

**STUDY ON RICE FARMER'S ACCESS TO MARKET
INFORMATION VIA MOBILE PHONE AND ITS IMPACT ON
THEIR MARKETING ACTIVITIES**

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**STUDY ON RICE FARMER'S ACCESS TO MARKET INFORMATION
VIA MOBILE PHONE AND ITS IMPACT ON THEIR MARKETING
ACTIVITIES**

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This is to certify that the thesis entitled “STUDY ON RICE FARMERS’ ACCESS TO MARKET INFORMATION VIA MOBILE PHONE AND ITS IMPACT ON THEIR MARKETING ACTIVITIES” submitted to the department of Agribusiness and Marketing, Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (M.Sc) in Agribusiness and Marketing embodies the result of a piece of bonafide research work carried out by Farjana Akter Shila bearing Registration No. 14-05994 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

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**DEDICATED
TO
MY BELOVED
PARENTS**

ABBREVIATIONS

ICT	Information and Communication Technology
IRRI	International Rice Research Institute
MT	Metric Ton
PFDS	Public Food Distribution System
BTRC	Bangladesh Telecommunication Regulatory Commission
DAM	Department of Agricultural Marketing
DAE	Department of Agricultural Extension
USSD	Unstructured Supplementary Service Data
SMS	Short Message Service
MFS	Mobile Financial Services
TCB	Trading Corporation of Bangladesh
VPP	Village Pay Phone
BBS	Bangladesh Bureau of Statistics
SPSS	Statistical Package for the Social Sciences
AI	Artificial Intelligence

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STUDY ON FARMER'S ACCESS TO MARKET INFORMATION VIA MOBILE PHONE AND ITS IMPACT ON THEIR MARKETING ACTIVITIES

ABSTRACT

The study focuses on the prospects of using a mobile phone as an information and communication tool in receiving market information by farmers. The objectives of this study were to describe the farmers' socio-economic characteristics, identify the factors that affect farmers' mobile phone use, and find out the impacts farmers are observing by using a mobile phone in marketing of paddy. The study was conducted at the 5 villages of Debidwar Upazila in Cumilla district. A total one hundred farmers were interviewed through a well-structured interview schedule. The study shows that 79% of the farmers use mobile phone, and education and income has a significant positive effect on the use of mobile. In addition, mobile phone use has several impacts on farmers' marketing activities like collecting lots of information at a time, decision making, increasing the bargaining power of the farmers, reducing information search cost, saving time and so on.

Key words: ICT, Marketing Information, Mobile phone.

CHAPTER I

INTRODUCTION

1.1 Introduction.

According to Barrett, (2010), “Markets in most developing countries often failed for smallholder farmers who form the majority of agricultural producers”. Smallholder farmers' failure to succeed in agricultural markets is frequently due to a lack of information or an endemic problem of information asymmetry between farmers and buyers (Kydd & Doward, 2004; Poulton et al., 2006).

As a result, rather than traveling to distant better-paying markets, the majority of smallholder farmers sell their produce in local low-paying marketplaces or at the farm gate (Fafchamps & Hill, 2005). So, with access to information on available marketplaces and current market pricing, the mobile phone provides farmers with the potential to resolve market failure and improve market participation.

Market information is an important fact facilitating function in the agricultural marketing system. It facilitates marketing decisions, regulates the competitive market process and simplifies marketing mechanisms. Reliable market information is needed by farmers in planning production and marketing timely as well as by other market participants in arriving at optimal trading decisions. Marketing information service should ideally be available to all. Removal of inter and intra-state restrictions on storage and movement of agricultural production demands existence of complete and accurate marketing information services to the farmers to facilitate better realization of prices for the produce of marketed items.

The desire to better understand the economics of knowledge has developed in recent years. (e.g. Hitt and Brynjolfsson, 1996; Stiglitz, 1985; Stiglitz and Weiss 1981). In emerging countries, information and communication technology (ICT) is quickly becoming a key driver of economic growth. In order to improve their access to agricultural markets, a rising number of farmers in underdeveloped countries have recently adopted mobile phone technology.(Katengeza et al., 2011).

According to Siddique et al., (2017), “In Bangladesh, rice is the staple food for about 160 million people in Bangladesh and plays a crucial role in their livelihood”. The income of the majority of farmers, as well as their food security, is determined by the price of rice. Most of the farmers in Bangladesh are smallholder farmers. Their income level is so poor. So, a slight change in the price of rice is highly sensitive to the lower and middle classes of farmers who live below or on the poverty line. There is a huge information gap in the rice marketing channel for which the farmers cannot reach the ultimate buyer and are thus always deprived of the fair price. If Information and Communication Technology (ICT) can be applied to develop the rice marketing system, the whole nation will benefit from it.

