USE OF YOUTUBE FOR DIFFUSION OF INNOVATIVE AGRICULTURAL TECHNOLOGIES: A DIGITAL SELF-HELP APPROACH TO THE FARMERS

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CERTIFICATE

This is to certify that the thesis entitled, **"Use of YouTube for Diffusion of Innovative Agricultural Technologies: A Digital Self-Help Approach to the Farmers"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka in partial fulfillment of the requirements for the degree of **Master of Science (MS) in Agricultural Extension**, embodies the result of a piece of bona-fide research work conducted by **SUSHAMA BARUA, Registration no. 19-10025** under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information, received during the course of this study has been dully acknowledgement by him.

Dated: June, 2021

Dhaka, Bangladesh

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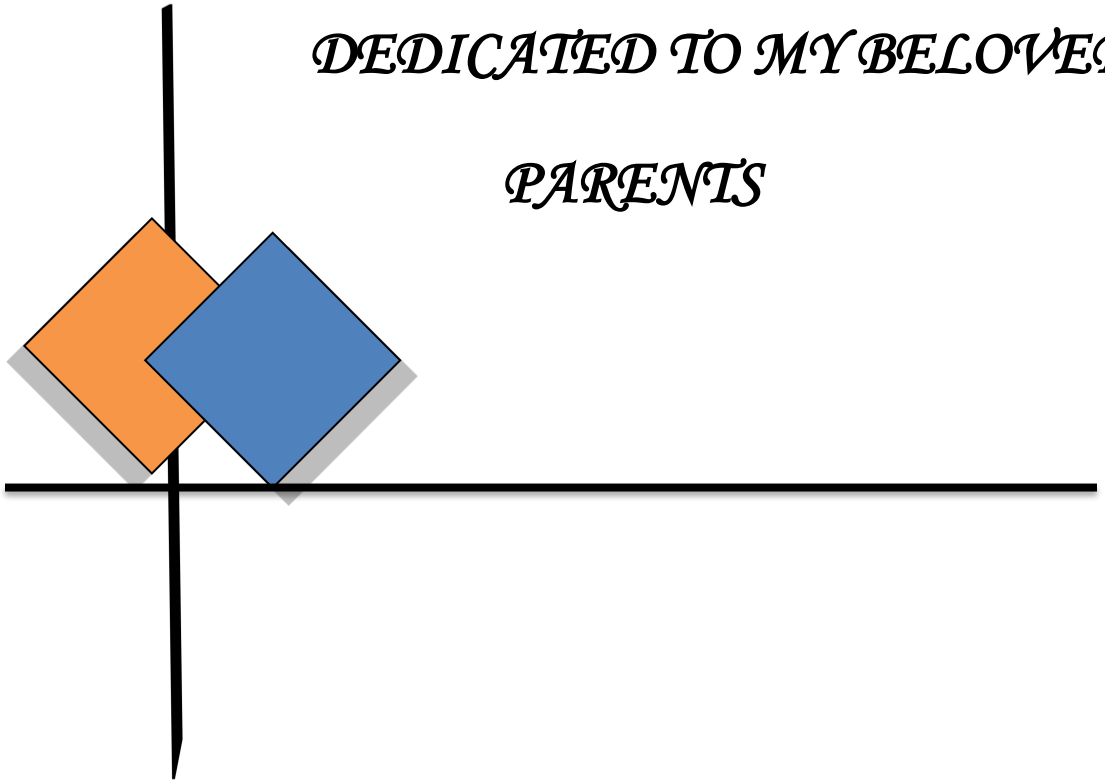
DEDICATED TO MY BELOVED

PARENTS



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The researcher

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ABBREVIATION AND ACRONYMS

AEO	Agriculture extension officer
BBS	Bangladesh Bureau of Statistics
DAE	Department of agriculture extension
et al.	All others
etc.	et cetera, and the other
Fig.	Figure
ICT	Information and Communication Technology
PCI	Problem Confrontation Index
SPSS	Statistical Package for Social Science

Use of YouTube for Diffusion of Innovative Agricultural Technologies: A Digital Self-Help Approach to the Farmers

ABSTRACT

Digital self-help approach (YouTube) has a growing role in the diffusion of knowledge and innovation within the agricultural sector, allowing a greater number of farmers, researchers and practitioner to share information and experiment so as to facilitate innovative farming practices. The main objectives of this study were to determine the extent of use of digital self-help approach (YouTube) that influences on innovative agricultural technology diffusion to the farmers and explore the contribution of the selected characteristics of the farmers to their use of digital self-help approach (YouTube). Data were collected from 93 farmers of five selected villages of four unions of Rangunia upazila of Chattogram district during 20th January to 21th February, 2021. The findings revealed that 66.7 percent of the respondents had medium use, 16.1percent had low use, and only 17.2 percent had high use of digital self-help approach (YouTube) in diffusion of innovative agricultural technologies. Majority (41.9 percent) of total respondents had medium influence on innovative agricultural technology diffusion by use of digital self-help approach (YouTube). About 52.7 percent of the respondent's perceived medium credible, 2.2 percent perceived low credible and 45.2 percent perceived high credible of digital self-help approach (YouTube) in receiving innovative agricultural technology. As regard to contribution, annual family income, innovativeness, farm size, farming experience, agricultural extension media contact and agricultural knowledge of the farmers had significant contribution to their extent of use of digital self-help approach (YouTube) while age, education, family size had no significant contributing to their extent of use of digital self-help approach (YouTube). Out of six problems, three problems in descending order of Problem Confrontation Index (PCI) were high price of internet package, unavailability of smart phone and ignorance of using smart phone.

CHAPTER I

INTRODUCTION

1.1 General Background

Agriculture is an important sector in most developing countries and the majority of the rural population of the world depends on it (Stienen, 2007). The contribution of agriculture to rural development is highly dependent on the generation and delivery of new agricultural technologies and most of these new technologies can be described as information intensive (Tripp, 2001). Information has become a critical factor of the agricultural production (Rao, 2007). Agricultural information is necessary to reach farmers and agriculturists in order to meet their needs. If farmers for example have access to relevant agricultural information, food shortages may be eradicated. Such information is crucial to their farming activities and impact on household food security (Gundu, 2009). According to Shaik *et al.* (2004) agricultural extension systems in most developing countries are under-funded and have had mixed effects. Much of the extension information has been found to be out of date, irrelevant and not applicable to small farmers' needs, leaving such farmers with very little information or resources to improve their productivity. Information is an important resource for agriculture and rural development and communicating information is a major function of extension aimed at the promotion of agricultural development (Sanusi, 2010). Access to and use of current information is critical, not only for the financial success of farmers, but to support sustainable agricultural systems. Information and communication technologies (ICT) have touched almost every field of human activity and agriculture is not an exception to that (Winrock, 2003). According to Gakuru *et al.* (2009) agricultural informatics is a new concept that has arisen following the rapid development in ICT and the internet. Referred to as e-agriculture, agricultural informatics is an emerging field which combines the advances in agricultural informatics, agricultural development and entrepreneurship to provide better agricultural services, enhanced technology dissemination, and information delivery through the advances in ICT and the internet. The main focus of ICT in agriculture is meeting the farmers' needs for information.

Bangladesh is one of the least developed countries in the world. The great majority of its people depend on agriculture for earning their living. More than 70% people in the

rural areas directly or indirectly are involved with agriculture (BBS, 2011). In Bangladesh, farmers are often unaware about new ideas and practices in agriculture. The use of ICT in agriculture among rural farmers of Bangladesh is limited because of lack of proper education, poor social and economic conditions and a scarcity of information and technological infrastructure. The government of Bangladesh has stepped into a new era of a digital world with a spectacular vision for making a Digital Bangladesh as outlined by its current Prime Minister Sheikh Hasina. As a parliamentary election manifesto, "Digital Bangladesh" Information and Communication Technology (ICTs) has been considered the essential development tool for up-scaling the economic and social status of the citizens of Bangladesh. Emphasis and investment is driven toward infrastructural development of ICTs.

Social media is yet another ICT based tool, which once used purely for entertainment, has great potential to be used for knowledge sharing and collaboration even in agriculture. These ICT tools are relatively easier to use and are gaining popularity in agriculture sector. Social media are a contemporary channel of digital communication that is composed of various evolving tools for discussion, interaction and sharing of information among people. It has completely changed the topography of personal communication. It plays a very important role in enhancing interactions and information flows among different actors involved in agricultural innovation and also enhance capacities of agricultural extension. Farming communities regularly share information and knowledge about new agricultural technologies, market information, location, availability and prices of farm inputs, diagnostic information about plant and animal diseases, and soil problems (Ballantyne, 2006). "Social media are web-based tools of electronic communication that allow users to exchange information individually or in groups, share ideas and opinions, make decisions and create, store, retrieve and exchange information -Allows to provide the facility of providing (text, images, videos, etc.), by anyone in the virtual world (Suchidipata and Saravanan, 2016). These are digital networks that use user-created information - opinion, Video, audio, and multimedia are used to share and discuss. The revolutionary aspects of social media are apparent from the recent growth of 2.56 billion mobile social media users worldwide who constitute approximately 68% of global internet users (Kemp, 2017). Social media has become an essential means of communication because of increased use of Smartphones and mobile internet users

worldwide (Stanley, 2013). Various social media tools such as Facebook, Twitter, YouTube, LinkedIn, WhatsApp etc. are becoming greater ways of sharing information about agricultural technology. Among them YouTube is more popular media for the farmers.

