your educational qualification.

a) Read up to class

b) Passed class

3. Family size: Please mention your total number of family members (including yourself)

Male	- - - - -	Female	- - - - -	Total=	- - - - -
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4. Farming Experience: How many years are you engaged in agricultural profession?

Ans: Years

5. Annual income: Please mention your annual income according to the following sources.

Sl. No.	Sources	Income in Tk
a.	Agriculture	
b.	Service	
c.	Business	
d.	Others (if any)	
	Total	

6. Organizational participation: Indicate the nature of your participation in the following organizations.

Sl No.	Name of Organization	Not Involved	Involved			
			Ordinary Member	Executive member	Secretary	President
1.	Krishak Somabay Samittee					
2.	Cooperative Society					
3.	School/Madrasha Committee					
4.	Mosque/Mondir Committee					
5.	Market Committee					
6.	Others					

7. Cosmopolitaness: Indicate how frequently you visit the following places?

Sl. No.	Places of visit	Not at all	Extent of participation		
			Rarely	Occasionally	Frequently
1.	Visit to houses of friends or relatives (times/week)		1	2-3	≥ 4
2.	Visit to local market or Up office (times/month)		Do	Do	Do
3.	Upazila head quarter or market (times/3 month)		Do	Do	Do
4.	Visit to own district town (times/6 month)		Do	Do	Do
5.	Visit to other district town (times/year)		Do	Do	Do
6.	Division/capital city (times/year)		Do	Do	Do

8. Attitude towards ICT Tools: Give your opinion about the following statements.

Sl. No.	Statements	Level of agreement				
		SA	A	U	D	SD
+1.	ICTs provide possible solutions to the present agricultural situation					
-2.	ICTs cannot deliver personalized information					
+3.	All kinds of information exchange are possible only through ICTs					
-4.	Existing infrastructure of ICTs is not enough to meet the needs of the farming community					
+5.	ICT based Pest/disease outbreak warning system facilitate farmers to take preventive measures					
-6.	ICT extension services avoid the personal extension contact					

SA= Strongly agree, A=Agree, U=Undecided, D=Disagree and SD= Strongly disagree

9. Innovativeness. Please furnish your information about the duration and extent of uses of the following technologies.

Sl. No.	Name of the Technology	Duration of adoption			
		Do not use	Above 2 years	Within 2 years	Within 1 year
1.	Mobile phone				
2.	Access to internet for agricultural purpose				
3.	FM radio				
4.	Watching Satellite TV channel				
5.	Use of IPM in rice field				
6.	Soil test for fertilizer dose determination				
7.	Cultivate green manuring crops				
8.	Cultivate Hybrid variety of rice				
9.	Practicing organic farming				
10.	Use of balance fertilizer dose				

10. Preference of ICT tools

10.1 Contact with ICT tools: Mention of your nature of contact with the following ICTs in receiving agricultural information.

Sl. No.	Items	Extent of use			
		Not at all	Rarely	Occasionally	Frequently
1.	Mobile phone (times/week)		1-5	6-10	≥ 10
2.	Computer or laptop (times/season)		1-2	3-4	≥ 5
3.	Internet (times/season)		1-2	3-4	≥ 5
4.	Krishi call centre 16123 service (times/season)		1-2	3-4	≥ 5
5.	Farmer information and service center (times/season)		1-2	3-4	≥ 5
6.	Watch <i>Mati-o-Manus</i> TV program (times/month)		1-2	3-4	≥ 5
7.	Watch <i>Hridoye Mati-o-Manus</i> TV program (times/month)		1-2	3-4	≥ 5
8.	Listen <i>Desh Amar Mati Amar</i> radio program (times/month)		1-2	3-4	≥ 5
9.	Use of <i>krishok-er-janala</i> (times/season)		1-3	4-6	≥ 7
10.	Use of <i>Krishi prujokthi vander</i> (times/season)		1-3	4-6	≥ 7

10.2 Usefulness of ICT tools: Mention the usefulness of the following ICTs in receiving agricultural information.

Sl. No.	Communication sources	Extent of usefulness (in %)			
		Not useful (0)	Somewhat useful (1-49)	Useful (50-79)	Very useful (80-100)
1.	Mobile phone				
2.	Computer or laptop				
3.	Internet				
4.	<i>Krishi</i> call centre 16123 service				
5.	Farmer information and service center				
6.	Watch <i>Mati-o-Manus</i> TV program				
7.	Watch <i>Hridoye Mati-o-Manus</i> TV program				
8.	Listen <i>Desh Amar Mati Amar</i> radio program				
9.	Use of <i>krishok-er-janala</i>				
10.	Use of <i>Krishi prujokthi vander</i>				

Thank you for your cooperation.

.....
Signature of the interviewer and date

APPENDIX B

Correlation Matrix of the Focus Issue and Selected Characteristics

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	Y
X ₁	1									
X ₂	-.574**	1								
X ₃	.135	-.108	1							
X ₄	.955**	-.561**	.144	1						
X ₅	-.094	.222*	.134	-.103	1					
X ₆	.069	-.073	.166	.061	.040	1				
X ₇	-.192	.245*	.036	-.106	.327**	-.077	1			
X ₈	.136	.024	.084	.076	.389**	.119	.245*	1		
X ₉	-.192	.181	.067	-.196*	.307**	.046	.325**	.143	1	
Y	-.273**	.413**	-.114	-.240*	.270**	-.024	.336**	-.030	.321**	1

*, Correlation is significant at the 0.05 level of significance (2-tailed).

**, Correlation is significant at the 0.01 level of significance (2-tailed).

X₁= Age

X₂= Education

X₃= Family size

X₄= Farming experience

X₅= Annual income

X₆= Organizational participation

X₇= Cosmopoliteness

X₈=Attitude towards ICT tools

X₉= Innovativeness

Y = Preference of farmers towards ICT tools

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