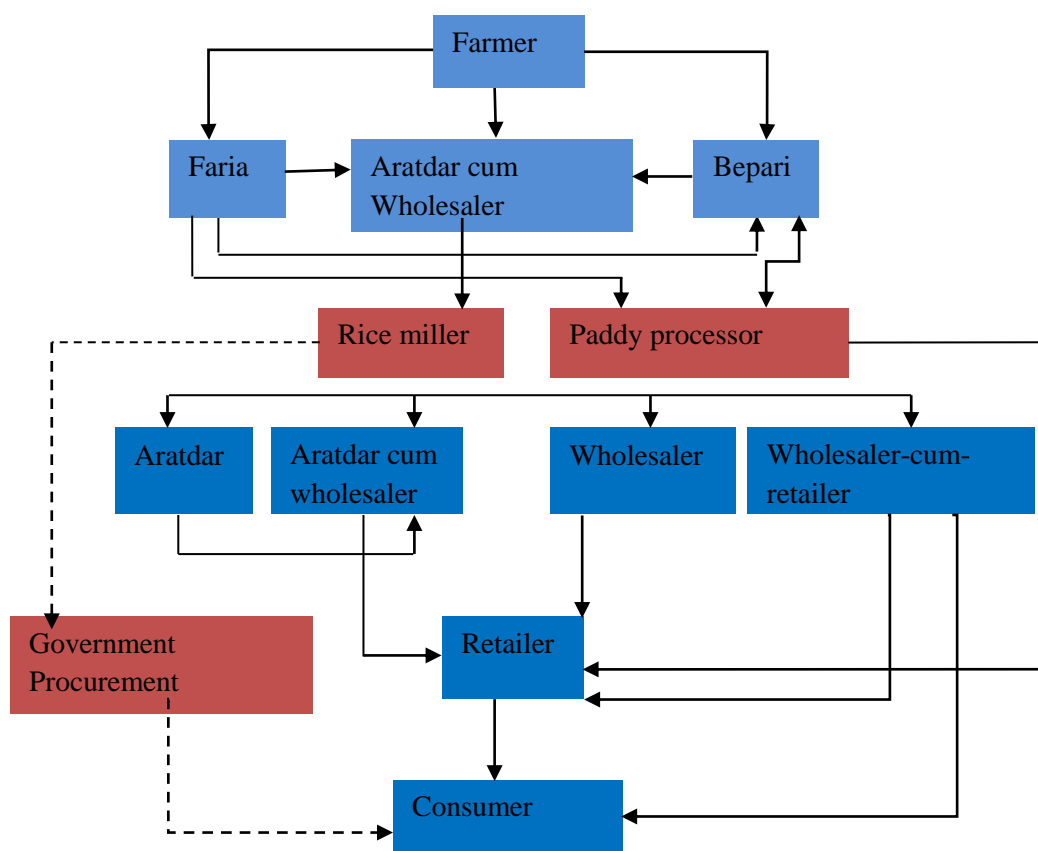
The study focuses on mobile phone use, the most widely used new generation ICT tool by households in developing countries, for agricultural marketing. The study examines the use of mobile phones among paddy farmers in Bangladesh. Therefore, it assesses explicitly the factors that influence the use of mobile phone by the paddy farmers for receiving market information and find out the impacts caused by the use of the mobile phone by the farmers. The rest of the paper is organized as follows: section 2 presents the literature review; section 3 defines the study methods and data sources; while results and discussion are outlined in section 4 and section 5 presents the conclusion, policy implications and scopes for further studies.

1.2 Background of the Study

Rice is the most significant crop in the agricultural sector, and it dictates the rate of progress in the non-crop agriculture sub-sector. According to The Statistical Yearbook of Bangladesh (2018-2019), about 34718 metric tons of rice was produced from a total area of 29271 acres in Bangladesh”. The country was ranked as the fourth-largest rice producer globally (IRRI, 2019). But still, we have to import rice. The fiscal year, 2019/20 rice import forecast was projected about 500,000 MT (Bangladesh Grain & Feed Annual, 2019).

On the other hand, most rice farmers opine that they do not get a fair price in the market. This is happening because of some inefficiencies in the rice marketing system, such as lack of market information, lack of credit to finance, short-run stocks, inadequate transportation, lack of monitoring, and the syndicate in the market (Field survey, 2021). Under the consideration of the farmers opinion, the rice market system was analyzed in this study. Where it is found that there are so many marketing channels of rice exist in our country.

Here is an example of a traditional marketing channel in our country:



Source: Raha et al., 2013

Figure 1.1 Marketing channels of rice in Bangladesh

There are varieties of actors or direct market players in the marketing channels. So the total profit earned from the ultimate marketing procedure of rice is divided among so many market actors. Among them, Faria and Bepari are the most prominent players in the market.