YouTube was founded in 2005, and rapidly expanded to be the second most visited site worldwide (Arthurs *et al*., 2018). Mike Thelwell (2016) described the benefit of computational research methods and digital research usefulness for YouTube as a platform. The platform's content, user-generated videos, has become a valuable informational source and can be utilized by activists to recruit new followers and engage online communities (Arthurs *et al*., 2018). YouTube viewers utilize the platform for both entertainment and information (Shao, 2009). YouTube can be beneficial in agricultural marketing to create an image of authority, build credibility and trust, and engage with the audience, more so than many other forms of media (Agrawal, 2016). Businesses have used the site to demonstrate merchandise, promote expertise, interact with customers, and explain important concepts (Evans, 2011). Approximately half of all YouTube users stated they have used YouTube for instructions to help them complete a task, such as cooking (Smith, Toor, & Van Kessel, 2018). Because video incorporates sound, visuals, motion, color, and emotion, it is the most powerful tool to communicate (Brown, 2005). Video requires less cognitive processing, the information is retained by the viewer more easily, and it is also an inexpensive form of marketing (Belk & Kozinets, 2012). YouTube has increased the power of a well-produced video as it provides a well-searched forum to share content – many marketing experts claim that well- executed YouTube presence is a vital piece to any marketing strategy (Agrawal, 2016). YouTube has allowed agricultural organizations to showcase various farming, ranching, or food production processes, taking the viewer into places they could not normally see because of location or regulations. YouTube is also becoming a very important tool in farming because it has the ability to connect with farmers around the world over large geographical distances. The benefits of this can be as large or as small as the farmers choose, depending on how much time we wish to spend on it. The use of YouTube depends on different socio-economic characters of the farmers. According to Bhagava (2015) older man used a lower percentage of YouTube for receiving agricultural information. Education is also influenced the farmers on using YouTube. According

to Baker et al. (2007) education is an important factor in influencing ones behavior and attitude towards adoption of technology. Higher level of education helps to utilize YouTube for receiving agricultural technology (Balkrishna and Deshmukh 2017). YouTube plays a very important role in enhancing interactions and information flows among different actors involved in agricultural innovation and also enhance capacities of agricultural extension and advisory service providers. In Bangladesh farmers saw different YouTube channel for getting agricultural information and new technologies. These are Krishi Bioscope, Dipto Krish, Chitropuri Krishi, Shykh Seraj, Krishoker Dorpon. These channel published different agriculture related problems, solutions and new technologies by which farmers easily get benefitted.

1.2 Statement of the Problem

In the context of the above circumstances the researcher intended to find out the answers to the following research questions:

1) What were the socio-economic profiles of digital self-help approach (YouTube) user farmers?
2) What extent the farmers utilize the digital self-help approach (YouTube) that influences on innovative agricultural technology diffusion?
3) How much the digital self-help approach (YouTube) influence & credible to diffusion of innovative agricultural technology as perceived by the farmers?
4) What were the contributions of the selected characteristics of the farmers to their use of digital self-help approach (YouTube)?
5) What were the problems faced by the farmers in using digital self-help approach (YouTube)?

1.3 Specific Objectives

Based on the discussion, the following objectives have been formulated to guide the research:

1) To describe the selected socio-economic profile of digital self-help approach (YouTube) user farmers;
2) To ascertain the extent of use of digital self-help approach (YouTube) that influences on innovative agricultural technology diffusion to the farmers;

3) To identify the influence & credibility of digital self-help approach (YouTube) used by the farmers on innovative agricultural technology diffusion;
4) To explore the contribution of the selected characteristics of the farmers to their use of digital self-help approach (YouTube) for diffusion of innovative agricultural technologies; and
5) To identify the problems faced by the farmers in using digital self-help approach (YouTube).

1.4 Scope of the Study

The main focus of the study is to ascertain the use of digital self-help approach (YouTube) that influences on innovative agricultural technology diffusion to the farmers. The findings of the study will be specifically applicable to Rangunia Upazila of Chattogram district. However, the findings may also applicable to other areas of Bangladesh where the physical,socio-economic and cultural conditions do not differ much with those of the study area. The socio- economic condition of the rural farmers' will be visible due to using digital self-help approach (YouTube) through this research. It also made a scope to review the emerging issues like benefits obtained from using digital self-help approach (YouTube) through this approach and helped to come up with some suggestions for policy intervention for future activities. However, the findings will also have implications for other areas of the country having relevance to the socio-cultural context of the study area. The investigator believes that the findings of the study will reveal the phenomenon related to diffusion of innovation. These will be of special interest to the policy makers and planners in formulating and redesigning the extension programs.

1.5 Justification of the Study

The main focus of the study was to assess the use of digital self-help approach (YouTube) that influences on innovative agricultural technology diffusion to the farmers. It is important to investigate whether or not farmers influenced on innovative agricultural technology diffusion by using digital self-help approach (YouTube). Digital self-help approach (YouTube) spreads formation of knowledge societies in rural areas of the developing countries, which can realize when knowledge and information are effectively improved agricultural and rural development. YouTube could use to facilitate, strengthen and replace an existing information systems and

networks. It could regard as both a driver and an enabler. Especially agricultural sector is facing many problems in obtain new information about market price, whether updates and other related issues. Now a day YouTube helps the farmers to solve their own problems by giving information and different methods of agricultural technologies. There is no doubt that YouTube is a challenge and an opportunity for developing countries. YouTube is a powerful tool for agricultural technology diffusion. It has impact on all aspects of life by reducing time, distance and the information gap. YouTube is increasing day by day for greater and faster agricultural technology diffusion among the farmers. But no researchers conducted research on use of YouTube on innovative agricultural technology diffusion in Bangladesh. Considering the above facts the researcher deemed it a timely necessity to undertake the present study entitled "Use of YouTube for Diffusion of Innovative Agricultural Technologies: A Digital Self-Help Approach to the Farmers".

1.6 Assumptions of the Study

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

1. The respondents included in the sample were capable of furnishing proper responses to the questions of the interview schedule.
2. Views and opinions furnished by the respondents were the representative views and opinions of the whole population of the study.
3. The responses furnished by the respondents were reliable and they truly expressed their opinions on the influences of agricultural technology diffusion by using digital self-help approach (YouTube).
4. The data collected by the researcher were free from bias.
5. The researcher who acted as the interviewer was well adjusted to the social and cultural environment of the study area. Hence, the respondents furnished their correct opinions without any hesitation.
6. The respondents had almost similar background and seemed to be homogenous to a great extent.
7. The information sought by the researcher revealed the real situation to satisfy the objectives of the study.

1.7 Limitations of the Study

Considering the time, respondents, communication facilities and other necessary resources available to the researcher and to make the study manageable and meaningful, it became necessary to impose certain limitations as mentioned below

1) Population of the study was limited. Only 93 farmers were selected randomly as sample of the study.
2) The study was conducted in only Chattogram District.
3) For information about the study, the researcher depended on the data furnished by the selected respondents during their interview with him.
4) There were many characteristics of the farmers but in the study only 9 of them were selected in this study. This was done to complete the study within limited resources.
5) Facts and figures were collected by the investigator applied to the present situation in the selected area.

1.8 Definition of the Terms

Information and Communication Technology (ICT)

ICT stands for Information and Communication Technology. Information and communication technology (ICT) is the term used to describe the tools and the processes to access, retrieve, store, organize, manipulate, produce, present and exchange information by electronic and other automated means. This includes the Internet, mobile telephone, computer, satellite, Radio, Television, over cable or aerials, multimedia, poster, newspaper etc. In this study only eight selected technologies (i.e., Radio, Television, Simple cell phone, Smart cell phone, Online/offline agricultural apps, online news, Multimedia and Internet) have been taken into consideration.

Technology

A technology is a device being generated through the combination of knowledge, inputs and management practices, which are used together with productive resources to gain a desired output.

Digital self-help approach

Digital self-help approach means people of the community can solve their problems by using digital media and by themselves

YouTube

YouTube is an American online video sharing and social media platform owned by Google. It was launched on February 14, 2005, by Steve Chen, Chad Hurley, and Jawed Karim. It is the second most visited website, right after Google.

CHAPTER II

REVIEW OF LITERATURE

Researchers from different sectors teachers, students, started study on social media and its effects on different sector. No study till documented on social media especially digital self-help approach (YouTube) and its influence on Agricultural Technology Diffusion. The purpose of this Chapter is to review available literatures having relevance to the present study. Exhaustive efforts were made by the researcher to review the previous research works directly or indirectly related to the present study in home and abroad. The researcher has tried her best to collect needed information through searching relevant studies, journals and periodicals.

Social media platforms being used by farmers

In the agricultural sector, there is growing rate of social media usage amongst stakeholders. Sokoya *et al*. (2012) opined that there is climbing increase in the utilization of social media among agricultural researchers, professionals and others stakeholders in the agricultural sector. Social media have ensured quick delivery and response to information between the receiver and sender. An effective way of ensuring successful delivery and sustainability of a viable agricultural extension subsector. In the words of Mukhtar *et al.* (2015), social media has fostered a fast platform for information dissemination and interactive contact; rivaled by none in this time. The degree of social media penetration is obviously growing faster that imagined, couple with the level of technology advancements that continue to bring world at everyone's finger tips and make information accessible without having to go through hiccups of travelling and delays. Stanley (2013) expressed that it is staggering to believe that in little as two short decades, the evolution of the internet and social media has taken place right before our very eyes. Therefore, since extension deals with audience (farmers centrally) to effect positive social change social media present a great opportunity. Since the late 1990s, several different types of social media sites have been launched (Rupak *et al*. 2014). Through social media, users are able to interact, create, share, retrieve and exchange textual, pictorial and video information (Suchiradipta & Saravanan, 2016). In the agricultural sector, social media platforms are gaining acceptance with professionals using them to establish networks while farmers talk to peers and consumers (Jijina & Raju, 2016). The significance of social

media in the agricultural sector is in their ability to unite farmers, industry and consumers thus enabling realization of engagement, confidence, transparency and acceptability along the value chain (Sophie, 2013). Social media facilitates networking among peer farmers, and between farmer and industry, crisis communication as well as consumer engagement which are essential values of communication in the agricultural sector (Sophie, 2013). Generally, social media has attracted users in hundreds of millions world over who clearly appreciate the ensuing benefits leading to the intense and hyper usage shaped by users' positive attitude towards the technologies (Walther, 1996). The significance of social media at individual and society level in the recent past has triggered intense discussions on the subject matter in the academia world attracting a lot of research interests in many scientific disciplines (Khang *et al.* 2012). However, according to Rupak *et al.* (2014), some social media sites continue to exist and witness an impressive proportion of growth in terms of number of users and the quantity or volume of information exchanged while others have faltered and closed. Failure of many of these sites can be attributed to their inability to garner acceptance and popularity among the target users (Rupak *et al.* 2014).

Suchiradipta and Saravanan (2016) in their study on social media and delivery of agricultural extension services found that Facebook was the most popular platform followed by Twitter, Blogs, LinkedIn and Google+ descending order in receiving agricultural information. Kuria (2014) found that in Kenya, Facebook platforms like Mkulima Young have been connecting young Kenyan farmers with their consumers locally and internationally further giving them the opportunity to share experiences with their counterparts across the globe. Chang (2016) found that maximum number of farmers in Taiwan used Facebook in receiving agricultural information. Leonard *et al.* (2011) found that farmers and others used Facebook to communicate information in social movements related to agricultural issues.

Naruka *et al.* (2017) found that farmers perceive WhatsApp as a 'convenient' communication application, problem solving with audio-visuals, on-time, solution at the time of crisis in their agriculture activities. Thakur *et al*. (2017) found that maximum farmers in India used WhatsApp as an agricultural extension tool. Similar results also found by Kamani *et al.* (2016) in their perspective study. Thakur *et al*. (2016) found that maximum farmers in Himachal Pradesh sharing and receiving

livestock related information through WhatsApp. Balkrishna and Deshmukh (2017) found that most of the farmers used WhatsApp for agricultural marketing.