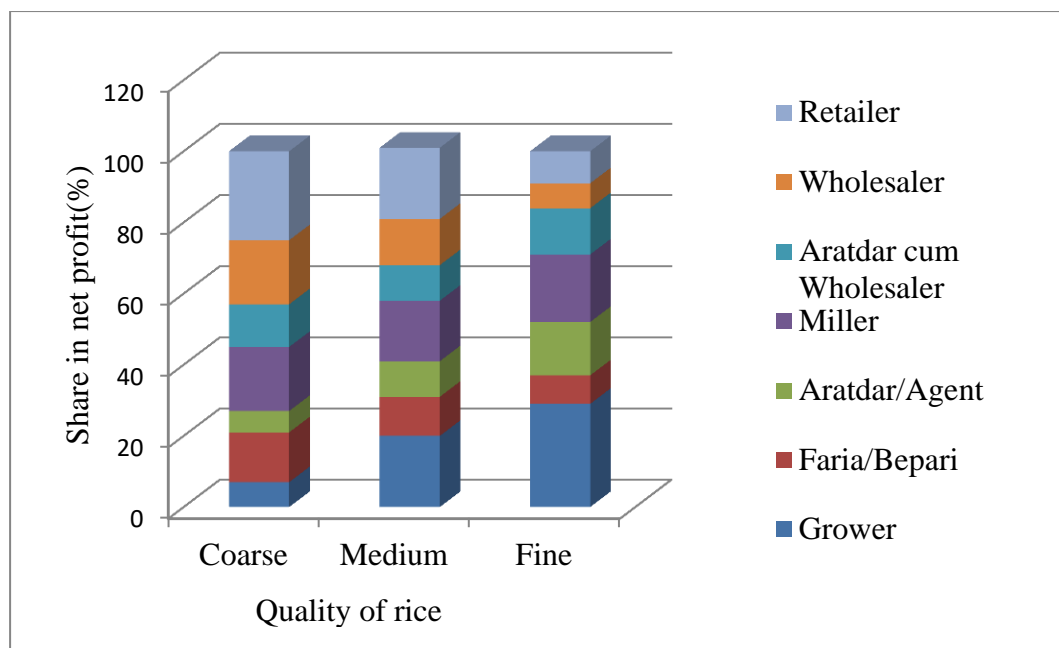
According to the study of Alam et al., (2016), “The rice sector is primarily market-driven. However, millers and private traders control all levels of the rice value chain. These private traders, millers, and wholesalers procure and sell domestically produced rice”, which results in the large price spread of farmgate and retail price.

Here is an evidence of the inefficiency in the rice marketing system from a literature.

Table 1.1 Share of different participators in net profit of rice.

Actors	Net Profit (Tk. per kg)		
	Coarse rice	Medium rice	Fine rice
Grower	0.60	2.07	6.00
Faria/Bepari	1.26	1.12	1.68
Aratdar/Agent	0.53	1.01	3.13
Miller	1.63	1.76	3.98
Aratdar cum Wholesaler	1.06	1.02	2.60
Wholesaler	1.63	1.38	1.43
Retailer	2.29	2.13	1.75

Source: Hossain et al., 2015



Source: Hossain et al., 2015

Figure 1.2 Share of different actors in net profit of rice.

Figure 1.2 shows that retailers receive roughly 25% of the net profits on coarse rice, but only 20.3 percent on medium rice. In the case of fine rice growers earn 29 percent of the net profit. In general, profit analysis reveals the farmers' disadvantageous situation, as they earn the lowest profit while also incurring a greater portion of the risks.

Furthermore, despite the fact that growers are meant to receive government price support for coarse rice (through public procurement under the PFDS), they earn a relatively low net margin for this variety of rice.

One of the main reasons behind this is the lack of proper knowledge about available markets. Most of the rice farmers are small to medium scale farmers (Field survey, 2021). They prefer to sell their products to the local Bepari or Faria or in the farm gate. If farmers could contact the miller directly or they could sell their products in the convenient markets, they may get a fair price. But it is not possible to remove all the intermediaries from the market. Because it is not possible for the farmers to sell their products directly to the ultimate consumers. There are some procedures to transform paddy into rice like husking,

grading, polishing, packaging etc. Market intermediaries play these tasks and make this process easier.

But for the betterment of the farmers, the time demands that the farmers should sell their products directly to the ultimate buyer. Due to the advancement in information and communication technology, the demand becomes more valid. The researcher tried to show a single aspect of using information and technology in paddy marketing. Now a days mobile phones are most available source of information and some research show its usefulness in agricultural marketing system. This study analyzes the consequences of using mobile phone as a source of information for the rice farmers and how it affects their subsistence.

1.3 Scopes of Mobile Phone Use Among the Farmers in Bangladesh:

In the field of communication, there are so many mediums and tools for one way or two-way communication. For example, we can say radio, television, print media, mobile phones, internet etc. Among them, mobile phone technology may be the easiest and most effective way of two-way communication for the farmers. Other communication tools are also effective in some cases. In this paper, the researcher has mainly discussed the effectiveness and opportunity of a mobile phone as both an information and communication device. This paper has mainly focused on mobile phone, which provides market information that could in principle, have the same effects; as Eggleston et al.(2002) put it, it is the "I" and the "C" that are important, not the "T".

Goyal (2008), for example, found improvements from village-based internet kiosks, whereas Svensson and Yanagizawa (2009) discovered radio impacts. Other technologies may have certain advantages over the mobile phones, such as the capacity to consolidate information and provide information on all marketplaces at the same time. On the other hand, Radio does not allow for sales negotiations, and computers and internet access remain pricey (and in many places connectivity is simply not available).

Case studies included in the World Bank's ICT in Agriculture Sourcebook from various initiatives in which extension agents and farmers use mobile phones to improve their communication (Table 1.2). Most of these projects are not just about mobile apps; they are also about web-based apps. Nonetheless, the impact of mobile on extension functions is worth noting.

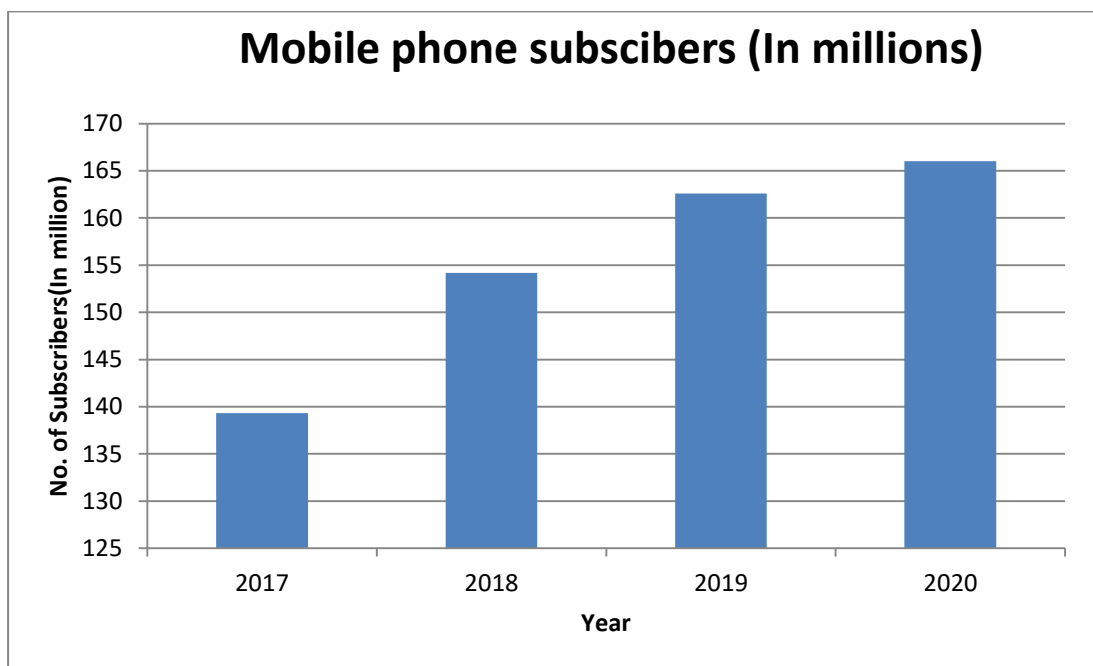
Table 1.2 The World Bank ICT in Agriculture Sourcebook

Examples

Project	Description and mobile use	Extension function
Eastern Corridor Agriculture Market Information Centre, Ghana	Market information to community cooperatives	Link farmers to markets
InfoPrix, Benin	Market information, staple foods	Link farmers to markets
Esoko, West Africa	Market information	Link farmers to markets
Kilimo Salama, Kenya	Provide insurance to farmers through a unique mobile purchasing system for seeds, fertilizers and pesticides	Link farmers to markets; facilitate access to credit and inputs
Kenya Agricultural Commodities Exchange	Use Safaricom SMS platform to link farmers to buyers	Link farmers to markets
Uluguru Mountains, Tanzania	Mobile access by women farmers to current market information	Link farmers to markets
Uganda Rural Information Systems	Mobile updates for rural farmers connected to a full ICT and experts who train the farmers	Link farmers to markets; raise awareness, Provide information, demonstrate
Xam Marse, Senegal	Mobile information including prices and availability of fruits, vegetables, meat and poultry	Link farmers to markets