Cline (2011) respondents allocate a large portion of their time to social media sites for agricultural purposes and were participatory in 'agvocacy' process via social media. Respondents prefer twitter to gather and disseminate agricultural information. 'Agvocates' view twitter as not only a sharing place for agricultural news but also a sharing place for advice and opinions. Steel & Filipic (2013) found that Twitter is used by agricultural communicators belonging to the Association of Communication Excellence to post stories they have written, get story ideas, find sources, and follow hashtags.

Shultz (2010) found that Facebook and YouTube used by the agricultural communicators (farm broadcasters, agricultural editors, public relations professionals, and others. Gosh *et al.* (2021) found their study that farmers and extension agents mostly used Facebook and YouTube for agricultural purpose. Sebotsa *et al.* (2020) found that Facebook and WhatsApp as the top highly used social media platforms amongst the youth in agriculture in Njoro Sub-county. Latif and Iftikhar (2020) found that Facebook, YouTube are the most common site which is used by the farmers for receiving agricultural technology and information. Daigle *et al.* (2021) found in their study that women farmers used Facebook, YouTube to reach consumers, seek agricultural information, and maintain emotional connections with other farmers.

Rhoades & Aue (2010) found that few US agricultural communication organizations, such as National Association of Farm Broadcasting (NAFB) or Agricultural Communicators Network (AAEA), are using video services such as YouTube to reach new audiences. Bhattacharjee & Raj (2016) found that farming organizations and individual farmers have YouTube channels to create awareness about agriculture and sharing information about agricultural practices and businesses. Although traditional audiences favor printed media, dissemination of information is growing through video platforms such as YouTube. Videos provide increasing opportunities for message exposure to online audiences and even cable television services.

From the above review discussions, researcher might be concluded that those journal papers reflect different social media platforms used by the farmers and their purposes of use. Unfortunately researcher never found any specific paper on digital self-help

approach (YouTube) which is used by the farmers for agricultural technology diffusion.

Influence of demographic characteristics on social media familiarity and usage

While a number of factors could be attributed to technology adoption, numerous studies investigating acceptance and use of social media platforms have given importance to the influence of demographic variables such as age, gender, education and experience on user decisions (Lubua & Pretorius, 2018).

Fundamentally, users belonging to different age brackets are obviously likely to have varied perceptions on social media based on their needs and exposure. A study by Suchiradipta and Saravanan (2016) found that a growing number of young people using the social media platforms for receiving agricultural information. Bhargava (2015) also found the similar result in India. He found that older men in the rural areas used a lower percent of social media for receiving agricultural information. Similar result found by Bolarinwa (2015) in his respective study. Contradictory results were found by Joshi & Dhaliwal (2019). They showed that middle age farmers group utilized social media for agriculture such as new varieties, trainings etc. Chhachhar & Hassan (2013) found that older uses social media in learning a new technology compared to younger ones. Similar results also observed by Kuria (2014) and Gosh *et al.* (2021) in their respective study. Khou and Suresh (2018) also found that middle age farmers are used social media for agricultural marketing.

Gender on the other hand is an important variable in adoption of innovations. In the African context, gender is broadly categorized into male and female. Since to some extent gender difference brings about differences in societal responsibilities, this demographic factor is useful in defining how an individual values a new technology (Yonazi et al. 2012). In their study on social commerce in developing countries, Talat *et al.* (2013) observed that men were less reliant on facilitating conditions when learning new technologies compared to women. Contradictory results were found by Gosh *et al.* (2021). They found that men used social media for agricultural extension service than women.

Education of the respondent is another key demographic variable in acceptance and use of technologies (Tang & Wu, 2015). The authors further hold that more

knowledge makes it easier for a user to understand the expected benefits arising from using a new technology. Baker *et al.* (2007) had earlier identified a user's education level as an important factor in influencing ones behavior and attitude towards adoption of technology. Balkrishna and Deshmukh (2017) found that higher level of education helps to utilize social media for receiving agricultural technology. Similar results also observed by Joshi and Dhaliwal (2019) and Kuria (2014) in their respective study.

Farm size has contribution to change the livelihood status that was observed by the researcher review work. Gosh *et.al* (2021) observed that receiving agricultural technology by using social media was positively influenced by farm size. Contradictory results were found by Joshi & Dhaliwal (2019). They found that there was no relationship between farm size and the utilization of social media for receiving agricultural technology.

From the above review discussions, researcher might be concluded that those journal papers reflect the influence of demographic characteristics on use of social media. Unfortunately researcher never found any specific paper on use of digital self-help approach (YouTube) which influenced the farmers for receiving different agricultural technology.

2.3 Research gap

Above reviews represents that some of study have been conducted on the different social media Facebook, WhatsApp, YouTube, Instragram that's farmers used for innovative practices and information sharing. Most of the paper reflects the influences of social media (Facebook, WhatsApp, YouTube, Instragram) on innovative agricultural technology diffusion. Very few researches works on YouTube conducted in different countries but in Bangladesh there was no research work on using YouTube for agricultural technology diffusion. This was a research gap of the study. This paper was conducted for fulfill the gap of previous studies.

2.4 Conceptual framework of the Study

The present study attempts to focus on using digital self-help approach (YouTube) by the farmers and their selected characteristics. Use of digital self-help approach (YouTube) by an individual may be influenced and affected by different interacting forces and many characteristics that he possesses. It is not possible to deal with all the characteristics in a single study. A conceptual model of the study has been presented below in Fig. 2.1 showing relationship among the variables under study.

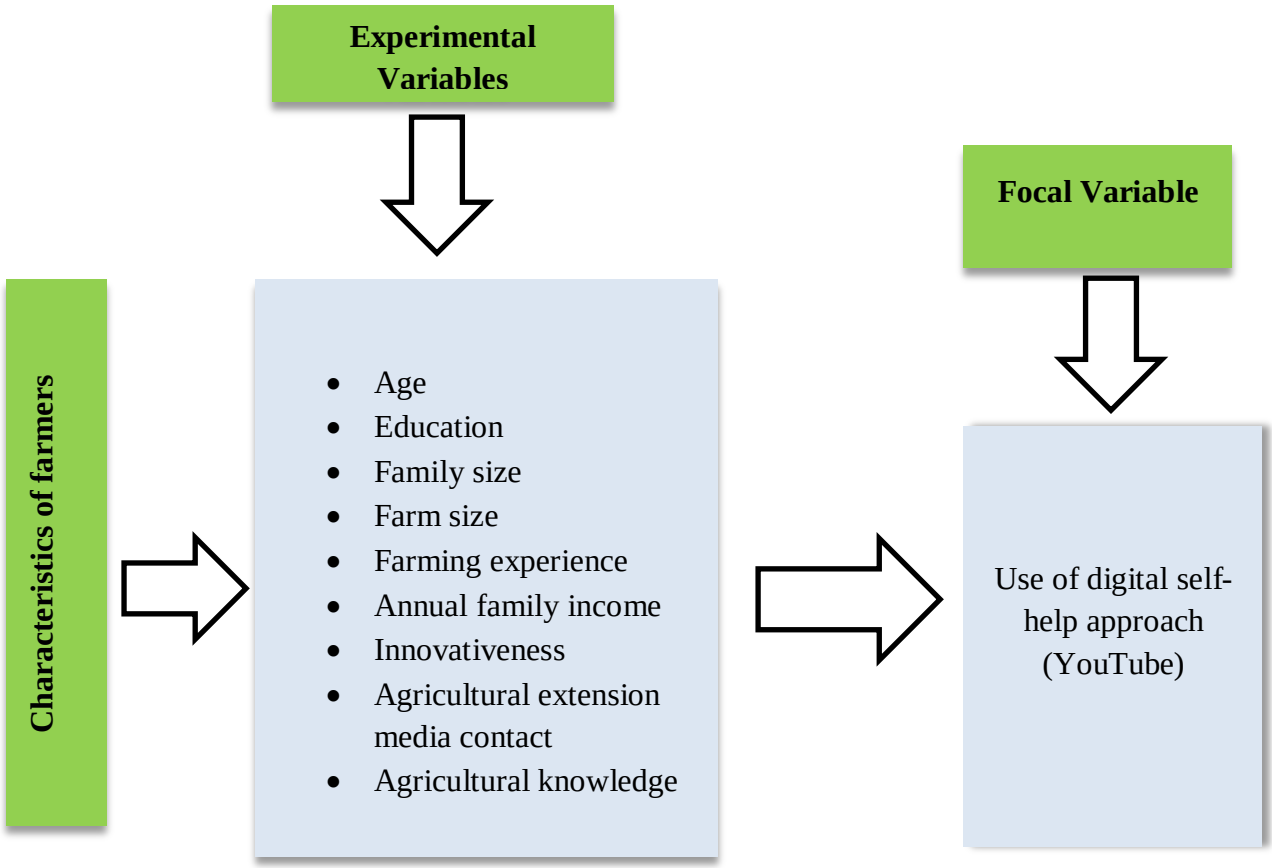

Figure 2.1 Conceptual framework of the study

CHAPTER III

MATERIALS AND METHODS

Methods play an important role in a scientific research. Methods and procedure should be such that enables the researcher to collect valid information and to analyze the same properly to arrive at correct decisions. To fulfil the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. This chapter of the thesis illustrates the research methods and procedures used to collect and analyse the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study e.g. selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements. A chronological description of the methods followed in conducting this research work has been presented in this chapter.

3.1 Local of the study

The study was conducted in Rangunia upazila of Chattogram district, where most of the people are engaged in farming activities. There were fifteen unions in Rangunia upazila and the present study was conducted in five selected villages of four unions namely ‘Pomra, Padua, Mariamnagar and Chandraghona’ based on the population size in each of the selected union. The area of Rangunia upazila is 347.72 sq km, located in between 22°18' and 22°37' north latitudes and in between 91°58' and 92°08' east longitudes. It is bounded by Chandanaish Upazila on the south; PatiyaUpazila, Boalkhali Upazila, Raozan Upazila & Kawkhali Upazila of Rangamati District on the west. Main sources of income are Agriculture 39.71,non-agricultural labourer 4.30%, industry 0.58%, commerce 16.24%, transport and communication 3.57%, service 12.31%, construction 1.03%, religious service 0.49%, rent and remittance 10.91% and others 10.86%.