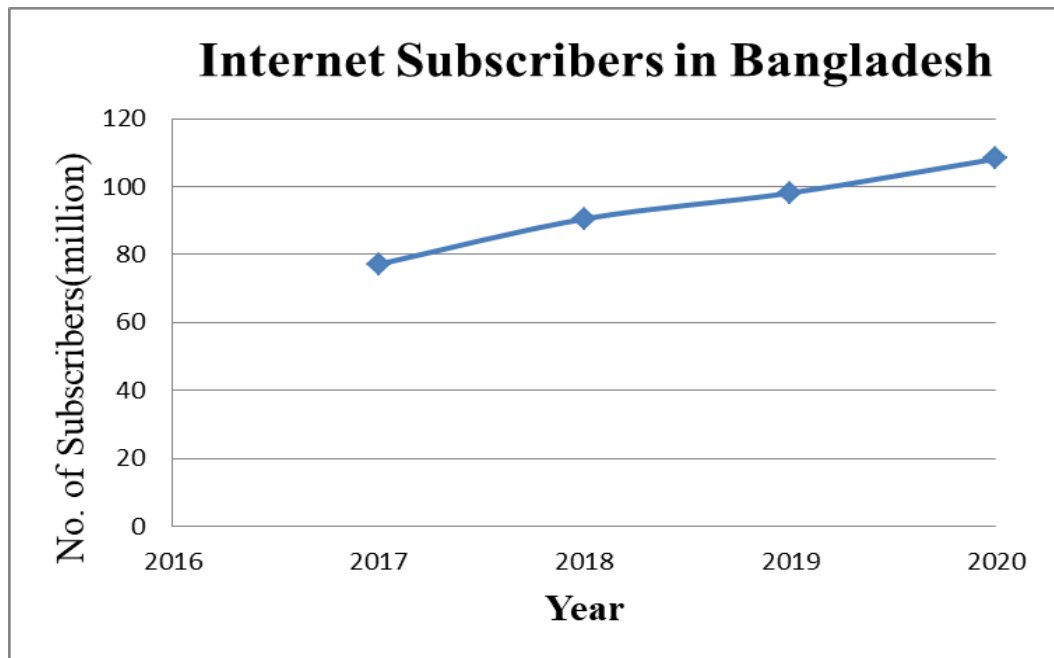
Source: World Bank, 2011.

When combined with the Internet, mobile technologies provide improved one-to-one connection with wholesalers, millers, or procurement agents, allowing farmers to receive critical information about prices, weather, market demand and supply, and other services. Even with the advent of smartphones, the Internet gives more complicated information and audience interaction. However, the current limits of the Internet should not be used as a disincentive to developing improved ICT services, because current trends indicate that Internet penetration and accessibility, especially in rural regions, will swiftly improve.



Source: BTRC, August 2020.

Figure 1.3 Mobile phone network subscribers in Bangladesh



Source: BTRC, August 2020.

Figure 1.4 Trend of Internet Subscribers in Bangladesh

On the other hand, the government has taken so many strategies and policies to develop the agricultural marketing system using ICT . For example, the Department of Agricultural Marketing (DAM) started an e-Marketing site on their website. Recently, the Agricultural Ministry has launched an app called “Sadai” with the association of DAM. The main purpose of these initiatives is to encourage farmers to use mobile phone technologies to sell their products and reduce the middleman's high-handedness.

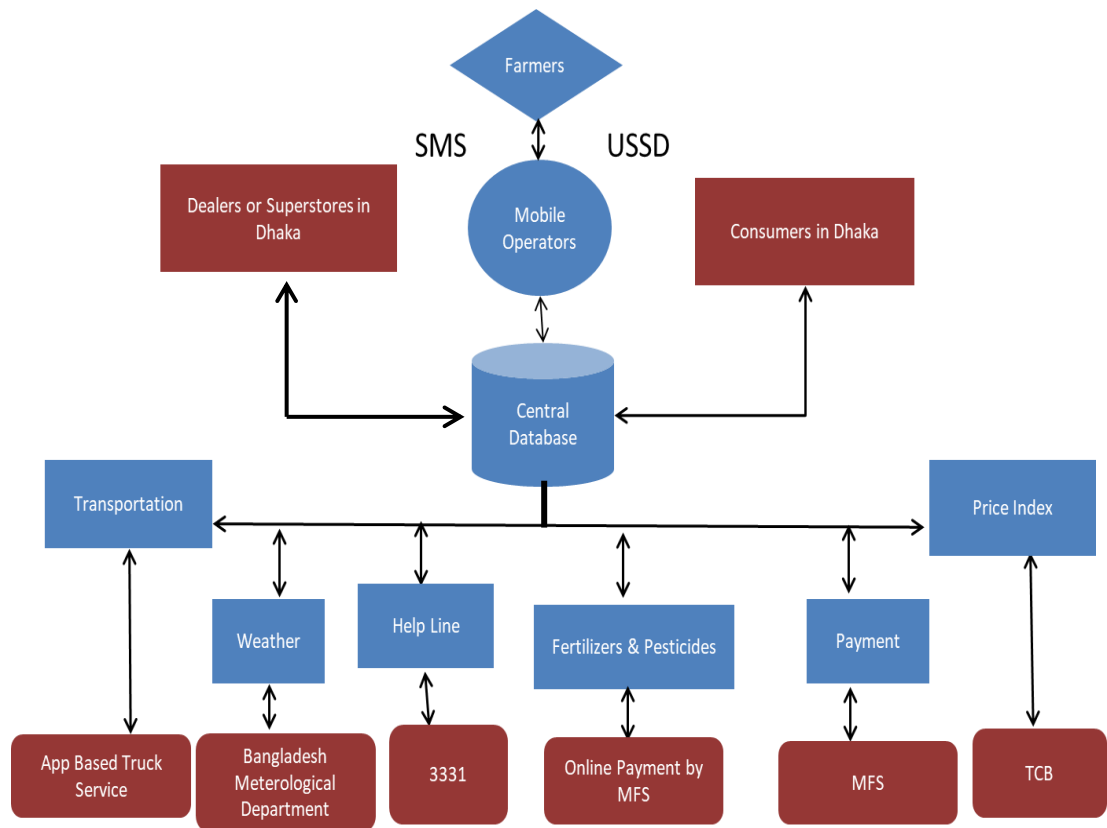
1.4 How Mobile Phones Can be an Integrated or One-stop Solution for Paddy Marketing

“Mobile phone technology for example, the use of USSD technology is an old practice by mobile operator companies, but now-a-days this platform is used for various purposes. USSD technology is a real-time session-based messaging service between cell phones and an application server in the network” (Zhou, 2015).