The map of the Chattogram district has been presented in Figure 3.1 and the specific study locations of Rangunia upazila of Chattogram district have also been shown in Figure 3.2

Fig: 3.1 A Map of Chattogram district showing the location of Rangunia Upazila

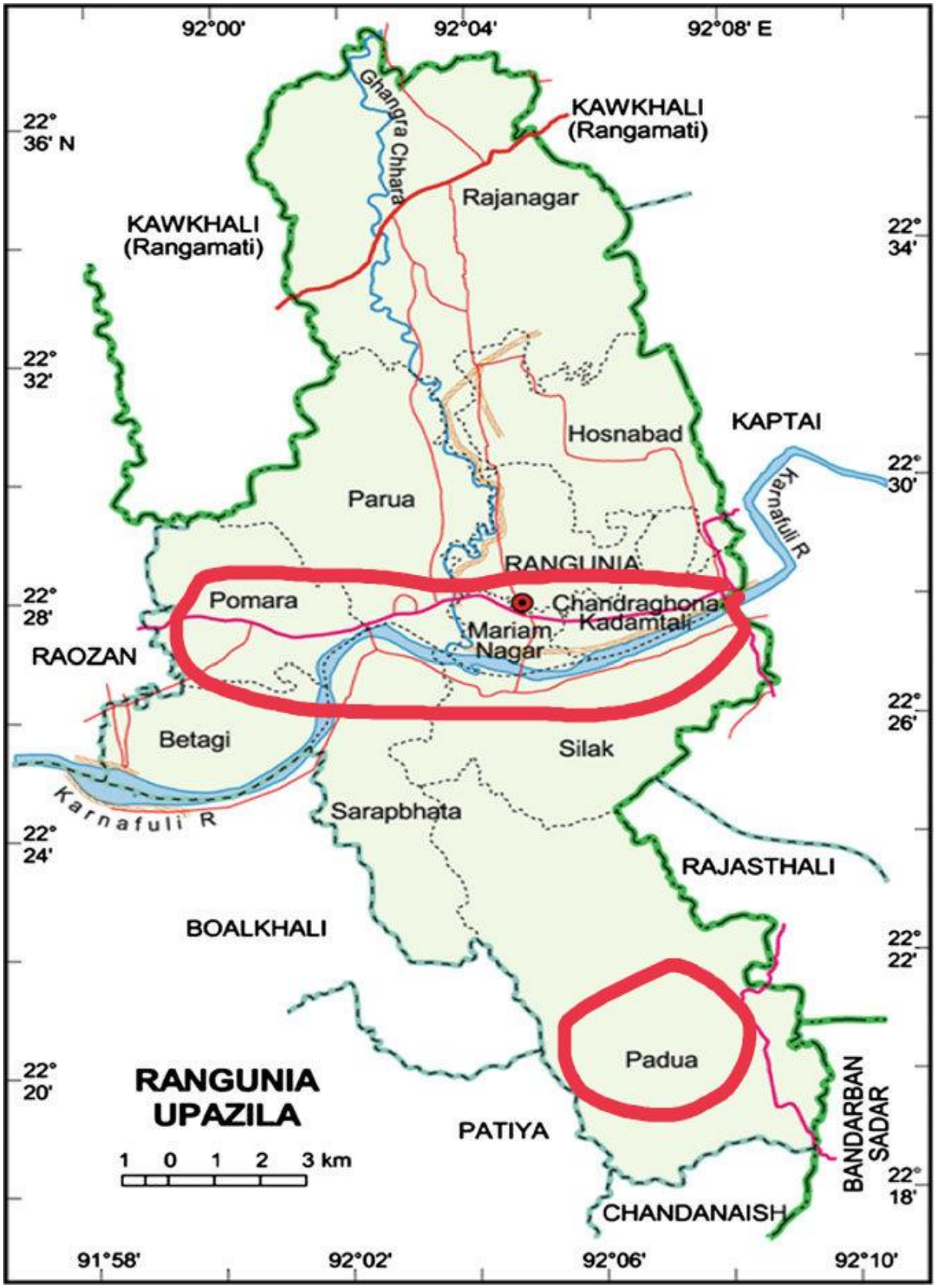

Fig: 3.2 A Map of Rangunia upazila showing the study area

3.2 Population and Sampling Design

People who engaged in farming activities and permanently reside in the selected villages constituted the active population of this study. Rangunia upazila under Chattogram district purposively selected for this research. However, random sampling technique followed for the village selection and stratified random sampling techniques followed for population selection. The total number of farmers in four unions were 3003; where 654 from Nazartila village, 566 from kadamtali village, 543 from Darikup village, 705 from Hilagazipara village, 535 from Mallikpara village under the Rangunia upazila which constituted the population of the study. A reserve list was maintained to fill in the gaps if any respondent in the original list was found missing as the same respondent in the interview period. Ten percent of the population was selected through proportionate random sampling procedure to include in the reserve list. Thus, 3003 farmers constituted population of study.

There are several methods for determining the sample size; here, the researcher used Yamane's (1967) formula for study group.

$$n = \frac{Z^2 P (1-P) N}{Z^2 P (1-P) + N (e^2)}$$

Where, n = Sample size;

N, Population size = 3003;

e, The level of precision = 10%;

z = the value of the standard normal variable given the chosen confidence level (e.g., z = 1.96 with a confidence level of 95 %) and

P, The proportion or degree of variability = 50%;

The sample size (n) is 93

According to Yamane's formula, the respondents comprised of 93 farmers. A reserve list of 10 farmers was also prepared so that the farmers of this list could be used for interview if the farmers included in the original sample were not available at the time of conduction of interview. The farmers of the villages were measured according to the proportionate of the total sample size (93) which was calculated using Yamane's (1967) formula. The distribution of the population, sample size along with the reserve list is given in the following Table 3.1

Table 3.1 Distribution of the farmers according to population and reserve list

Name of the selected upazila	Name of the selected union	Name of the selected villages	Number of the population	Sample size	Reserve list
Rangunia	Mariamnagar	Nazartila	654	20	2
	Chandroghona	Kadamtali	566	18	2
	Padua	Darikup	543	17	2
	Pomra	Hilagazipara	705	21	2
		Mallikbaripara	535	17	2
Total			3003	93	10

3.3 Research Instrument for Data Collection

In order to collect relevant information, a structured interview schedule was prepared considering the objectives of the study. The schedule was prepared in Bengali language for clear understanding of the respondents. The schedule obtained both closed and open form of questions. Questions were included in the schedule to collect data on the selected dependent and independent variables. Appropriate scales were developed to operationalize some selected characteristics of the farmers and the dependent variable. The interview schedule was pre-tested with ten farmers in actual field situation before finalizing the same for collection of data. Necessary corrections, modifications, alternations and rearrangements were made in the schedule based on the pre-test experience. The schedule was then cyclostyled in its final form for collection of data. An English version of the interview schedule has been presented in Appendix 1.

3.4 Selection of Variables

In a descriptive social research, selection and measurement of the variable is an important task. A variable is any characteristics which can assume varying or different values are successive individual's cases (Ezekiel and Fox, 1959). An organized research usually contains at least two identical elements i.e. independent and dependent variable. An independent variable is a factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is a factor, which appears, disappears or varies as the

experimenter introduces, removes or varies the independent variables (Townsend, 1953). In the scientific research, the selection and measurement of variables constitute a significant task. In this connection, the researcher reviewed literature to widen her understanding about the nature and scope of the variables relevant in this piece of research. She also discussed with departmental teachers and concerned researchers of the related fields. Ultimately selected nine characteristics of the respondents were selected as the independent variables and use of digital self-help approach (YouTube) was selected as dependent variable.

3.5 Measurement of independent variables

The independent variables of the study were age, education, family size, farm size, farming experience, annual family income, innovativeness, agricultural extension media contact and agricultural knowledge. The procedure followed in measuring the independent variables have been discussed in the subsequent sections.

3.5.1 Age

Age of a farmer referred to the period of time from his birth to the time of interview. It was measured in terms of actual years on the basis of his response to item no.1 of the interview schedule.

3.5.2 Education

Education was measured in terms of years of schooling completed by an individual in educational institutions. If a respondent did not know how to read and write, his literacy score was taken as zero (0). A score of 0.5 was given to that respondent who could sign his name only. Besides this, the respondent got a score of one (1) for his every year of schooling.

3.5.3 Family size

Family size of a farmer was determined by the total number of members in his family including him, children and other dependents. The scoring was made by the actual number of family members expressed by the farmers. For example, if a farmer had five members in his family, his score was given as 5. This variable appears in item number three (3) in the interview schedule as presented in Appendix-I.

3.5.4 Farm size

Farm size of a farmer referred to the total area of land on which his/her family carried out the farming operation, the area being in terms of full benefit to the family. The term refers to the cultivated area either owned by the farmer or cultivated on share cropping, lease or taking from other including homestead area and measured using the following formula (Rashid, 2014):

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

Where,

FS = Farm size

A = Homestead area

B = Own land under own cultivation

C = Land taken from others as borga

D = Land given to other as borga

E = Land taken from others on lease

The data was first recorded in terms of local measurement unit i.e. bigha, or decimal and then converted into hectare. The total area, thus, obtained is considered as his farm size score (assigning a score of one for each hectare of land). This variable appears in item number four (4) in the interview schedule as presented in Appendix-I. Based on their total farm size, the farmers were classified into five categories according to Department of Agricultural Extension (DAE, 1999).

3.5.5 Farming experience

In a measuring score of one (1) was assigned for each year of working experience of a respondent either in his own farm or to that of his parents. This variable appears in item number five (5) in the interview schedule as presented in Appendix-I.

3.5.6 Annual family income

Annual family income refers to the total financial return from different financial activities in one year. It was expressed in Taka. One score was given for 1000 taka. For an amount less than Tk.1000, a fraction score was computed and added with the main score. This variable appears in item number six (6) in the interview schedule as presented in Appendix-I.

3.5.7 Innovativeness

The term innovativeness referred to the degree to which an individual is relatively earlier in adopting new ideas than the other members of a social system (Rogers, 1983). Innovativeness of a respondent was measured on the basis of use of 6 improved agricultural practices.Score was assigned on the basis of earliness in use of a practice by a respondent. Five point scales was used for computing the innovativeness score as follows:

Adoption period	Score assigned
Within 1 year after hearing	4
Within 2 year after hearing	3
Within 3 year after hearing	2
Within 4 year after hearing	1
Never used	0

Finally, the innovativeness score of a respondent was obtained by adding the score for all 9 items. Thus, innovativeness score of a respondent could range 0 to 36, where 0 indicate no innovativeness and 36 maximum innovativeness.

3.5.8 Agricultural extension media contact

It was defined as one's extent of exposure to different communication media related to farming activities. Agricultural extension media contact of a farmer was measured by computing agricultural extension media contact score on the basis of their nature of contact with eight agricultural extension media. Each farmer was asked to indicate his nature of contact with four alternative responses, regularly, sometimes, rarely and not at all basis to each of the nine media and score of three, two, one and zero were assigned for those alternative responses respectively. These four options for each medium were defined specially to each medium considering the situation, rationality and result of pre-test. Logical frequencies were assigned for each of the four-alternative nature of contact. Agricultural extension media contact of the farmers was measured by adding the scores of seven selected source of information. Thus, agricultural extension media contact score of a farmer could range from 0 to 24, where zero indicated no agricultural extension media contact and twenty-four indicated highest level of agricultural extension media

contact. This variable appears in item number seven (7) in the interview schedule as presented in Appendix-I.

3.5.9 Agricultural knowledge

It referred to the knowledge gained by the farmers of different sources and also through their experiences of farming. The farmers were asked 18 questions on different aspects of agriculture. A score of two (2) was assigned for each question. Thus, the total score for all the 12 questions was 24. A respondent answering a question correctly obtained the full score of 2, while for wrong answer or no answer he could obtain zero (0) score. Partial score was assigned for partially correct answer. Thus the agricultural knowledge score of the respondents could range from 0-24, where 0 indicates very low knowledge and 24 indicates very high agricultural knowledge.

3.6 Measurement of dependent variables

Use of digital self-help approach (YouTube) for agricultural technology diffusion was the dependent variable of the study. It was measured on the basis of perception of the farmers regarding the use of digital self-help approach (YouTube) for the diffusion of agricultural technology to the farmers. The respondents assessed the effectiveness of information on the basis of extent of application in their real situation.

3.6.1 Use of digital self-help approach (YouTube)

Use of digital self-help approach (YouTube) by the farmers which influence on agricultural technology diffusion was measured through five point rating scale. The farmers were asked to indicate their extent of use of digital self-help approach (YouTube) by indicating “regularly,” “often,” “occasionally,” “rarely” or “never use.” A weight of 4, 3, 2, 1 and 0 was given for regularly, often, moderately, rarely and never use respectively. Thus, digital self-help approach (YouTube) use score of a farmer could vary for 0 to 4, where 0 indicated no use and 4 indicated very high use.

3.7 Measurement of the influence of using digital self-help approach (YouTube) on innovative agricultural technology diffusion

Influence of using YouTube on innovative agricultural technology diffusion was measured on the basis of opinions provided by the farmers in terms of their

availability of communication and their appropriateness in application. Four point rating scales namely highly influence, moderately influence, low influence and not influence was used to measure the extent of influence of using YouTube on innovative agricultural technology diffusion. A weight of 3, 2, 1 and 0 was given for highly, moderately, low and not influence respectively. Thus, the influence of using YouTube on agricultural technology diffusion score of a farmer could vary for 0 to 3, where 0 indicated not influence and 3 indicated highly influence.

3.8 Measurement of credibility of the digital self-help approach (YouTube)

The credibility of the YouTube programs on innovative agricultural technology diffusion was measured on the basis of opinion provided by the farmers regarding the extent of accuracy, simplicity, and effectiveness of information.

Five point rating scales namely high credibility, medium credibility, low credibility, very low credibility, and no credibility was used to measure the credibility of the digital self-help approach (YouTube).A weight of 4, 3, 2, 1 and 0 was given for high, medium, low, very low and no credibility respectively. Thus, the influence of using YouTube on agricultural technology diffusion score of a farmer could vary for 0 to 4, where 0 indicated no credibility and 4 indicated high credibility.

3.9 Problems confronted by the farmers in using YouTube

To find out problems confronted by the farmers in using YouTube, several consultation talks were hold with the relevant personnel. The score obtained from all the problems were added together to get the problems confrontation score for a respondent.

Problem confrontation scores were assigned in the following manner:

Categories	Score assigned
Very high	4
High	3
Moderate	2
Little	1
Not at all	0

Thus, problems confrontation score of a respondent could range from 0 to 24, while '0' indicating no problem and 24 indicating high problem. Again problems confrontation index was computed for each of the problems by using the following formula.

Problem Confrontation Index = Pvh x 4 + Ph x 3 + Pm x 2 + Pl x 1+ Pn x0

Where,

Pvh= Total number of the farmers expressed ' very high' problem

Ph = Total number of the farmers expressed 'high' problem

Pm= Total number of the farmers expressed 'medium' problem

Pl=Total number of the farmers expressed 'low' problem

Pn=Total number of the farmers expressed'not at all' problem

Thus, Problem Confrontation Index (PCI) of any problem could range from 0 to 372, while 0 indicating nobody faced the problem and 372 indicating everybody faced the problem in high degree.

3.10 Statistical analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Sciences) computer program, version 22. Statistical measures as a number, range, mean, standard deviation were used in describing the variables whenever applicable. Data were coded, tabulated, compiled, and analyzed according to the objectives of the study. The farmers' extent of use of digital self-help approach (YouTube) was considered as the outcome variable to develop an Ordinary Least Squares (OLS) model to identify related explanatory variables and predict their level of contribution towards innovative agricultural technology diffusion. Five percent (0.05) level of significance was used as the basis for rejecting any null hypothesis.

3.11 Statement of hypothesis

According to Kerlinger (1973), a hypothesis is a conjectural statement of the relation between 2 or more variables. Hypothesis are always in declarative sentence form and they relate either generally of specifically variables to sentence form and they relate

either generally or specifically variables to variables. Hypothesis may be broadly divided into two categories, namely, research hypothesis and null hypothesis.

3.12 Research hypothesis

Each of the 9 selected characteristics (age, education, family size, effective farm size, farming experience, annual family income, innovativeness, agricultural extension media contact, and agricultural knowledge of the respondents) has significant contribution to the use of digital self-help approach (YouTube) on agricultural technology diffusion.

3.13 Null hypothesis

A null hypothesis states that there was no contribution to the concerned variables. The following null hypothesis was undertaken for the present study: “There was no contribution of the selected characteristics of the farmers to their use of digital self-help approach (YouTube) on agricultural technology diffusion.” The selected characteristics were age, level of education, family size, effective farm size, farming experience, annual family income, innovativeness, agricultural extension media contact, agricultural knowledge.

CHAPTER IV

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion was made of the findings with probable justifiable and relevant interpretation under this chapter.

4.1.1 Age

Age of the farmers ranged from 20 to 75 years with a mean of 45.16 years and standard deviation of 9.21. Data furnished in the table 4.1 shows that the middle-aged respondent's group was higher than old aged and young aged group. Based on the available information cited by the farmers, they were classified into three categories (MoYS, 2012).

Table 4.1: Distribution of the farmers according to their age

Categories	Basis of categorization (years)	Observed range (years)	Farmers		Mean	SD
			Number	Percent		
Young age	≤ 35	20-75	29	31.2	45.16	9.21
Middle age	36-50		**35**	**37.6**		
Old age	> 50		29	31.2		
Total			93	100		

It was found that 37.6 percent of the respondents were middle-aged, 31.2 percent of the respondents were old and rest 31.2 percent were young. It might be due to middle age farmers have sound knowledge of using YouTube. Similar results observed by Latif, Iftikhar & Shahzadi (2020) in their study area where middle aged respondents group was higher than old and young aged group. Ghosh, *et al.* (2021) indicates highest proportion (46.7 percent) of the respondents fell in the middle age category. Balkrishna & Deshmukh (2017) found that middle age farmers group was higher than young and old aged farmers group. Kuria (2014) indicates highest proportion (28.6%) of the respondents fell in the middle age category. It may be concluded that middle aged respondents were increased in study areas because they have sound knowledge on using YouTube.

4.1.2 Education

The level of education of the respondents ranged from 0.5 to 17, the average being 6.71 with a standard deviation of 5.07. Results showed that highest number of the respondents had in secondary education level where lowest number of the respondents had illiterate. Reza (2007) based on the level of education of the respondent were classified as illiterate, can sign only, primary education, secondary education and higher secondary education.

Table 4.2: Distribution of the farmers according to their education

Categories	Basis of categorization (Score)	Observed range (Score)	Farmers		Mean	SD
			Number	Percent		
Illiterate	0	0.5-17	0	0	6.71	5.07
Can sign only	0.5		26	28		
Primary education	1-5		14	15.1		
Secondary education	6-10		**33**	**35.5**		
Higher secondary education	>10		20	21.5		
Total			93	100		

It might be due to most of the farmers in the study area are conscious about the education. Similar results observed by Balkrishna & Deshmukh (2017) found that highest number of respondent were in primary and secondary level. Kuria (2014) found that majority 44.2% of respondents had secondary level, followed by 24.7% diploma level. But contradictory result was observed by Ghosh, *et. al*. (2021) where highest number of the respondent were illiterate (53.3%). From the above discussion, researcher might be concluded that in the study areas respondents were moderately conscious of education so no illiterate farmers were found.

4.1.3 Family size

Data presented in the Table 4.3 show that the respondents having medium sized family were higher than the respondents having small and large sized family respectively. Family size of the respondents ranged from 2 to 17 members, having an

average of 6.06 and standard deviation 2.46. Based on the family size score the respondents were classified into three categories namely 'small family', 'medium family', and 'large family' by Kisar (2018). Researcher may be included this category for categoring the family size.

Table 4.3: Distribution of the farmers according to their family size

Categories	Basis of Categorization (years)	Observed range (Score)	Farmers		Mean	SD
			Number	Percent		
Small family	≤ 3	2-17	5	5.4	6.06	2.46
Medium family	4-6		**76**	**81.7**		
Large family	> 6		12	12.9		
Total			93	100		

Table 4.3 indicated that 81.7 percent of the farmers had medium family size, while 5.4 percent of the farmers were small family and 12.9 percent had large family size. It might be due to the prevalence of joint family system in the study area. Joshi et al. (2019) found that majority (88%) had medium family. The family size is bigger than the national average might be due to laggardness of size control process and lack of enjoyment facilities in their daily life. From the above discussion it may be concluded that medium family size family is present in the study areas because they are not eager to use the family planning process and they have no idea of better enjoyment facilities of life which will be possible by their consciousness of family size control progress.

4.1.4 Farm size

The effective farm size of the farmers ranged from 0.06ha to 3.63ha with a mean and standard deviation of 0.82 and 0.77 respectively. Based on their farm size, the farmers were classified into five categories following the categorization according to DAE.