USSD connectivity is simple, inexpensive, and sometimes faster than the internet. Every service will be incorporated into a centralized database.

Mr. A, for instance, is a farmer with 1 quintal of paddy ready to sell. He must first sign up for the system. Then he phones *XXX# on his phone, which opens a new window with a variety of possibilities. He will decide whether or not to sell his produce, categorize it, and offer the amount of crop. After that, he will choose a market, such as Dhaka. When the central database receives these inputs, it will send him an SMS with contact information for possible buyers (Dhaka's dealers/wholesalers). This contact information will be created by artificial intelligence (AI), which will link up between buyers and sellers. Wholesalers will have access to an app that will allow them to report on demand volume. Farmers may be able to eliminate two intermediaries using this technique.

Wholesalers may now order trucks through an app, eliminating the need for a truck agent. 'Truck Lagbe?' is a new start-up that offers ten truck services. By doing so, we may be able to cut out even another middleman. Crops will be loaded onto trucks after buyers have been chosen and transportation has been arranged, and payment will be made directly to farmers' accounts via MFS (bKash, Rocket). The entire procedure should take no more than 2-3 hours. With this technique, farmers will have a higher profit margin because the final price can be reduced. Most crucially, they will obtain more market power. In addition, lead time will be reduced, crop and vegetable spoilage will be reduced, resulting in increased profitability.



Source: Islam, 2019

Figure 1.5 Process of USSD Based Agricultural Information System.

1.5 Statement of the Problem

In order to accomplish desired socio-economic progress, farm people must be connected to a broader communication network and have access to "just" and "timely" information. On the other hand, farmers in Bangladesh have a scarcity of knowledge and communication channels. To promote the use of mobile phone to acquire agricultural information, it is critical to have a thorough understanding of the existing level of mobile phone use by farmers.

However, the use of mobile phones by farmers in obtaining agricultural information must be investigated, with the following questions in mind:

1. How were the socio-economic characteristics of the farmers?
2. To what extent do the farmers use cell phone?
3. Which farmer's socio-economic characteristics are linked to their mobile phone use to get market information?
4. What type of benefits are farmers getting from mobile phone use in receiving market information?

From the questions above, some objectives of the study were enlisted.

1.6 Objectives of the Study

1. To describe the specific socio-economic characteristics of the farmers in the study areas.
2. To determine the factors affecting the mobile phone use for collecting market information.
3. To analyze the impacts of mobile phone use in obtaining the market information by the farmers.

CHAPTER II
LITERATURE REVIEW

The researcher made a detailed search of available literature related to this study. Available literature in Bangladesh as well as abroad were intensively reviewed to find out similar work. This chapter is divided into three sections. First section deals with the use of the mobile phone by the farmers. Second section deals with the relationship between farmers' characteristics and mobile phone use in receiving information. Third section deals with the impacts of using mobile phone in receiving market information.

2.1 Use of Mobile Phone by the Farmers

Ilahiane (2007) proved that the farmers of Morocco are rapidly adopting mobile phones and discussing marketing, weather, and business information with one another. In addition, farmers contact market brokers and nearby cities directly to sell their produces. Farmers, too, concentrate on finding important and up-to-date market information through social and commercial networks.

In a study on the utility of cell phones for crop farmers in Bangladesh's selected regions, it was discovered that 80.15% of farmers use at least one sort of mobile phone operator service (Mamun et al., 2019).

According to the study of Aker and Mbiti (2010) the spread of information and communication technology in emerging countries provides greater chances for private firms and government departments to disseminate knowledge and information. Mobile phone service has increased rapidly across Asian, African, and Latin American countries in recent years. In 2009, it was estimated that over 60% of the population of Sub-Saharan Africa, Asia, and Latin America had access to a mobile phone. Previously, mobile phones were primarily used by metropolitan dwellers who were wealthy. Rural and urban populations in developing countries are now using mobile phones, and they are benefiting from the latest information on weather, markets, and other related topics.

2.2 Relationship Among the Farmer's Characteristics and Their Use of Mobile Phone in Receiving Information

In the municipality of Maasin in the province of Iloilo, Philippines, 112 farmers were interviewed using the purposive sample approach to measure their willingness to adopt (WTA) for a mobile app - the Bamboost for selling bamboo products and to establish the related aspects. They discovered a positive correlation between the size of the farm and the readiness to use a mobile phone app to advertise bamboo products (Diaz et al., 2021).