Table 4.4: Distribution of the farmers according to their farm size

Categories	Basis of categorization (ha.)	Observed range (ha.)	Farmers		Mean	SD
			Number	Percent		
Landless	(≤.02)	0.06-3.63	0	0	0.82	0.77
Marginal	(0.021-0.20)		11	11.8		
Small	(0.21-1.00)		**58**	**62.4**		
Medium	(1.01-3.0)		20	21.5		
Large	(>3)		4	4.3		
Total			93	100		

Table 4.4 indicates that small farm holder constituted the highest proportion (62.4 percent) followed by medium farm holder (21.5 percent). The findings of the study reveal that majority of the farmers were small to medium sized farm holder. It might be due to their farm land was not affected by river erosion in that areas. Ghosh, et al. (2021) found that highest proportion (38.3%) small farm holder followed by marginal farm holder (31.7%). Small farm size was found higher amount might be due to their farm land was affected by river erosion in that areas.

4.1.5 Annual family income

Data presented in the Fig 4.1 shows that the respondents having medium annual family income were higher than the respondents of low and high annual family income respectively. On the basis of observed range, the respondents were classified into three categories namely “low income”, “medium income”, and “high income” as shown on the Fig 4.1. This category was conducted by Poddar (2015).

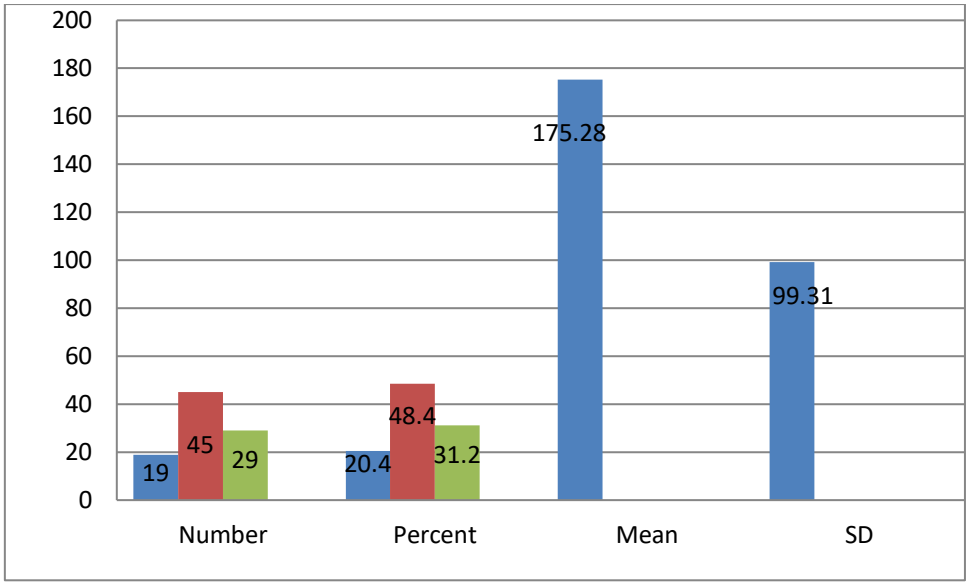

Fig 4.1 Distribution of the farmers according to their annual family income

In this figure presented that 48.4 percent respondent had medium income, 20.4 percent had low income and 31.2 had high income. The averages of income of the respondents were 175.28 and standard deviation of 99.31. Joshi *et al.* (2019) found that majority (38%) of the farmers had medium annual income. From the above discussion, it seems that most of respondents were from in medium income group. It might be added that they were involved in various activities such as dairy farm, labor, service and business.

4.1.6 Farming experience

Farming experience scores of the respondents computed as how many years of involving farming practices. Data presented in the Table 4.5 amplify that the highest percent of the respondents having medium farming experience researcher followed the Mean ± SD for categoring the farming experience of the respondents.

Table 4.5: Distribution of the farmers according to their farming experience

Categories	Basis of categorization (no. of years)	Observed range (no. of years)	Farmers		Mean	SD
			Number	Percent		
Low experience	≤9 (Mean ± 1SD)	2-50	15	16.1	22.13	12.66
Medium experience	10-34 (Mean ± 1SD)		**61**	**65.6**		
High experience	> 34 (Mean ± 1SD)		17	18.3		
Total			93	100		

Information furnished in the Table 4.5 amplifies that 65.6 percent respondents had medium experience while 18.3 percent respondents had 35 years or more farming experiences. Only 16.1 percent of the farmers had very few years of farming experience. Khou et. al. (2018) found that 46 per cent of the farmers have experience in farming for ten to fifteen years followed by 28 per cent have fifteen or more years. Agriculture is a complex business. Therefore, one needs multiple information to take correct decision. One acquires practical knowledge only after a long experience for judicial using the information sources. Moreover, the farming experience of an individual helps him to learn new technologies and may lead him to take correct decisions. From the above discussion it might be concluded that medium farming experience is present in the study areas because most of the farmers are young and middle age.

4.1.7 Innovativeness

Data presented in the Table 4.6 amplify that the highest percent of the respondents having medium innovativeness researcher followed the Mean ± SD for categoring the innovativeness of the respondents.

Table 4.6: Distribution of the farmers according to their innovativeness

Categories	Basis of categorization (Score)	Observed range (Score)	Farmers		Mean	SD
			Number	Percent		
Low innovativeness	≤19 (Mean± 1SD)	13-31	16	17.2	23	3.67
Medium innovativeness	20-26 (Mean ± SD)		**55**	**59.1**		
High innovativeness	> 26 (Mean± 1SD)		22	23.7		
Total			93	100		

On the basis of the innovativeness of the farmers, they were classified into three categories where 17.2 percent were low, 59.1 percent were medium and, 23.7 percent were high having an average of 23 and standard deviation 3.67. It might be due to most of the farmers were educated up to secondary level that's why they adopted any innovation quickly than others. Ćirić, *et al.* (2018) found that highest level of farmer innovativeness used YouTube for agricultural purpose. The farmers with low innovativeness opined that they received agricultural information from their peer groups, while the others used interpersonal, group discussion, social media, and mass media sources of information for getting agricultural information. These results would help the extension planners to chalk out future extension program for transfer of new ideas to the potential farmers. It seems that the medium innovativeness shows that most of the respondents have secondary education and their basic knowledge helps to develop their eagerness towards new innovation.

4.1.8 Agricultural extension media contact

Data presented in the Fig 4.2 amplify that the highest percent of the respondents having medium media contract researcher followed the Mean ± SD for categoring the agricultural extension media contract of the respondents.

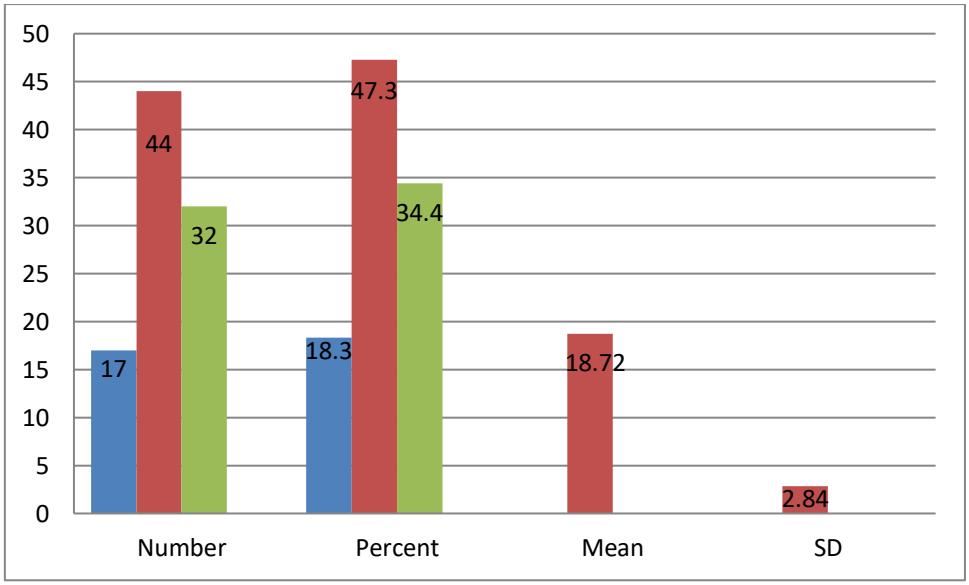

Fig 4.2: Distribution of the farmers according to their agricultural extension media contact

On the basis of the agricultural extension media contract of the farmers, they were classified into three categories where 18.3 percent were low, 47.3 percent were medium and, 34.4 percent were high having an average of 18.72 and standard deviation 2.54. From this Figure, it might be due to extension agent or media of the study area were available to the farmers. The finding was interesting but logical because in general the farmers in the rural areas of Bangladesh are less cosmopolite in nature and less exposed to different information sources. Finding revealed that 18.3 percent of the farmers had low agricultural extension media contact which demands for strengthening and improving the communication strategy. Low agricultural extension media contact might be the reason that some respondent may think that they have enough knowledge about farming activities. Agricultural extension media contact pertains to ones contact with multifarious sources of farming knowledge and information. It reveals that most of the respondents have secondary education so their communication eagerness is also developed.

4.1.9 Agricultural knowledge

Agricultural knowledge scores of the farmers ranged from 14 to 23 against possible score of 0 to 24. The average score and standard deviation were 20.03 and 2.08 respectively. Based on the agricultural knowledge scores, the farmers were classified

into three categories namely poor, moderate and sound agricultural knowledge as shown in Table 4.7

Table 4.7: Distribution of farmers according to their agricultural knowledge

Categories	Basis of categorization (Score)	Observed range (Score)	Farmers		Mean	SD
			Number	Percent		
Poor knowledge	≤17 (Mean± 1SD)	14-23	12	12.9	20.03	2.08
Medium knowledge	18-22 (Mean ± SD)		**73**	**78.5**		
Sound knowledge	> 22 (Mean± 1SD)		8	8.6		
Total			93	100		

Table 4.7 reveals that 78.5 percent of the farmers had moderate agricultural knowledge, 12.9 percent had poor knowledge and the lowest 8.6 percent had sound agricultural knowledge. It might be due to information and communication technologies help to increase knowledge. The majority of the respondents have secondary education therefore, their agricultural knowledge is also developed.

4.2. Use of digital self-help approach (YouTube)

Data presented in the Table 4.8 indicate that the highest percent of the respondents having medium uses researcher followed the Mean ± SD for categoring the extent of use of digital self-help approach (YouTube) of the respondents.