Folitse et al. (2019) conducted a study on mobile phone usage among small-scale chicken farmers in Ghana and discovered that age and gender had a strong positive association with the use of a mobile phone to gather information. However, education has no such relationship.

Sikundla et al. (2018) investigated the adoption of mobile phone for marketing of agricultural produce among Qamata Irrigation Scheme (QIS) smallholder farmers in South Africa and the determinants of adoption. Two stage random sampling technique was used to interview 97 smallholder farmers employing a semi-structured questionnaire. Data generated was analysed using descriptive statistics and probit regression model. Analysis result shows that 71% of the smallholder farmers currently use mobile phone for agricultural marketing. Majority of the respondents (55%) used mobile phone to market their produce among relatives and neighbours. Probit regression result indicates that gender, social grant as main income source, private traders and local market marketing channel, monthly income, political and economic factors influence mobile phone adoption in agricultural marketing. Hence, they recommended mobile phone as marketing tool among smallholder irrigation farmers in South Africa and stated that Concerted efforts should be made to address erratic network and high airtime tariff challenges to encourage mobile phone adoption in marketing among smallholder farmers in the country.

Nyamba and Mlozi (2012) conducted a study on factors influencing the use of Mobile Phones in providing agricultural information in Kilolo District, Iringa, Tanzania, and proved that age had significant effect on use of mobile phone.

Kashem (2010) investigated farmers' use of mobile phones in receiving agricultural information along with agricultural development. He discovered that using a mobile phone to receive agricultural information has a strong negative relationship with age. On the other hand, literacy and income have a substantial positive relationship with the use of a mobile phone and the collection of data.

Ofuoku et al. (2007) found that the educational attainment of poultry producers have a strong link with mobile phone adoption. The drivers of small-holder farmers' adoption of mobile phone technology for agricultural marketing in Malawi's Mwanza, Dedza, and Mzimba districts were studied. The researchers used regression techniques to figure out what motivates people to use their phones and how often they use them. Literacy, distance to local market, land size, the current value of assets, crop revenue, and area variations all influence use positively, but access to electricity has a negative impact.

“Gender, engagement in agricultural initiatives, possession of a mobile phone, current asset worth, distance to nearest public phone services, and regional variances all influence the intensity of use. The endowment of assets is crucial in increasing the use of mobile phone technology. Because most women have limited access to assets, gender inequities have a considerable impact on adoption. The study proposes that farmers' access to mobile phones for agricultural marketing should be improved. The government, in partnership with mobile network operators, should, according to the report, reduce calling tariffs to enhance use, minimize gender disparities in accessing assets, and enhance investment in supporting infrastructure” (Katengeza et al., 2011).

According to Ofuoku et al. (2007), “the size of the poultry farmers' farms had a significant impact on mobile phone adoption.”

2.3 Impacts of Using Mobile Phone in Receiving Information

Aker and Mbiti (2010) showed that, over the last decade, mobile phone usage in Sub-Saharan Africa has increased dramatically, with 60% of the population now having access to one. According to empirical research, mobile phones can help both consumers and producers. They give an overview of how mobile phone telephony can influence economic development in Sub-Saharan Africa, including improved market information and coordination among agents, increased job creation, improved communication among social networks, and the development of new services like mobile banking.

According to Aker (2008), “price dispersion among marketplaces is frequent in both developed and developing countries, owing to the cost of information. They devised a novel sequential search theoretical model in which traders participate in an optimal search for the maximum sales price minus net transportation expenses.” According to the model, cell phone will increase trader’s reservation sales prices and the number of markets over which they search, leading to a reduction in price dispersion across markets. To test the predictions of the theoretical model, they used a unique market and trader dataset from Niger that combines data on prices, transport costs, rainfall and grain production with cell phone access and trader behavior. They first exploited the quasi-experimental nature of cell phone coverage to estimate the impact of the staggered introduction of information technology on market performance. The survey contained responses of 395 traders located in 35 markets across six geographic regions of Niger. The results provide evidence that cell phones reduce grain price dispersion across markets by a minimum of 6.4% and reduce intra-annual price variation by 10%.

Aker (2010) found empirical evidence of the nature and magnitude of the effects of mobile phone coverage on agricultural market performance in Niger. In their paper, they used two primary datasets. The first included data on prices, transport costs, and rainfall obtained from secondary and primary sources in Niger. This dataset includes monthly agricultural prices over eight years (1999–2006) across 37 domestic markets. In addition, monthly data on gas prices, mobile phone and landline coverage, road quality, trade flows, and district population levels were also collected. The second dataset was based on a survey of traders, transporters, and market resource persons in Niger collected by the author between 2005 and 2007. The survey included 415 traders located in 35 markets across 6 geographic regions of Niger. They found the introduction of mobile phones was associated with a 10 to 16% reduction in price dispersion across markets, with a larger impact for those market pairs with higher transport costs. The paper also provides evidence on a network effect, as mobile phones have a more substantial effect on price dispersion once a critical mass of market pairs has mobile phone coverage, mobile phones appear to be a particularly effective and low-cost means of providing such information, and are well-suited to social and commercial norms in sub-Saharan Africa.