Table 4.8: Distribution of farmers according to their use of digital self-help approach (YouTube)

Categories	Basis of categorization (Score)	Observed range (Score)	Farmers		Mean	SD
			Number	Percent		
Low use	≤18 (Mean ± 1SD)	13-39	15	16.1	25.69	6.05
Medium use	19-31 (Mean ± SD)		**62**	**66.7**		
High use	> 31 (Mean ± 1SD)		16	17.2		
Total			93	100		

On the basis of the uses of digital self-help approach (YouTube) of the respondents, they were classified into three categories where 16.1 percent had low, 66.7 percent had medium and, 17.2 percent had high use of YouTube with an average of 25.69 and standard deviation 6.05. It might be due farmers are advanced in digital self-help approach (YouTube) for receiving agricultural information. Sebotsa, *et al.* (2020) found that the least platform YouTube used (8.7%) by the respondents. It seems that most of the respondents have secondary education and their basic knowledge helps to develop their eagerness towards using digital self-help approach (YouTube) for agricultural purpose.

4.3.1 Influence of digital self-help approach (YouTube) on diffusion of innovative agricultural technologies as perceived by the farmers

Data presented in the Table 4.9 amplify that the highest percent of the farmers opined the digital self-help approach (YouTube) as a medium influence researcher followed the Mean ± SD formula for categoring the influence on digital self-help approach (YouTube) perceived by the respondents**.**

Table 4.9: Distribution of farmers according to their opinion on influence on digital self-help approach (YouTube)

Categories	Basis of categorization (Score)	Observed range (Score)	Farmers		Mean	SD
			Number	Percent		
Not influence	0	0-3	2	2.2	2.13	0.79
Low influence	1		18	19.4		
Moderately influence	2		**39**	**41.9**		
Highly influence	3		34	36.6		
Total			93	100		

On the basis of the influence on digital self-help approach (YouTube) of the respondents, they were classified into four categories where 2.2 percent had not influence, 19.4 percent had low, 41.9 percent had moderate and, 36.6 percent had high influence on YouTube with an average of 2.13 and standard deviation 0.79. It might be due to the farmers have positive attitude towards the information that they get from digital self-help approach (YouTube). Latif, Iftikhar & Shahzadi (2020) in their study area found that 86% of the respondents were medium influenced by using social media (Facebook, YouTube). Highest numbers of farmers were moderately influenced on digital self-help approach (YouTube) might be due to farmers get good benefit by using digital self-helf approach (YouTube).

4.3.2 Credibility of digital self-help approach (YouTube) perceived by the farmers

Data presented in the Table 4.10 indicate that the highest percent of the farmers opined the digital self-help approach (YouTube) as a medium to high credible for getting information. Researcher followed the Mean ± SD for categoring the credibility of digital self-help approach (YouTube) perceived by the respondents. It seems that the farmers have maintained better contact with digital self-help approach (YouTube) for getting agricultural information and may be they have got good results by using digital self-help approach (YouTube).

Table 4.10: Distribution of farmers according to their opinion on credibility of digital self-help approach (YouTube)

Categories	Basis of categorization (Score)	Observed range (Score)	Farmers		Mean	SD
			Number	Percent		
No credibility	0	0-4	0	0	3.16	0.87
Very low credibility	1		2	2.2		
Low credibility	2		23	24.7		
Medium credibility	3		26	28		
High credibility	4		**42**	**45.2**		
Total			93	100		

Latif, Iftikhar & Shahzadi (2020) in their study area found that mostly farmers (86%) trusted the agricultural technology and information from social media (Facebook, YouTube) and very few farmers did not trust regarding the agricultural technology and information. Agricultural information has recently been considered to be an important production input by the fanners like other inputs of agricultural production. In fact, judicious use of agricultural information can improve the quality of decision making ability of the farmers by changing their knowledge, skills and behavior in one hand, and can increasing farm output on the other. The information supplied by the YouTube media along with its utilization by the farmers is also equally important for increasing farm productivity. From the above results discussion that most of the respondents have get good benefit by using digital self-help approach (YouTube) for agricultural purpose so credibility of digital self-help approach (YouTube) is also developed.

4.4 Contribution of the selected characteristics of the farmers to their use of digital self-help approach (YouTube)

For this study nine characteristics of the respondents were selected and each of the characteristics was treated as independent variable. The final null hypothesis: There is no contribution of the selected characteristics (age, level of education, family size, effective farm size, farming experience, annual family income, innovativeness, agricultural extension media contact and agricultural knowledge.

Table 4.11: Multiple regressions showing the contribution of the selected characteristics of the farmers' to their use of digital self-help approach (YouTube)

Dependent Variable	Independent variables	*B*	SE *B*	β	*T*	Sig. *T*	R^2	Adj. R^2	F	*P*
Use of Digital Self-Help Approach (YouTube)	Age	-.04	.041	-.11	-1.17	.245	0.67	0.64	19.52	0.00
	Level of education	.043	.085	.036	.510	.612				
	Family size	-.08	.164	-.03	-.495	.622				
	Effective farm size	1.12	.570	.145	1.97	.052*				
	Farming experience	.102	.050	.214	2.06	.042*				
	Annual family income	.017	.005	.282	3.23	.002**				
	Innovativeness	.540	.150	.328	3.60	.001**				
	Agricultural extension media contact	.434	.210	.204	2.06	.042*				
	Agricultural knowledge	.626	.315	.216	1.98	.050*				

** Significant at .000 -.009 (1% level) * Significant at .010 -.049 (5% level)

It was observed that out of 9 variables only 6 independent variables namely effective farm size, farming experience, annual family income, innovativeness, agricultural extension media contact, agricultural knowledge were entered into the regression equation which contribute the farmers agricultural technology diffusion. The regression model shows that annual family income (0.002) and innovativeness (0.001) was the most contributing factors significant at a 1 % level. Otherwise, effective farm size (0.052), farming experience (.042), agricultural extension media contact (0.042) and agricultural knowledge (0.050) were the second contributing factors which were

significant at 5% level. The multiple adjusted R^2 values and R^2 value were found 0.64 and 0.67 and the corresponding F value was 19.52 which were significant at 0.000 levels. In order to estimate the farmers of using digital self-help approach (YouTube) for agricultural technology diffusion, the multiple regression analysis was used which is shown in a Table 4.11. Joshi (2019) revealed that there was a significant contribution of respondent's age and education on the utilization of YouTube for agriculture (significant at the 1% level of significance). Sebotsa, *et al.* (2020) found that the level of utilizing YouTube was not statistically significant (p=0.226) at a 5% level of significance. Therefore, the null hypothesis was accepted and the conclusion made that there was no statistically significant effect on the level of utilization of YouTube on youth participation in agriculture. From the above review, researcher may be concluded that multiple regression is a general and flexible statistical method for analyzing associations between two or more independent variables and a single independent variable. The process of performing a regression allows us to confidently determine which factors matter most, which factors can be ignored, and how these factors influence each other.

Usually, farmers are open to innovations if they can be understood through direct demonstration by a credible source like digital self-help approach (YouTube). Self-help programs could be offered by developing each farmer's technical knowledge through seeing many programs in YouTube. These programs have the potential to empower farmers through the provision of knowledge, skill, motivation and competencies that strengthen sustainable agriculture. This approach is suitable for Bangladeshi farmers because there is a shortage of extension personnel for support services. But the farmers in Bangladesh are facing different problem by using Youtube. Two initiatives could be considered to increase the extent of use of YouTube to uplift the agricultural technology diffusion among the farmers: 1) the government should take more initiatives through giving the facility of ICT media among the farmers. It is essential to take necessary steps to give the facilities to enlighten the ignorance farmers by giving them the knowledge about ICT media. 2) The government bank should give loan in easy terms to those farmers whose farm size was small in size and the farmers who doesn't have smart phone. 3) Agriculture extension office should arrange need based training courses so that farmers versus. If these policies should be maintained, researcher seems that diffusion of agricultural

technology rapidly happened among the farmers and farmers easily solve their own problem by using YouTube which would be changed in a locality of Bangladesh.

4.5. Problems confronted by the farmers in using digital self-help approach (YouTube)

Problems confrontation of the farmers in using digital self-help approach (YouTube) was investigated in this piece of research. Six problems were selected with the consultation of concerned personnel. In order to ascertain the extent of severity of problem confronted by the farmers in using digital self-help approach (YouTube), Problem Confrontation Index (PIC) was computed. The PCI of any problem could range from 0 to 372, where 0 indicated no problem and 372 indicated high problem. However, the Computed Problem Confrontation Index of the 6 problems ranged from 113 to 279 and has been arranged in rank order according to their problem indices which appears in Table 4.12

Table 4.12: Ranking of the problems confronted by the farmers in using digital self-help approach (YouTube)

SL. No.	Problems	Frequency of extent of problems confrontation (N=93)						
		VH	H	M	L	N	PCI	Rank
1	Lack of cooperation from SAAO	0	3	39	26	25	113	6
2	Unavailability of network	1	4	45	37	6	143	4
3	High price of internet package	26	44	20	3	0	279	1
4	Unavailability of smart phone	26	25	24	13	5	240	2
5	Ignorance of using smart phone	18	23	33	14	5	221	3
6	Lack of accessibility of internet	0	9	28	54	2	137	5

Abbreviations:

VH = Very High

H = High

M = Moderate

L = Little

N = Not at all

PCI = Problem Confrontation Index

Data contained in Table indicate that the farmers confronted highest problem in “high price of internet package” as indicated by its PCI of 279. This is the main problem of the farmers in using YouTube. The second and third problems confronted by them are “unavailability of smart phone” and “ignorance of using smart phone” respectively. In this way comparatively less problem confronted by the farmers is “criticize to other farmers for using YouTube” that means it is not a serious problem for the farmers in using YouTube. Khou *et al.* (2018) in their study found that most of the farmers indicated the first problem of using digital self-help approach (YouTube) is weak data and networks and the second problem is insufficient in training and education of using digital self-help approach (YouTube).

From the above discussion, it seems that government should take necessary steps to reduce the high cost of internet and give the facilities to enlighten the ignorance farmers by giving them the knowledge about ICT media .The government bank should give loan in easy terms to those farmers whose farm size was small in size and the farmers who doesn’t have smart phone.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This Chapter presents summary of major findings, conclusion and recommendation of the study.

5.1 Summary of Findings

Selected characteristics of the farmers

The major findings of the study are summarized below:

Age

Age of the farmers ranged from 20-75 years with the average of 45.16 years and the standard deviation was 9.21. Highest proportion (37.6 percent) of the farmers was under middle aged category.

Education

Education score of the respondents ranged from 0.5-17 with the average of 6.71and the standard deviation was 5.07. Highest proportion (35.5 percent) of the farmers was under secondary education.

Family size

Above the most (81.7%) of the respondent had medium family size compare to 5.4 % and 12.9% had small and large family size respectively.

Farm size

The small farm size constituted the highest proportion (62.4%), whereas 21.5% and 4.3% had medium and large farm size.

Farming experience

Farming experience score of the farmers ranged from 2-50, with an average 22.13. The highest proportion had medium farming experience is 65.6%, while 16.1% had low farming experience and 18.3% had high farming experience.

Annual family income

The highest proportion (48.4 %) of the respondents had medium annual income, while 31.2% percent had low income and 20.4 percent had high income.

Agricultural extension media contacts

The highest proportion (47.3%) of the respondents had medium extension media contact as compared to (18.3%) and (34.4 %) having low and high extension media contact respectively.

Innovativeness

Medium innovativeness constituted the highest proportion (59.1%) as compared to low (17.2%) and high (23.7%) respectively

Agricultural knowledge

The highest proportion (78.5%) of the respondents had moderate knowledge on agriculture while (12.9) %) had poor knowledge and (8.6%) of the farmers had good knowledge on agriculture respectively.

Use of digital self-help approach (YouTube)

Use of digital self-help approach (YouTube) by the respondents varied from 13-39 with a mean of 25.69 and standard deviation 6.05. Possible digital self-help approach (YouTube) using scores of the respondents ranged from 40-0. Majority 66.7 percent of total respondents had medium use of digital self-help approach (YouTube) in receiving innovative agricultural technologies compared to 16.1 percent and 17.2 percent having low and high use of digital self-help approach (YouTube) in receiving innovative agricultural technologies.

Influence of digital self-help approach (YouTube) on diffusion of innovative agricultural technologies as perceived by the farmers

Scores of the respondents ranged from 0-3 with a mean of 2.13 and standard deviation 0.79. Majority 41.9 percent of total respondents had moderately influence on innovative agricultural technology diffusion by use of digital self-help approach (YouTube) compared to 19.4 percent and 36.6 percent having low and high influence on innovative agricultural technology diffusion by use of digital self-help approach (YouTube)

Credibility of digital self-help approach (YouTube) perceived by the farmers

It was found that 45.2 percent had high credible, 28 percent had medium credible and 24.7 percent had low credible of digital self-help approach (YouTube) in receiving innovative agricultural technology.

Contribution of the selected characteristics of the farmers to their use of digital self-help approach (YouTube)

There was a significant contribution of the farmers' annual family income (0.002) and innovativeness (0.001) were the most contributing factors significant at a 1 % level for the innovative agricultural technology diffusion by the use of digital self-help approach (YouTube). There was a significant contribution of effective farm size (0.052), farming experience (.042), agricultural extension media contact (0.042) and agricultural knowledge (0.050) was the second contributing factors which was significant at 5% level for the innovative agricultural technology diffusion by the use of digital self-help approach (YouTube).

Problems confronted by the farmers in using digital self-help approach (YouTube)

The farmers expressed some problems as barriers for their use of digital self-help approach (YouTube) as receiving innovative agricultural technologies. An attempt was made to identify the problem of the farmers using digital self-help approach (YouTube) as receiving innovative agricultural technologies. As many as 6 problems were mentioned by the farmers of the study area. The problems were ranked in a decreasing order of Problem Confrontation Index (PCI) which ranged from 113 to 279 against the possible range of 0 to 372.

The problems are presented below descending order based on Problem Confrontation Index (PCI):

- High price of internet package
- Unavailability of smart phone
- Ignorance of using smart phone
- Unavailability of network
- Lack of accessibility of internet
- Lack of cooperation from SAAO

5.2 Conclusions

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

- The use of digital self-help approach (YouTube) is satisfactory as most (83.9%) of the respondents belonged to medium to high use category.
- Most (78.5%) of the respondents were moderate to highly influenced by innovative technologies broadcasted through YouTube channel.
- Most (73.2%) of the respondents opinioned that YouTube is a moderately to highly credible self-help approach for the innovative agricultural technologies diffusion.
- Farm size, annual family income, innovativeness, agricultural extension media contact, agricultural knowledge had positive and significant relationship with their use of digital self-help approach (YouTube).
- The farmers faced 6 problems different extend any 6 identified problems; high price of internet package was very highly sever problem while the least problem was lack of cooperation from SAAO was addressed by the respondent.

5.3 Recommendations

5.3.1 Recommendations for policy implications

On the basis of the findings and conclusion of the research some recommendations have been formulated. These are following-

I. To increase their knowledge on agriculture, digital self-help (YouTube) usage should be increased.

II. Extension agent or change agent should take care of increasing the innovation level of the farmers in the study area.

III. The government bank should give loan in easy terms to those farmers whose farm size was small in size and the farmers who doesn't have smart phone.

IV. Government should take necessary steps to reduce the high cost of internet and give the facilities to enlighten the ignorance farmers by giving them the knowledge about ICT media

5.3.2 Recommendations for further study

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

I. The present study was conducted in Rangunia Upazila under Chattogram district. It is recommended that similar studies should be conducted in other areas of Bangladesh

II. This study investigated the contribution of 9 characteristics of the farmers with the use of digital self-help approach (YouTube) influences on innovative agricultural technology diffusion. Therefore, it is recommended that further study should be conducted with other characteristics of their use of digital self-help approach (YouTube) influences on innovative agricultural technology diffusion.

III. The present study was concern only with the extent of use of digital self-help approach (YouTube) that influences on innovative agricultural technology diffusion to the farmers. It is therefore, suggested that further studies should be included more reliable use of concerned variable is necessary for further study.

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APPENDIX- I

An Interview Schedule Use of YouTube for Diffusion of Innovative Agricultural Technologies: A Digital Self-Help Approach to the Farmers

[This information will only be used in research purpose]

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University,
Dhaka 1207

An Interview Schedule for the Study Entitled

Use of YouTube for Diffusion of Innovative Agricultural Technologies: A Digital Self-Help Approach to the Farmers

Name of the respondent: …… …….Serial No: ……...

Village: ……..…… Contact No: …….....

Union: ……Upazila: ……..

(Please provide the following information. Your information will be kept confidential and will be used for research purpose only)

1.1 Age

How old are you?_____Years.

1.2 Level of education

Please mention your level of education.

a) I can't read and write ☐

b) I can sign only ☐

c) I have passed ……. Class

d) I took non-formal education which is equivalent to …….. Class

1.3 Family size

Please mention the number of your family member

a) Male….....

b) Female…… Total……

1.4 Effective farm Size

(Please mention the area of your land possession)

Sl. No.	Use of land	Land possession	
		Local unit	Hectare
1.	Homestead area (A)		
2.	Own land own cultivation (B)		
3.	Land taken from others on Borga system(C)		
4.	Land given to others on Borga system (D)		
5.	Land taken from others on lease (E)		
Total=A+B+1/2(C+D)+E			

1.5 Farming experience

How long have you been practicing farming activities? ..... Year

1.6 Annual family income

Please mention your yearly family income from each of the following sources

Sl. No.	Sources of income	Total value (Taka)
1.	Main crop (..... , etc.)	
2.	Secondary crop (....., etc.)	
3.	Labor	
4.	Service	
5.	Business	
6.	Others (specify) please……	
Total		

1.7 Innovativeness

Please indicate your position from the following categories

Sl. No	Name of technologies	Nature of the innovativeness				
		Innovator (Used within a year) (4)	**Early adopter (Used 1 to 2 years) (3)**	**Early majority (Used 2 to 3 years) (2)**	**Late majority (Used after 3 years) (1)**	**Laggard (Never used) (0)**
1	Use of green manure					
2	Use of weedicide					
3	Use of new variety					
4	Use of Vermicompost					
5	IPM					
6	Poultry vaccination					
7	Use of power pump					
8	Use of power tiller					
9	Use of guti urea					

1.8 Agricultural extension media contact

(Please indicate the extent of contact in following sources)

SI. No.	Communication media	Extent of contact			
		Regularly (3)	**Sometimes (2)**	**Rarely (1)**	**Not at all (0)**
1.	Meet with contact growers				
2.	Meet with agricultural input (seed/fertilizer/pesticide/fish feed/poultry feed/equipment) dealers				
3.	Meet with SAAOs				
4.	Meet with social worker				
5.	Meet with Agriculture Extension officer/UAO				
6.	Agricultural program through YouTube				
7.	Involvement in farmers' cooperative discussion meeting				
8.	Participation in agricultural result demonstration program/Field day				

1.9 Agricultural Knowledge

SI. No.	Questions	Total Marks	Marks Obtained
1	Mention two high yielding varieties of rice	2	
2	Mention two harmful insects of rice	2	
3	Mention two harmful weeds in rice field	2	
4	Mention two stored grain pests	2	
5	Name two modem varieties of maize	2	
6	Name two modem varieties of potato	2	
7	Name two improved varieties of tomato	2	
8	Name two winter vegetables	2	
9	Name two summer vegetables	2	
10	Name two vegetables which can grow round the year	2	
11	Mention two major problems for vegetables cultivation	2	
12	What are the qualities of good seeds	2	
Total		24	

2. Use of Digital Self-Help Approach (YouTube)

Please mention the use of digital self-help approach (YouTube) in receiving different types of agricultural technologies.

Sl. No.	Digital self-help approach (YouTube) related technology	Use				
		Regularly (4)	Often (3)	Occasionally (2)	Rarely (1)	Never (0)
1	Use of sweeping net					
2	Poultry vaccination					
3	Artificial pollination					
4	Use of sex pheromone trap					
5	Use of power tiller					
6	Use of power pump					
7	Use of cultivation of modern variety of crops					
8	Use of light trap for insect control					
9	Use of granule urea					
10	Practice of organic farming					

3.1 Influence of using digital self-help approach (YouTube) on innovative agricultural technology diffusion

Please mention the influence of using digital self-help approach (YouTube) on innovative agricultural technology diffusion.

Digital Self-help Approach	Degree of influence			
	Highly influence (3)	**Moderately Influence (2)**	**Low influence (1)**	**Not influence (0)**
YouTube				

3.2 Credibility of the digital self-help approach (YouTube) on innovative agricultural technology diffusion

Please mention the credibility of the credibility the digital self-help approach (YouTube) on innovative agricultural technology diffusion

Digital Self-help Approach	Degree of credibility				
	High credibility (4)	**Medium credibility (3)**	**Low credibility (2)**	**Very low credibility (1)**	**No credibility (0)**
YouTube programs					

5. Problems confronted by the farmers in using digital self-help approach (YouTube)

Please mention the problems confronted by the farmers in using digital self-help approach (YouTube)

Sl. No.	Problems	Opinion on severity problem				
		Very high (4)	High (3)	Moderate (2)	Little (1)	Not at all (0)
1	Lack of cooperation from SAAO					
2	Unavailability of network					
3	High price of internet package					
4	Unavailability of smart phone					
5	Ignorance of using smart phone					
6	Lack of accessibility of internet					

Thank you for your kind co-operations.

…….

Signature of the interviewer