Antonio and Berkhout (2012) found that if mobile phones helped farmers to solve development problems such as the difficult and costly access to sources of information, low productivity because of inadequate knowledge on efficient rice technologies, costly and inefficient farm transactions, and low selling price of rice. This study resulted in direct economic benefits in terms of production and marketing efficiency, either through savings, higher yield, or higher selling price of rice. Although these direct benefits were not that high, indirect benefits such as saving time from farming and knowledge on efficient farm practices provide more economic benefits. The distance of the farmer's house to the agriculture office, expenses per season per hectare, distance of farm to the nearest rice mill and house, farm yield per season per hectare, the volume and area planted to rice in the province, the farm village urban/rural classification, years in farming, extent of farm work, farm size, and home village population are among the 34 socio-economic characteristics that served as independent variables in this study. This

study also gives subtle information on which of these characteristics impact the extent of benefits from cell phone usage in farming through simple regression analysis. Overall, the findings of this study revealed that, while using their phones less frequently than the average user, the majority of Filipino rice farmers (85%) were able to benefit monetarily from them. Farmers' average economic benefits from mobile telephone were not particularly great, but they might nevertheless make a considerable contribution to their revenue. Because most farmers are unaware of the different ways in which mobile telephony might help them save money or improve income, the economic benefits of mobile telephony are not entirely realized.

In Bangladesh, Bays et al. (1999) did a study on village pay phones and poverty reduction. They gathered information from 50 VP operators in 50 localities with a total of 350 users. The study's findings led to two main conclusions: 1. implementing pragmatic policies can transform telephones into production items, particularly by cutting transaction costs, and 2. services originating from telephones in villages are expected to assist the poor significantly. Village Pay Phones (VPPs) appear to have observable and positive effects on women's empowerment and social status and their households that lease phones. In addition, phones provide other non-economic benefits to villagers in general, such as improved law enforcement, more speedy and effective communications during calamities, stronger kinship bonding, and so on. Islam and Grönlund (2007) used design-reality gap analysis and stakeholder theory to evaluate an e-government initiative in Bangladesh. The project under this study was an Agricultural Market Information System, which was designed to give farmers, wholesalers, and retailers fast and accurate market information to make actors more informed and markets more effective. The research questions were why the system failed and what might be done to fix it. The investigation revealed flaws in project resources such as staff supply and qualifications and adaptation to stakeholder preferences, demands, and skills. The most significant factors for success, according to this study, are the utilization of mobile technologies in conjunction with contact centers and locally available human resources. According to their survey, around 80% of farmers would be willing to sell their products in other markets if given

the chance. Information that is up to date and accurate about prices is one important ingredient in this opportunity.

Jensen (2010) shown in a review study that mobile phones had begun to play a role in the selling of agricultural goods in underdeveloped countries. He explored the possible effects of ICTs on welfare, both in terms of efficiency improvements through improved arbitrage and welfare transfers across supply chain participants through reduced informational asymmetries and market power.

According to a study by Mittal and Tripathi (2009), because of current information asymmetry at every stage of the agri-supply chain, India's agricultural sector suffers from poor growth rates and low productivity. This research attempted to answer questions about the use of mobile phones and mobile-enabled services on agricultural productivity through focus group discussions and in-depth interviews with farmers. They discovered that, while mobile phones can help improve farm productivity and rural incomes, the quality of information, the timeliness of information, and the trustworthiness of information are the three most important aspects that must be delivered to farmers in order to meet their needs and expectations. Muto and Yamano (2009) studied whether enhanced information flow owing to mobile phone network expansions lowers the marketing expenses of agricultural goods in their study paper. They used panel data from 856 Ugandan homes in 94 areas, with the number of communities serviced by mobile phone networks increasing from 41 to 87 between 2003 and 2005. They discovered higher banana sales in rural communities after expanding coverage, but not maize sales. Farmers in remote places that grow perishable commodities appeared to be more willing to participate in the market as cell phone coverage expanded. "Mobile phone usage in third-world nations is playing a critical role for the expansion of farmers' business towards agriculture," Razaque and Sallah (2013) wrote in a review of certain papers. Recently, mobile phone communication has been deemed critical in boosting farmers' access to better comprehend agricultural market conditions. Farming communities value mobile phones as a simple, quick, and handy means to communicate and receive

immediate solutions to their problems. Farmers, in particular, now have the ability to obtain information on marketing and weather via their cell phones. They can communicate directly with market personnel and provide their produce at reasonable prices thanks to this vital technology. The usage of a cell phone also keeps them informed about weather forecasts for agricultural input applications such as fertilizer and pesticides that may be impacted by unforeseeable calamities, as reported by the metrological department. This gizmo has provided a fresh perspective.

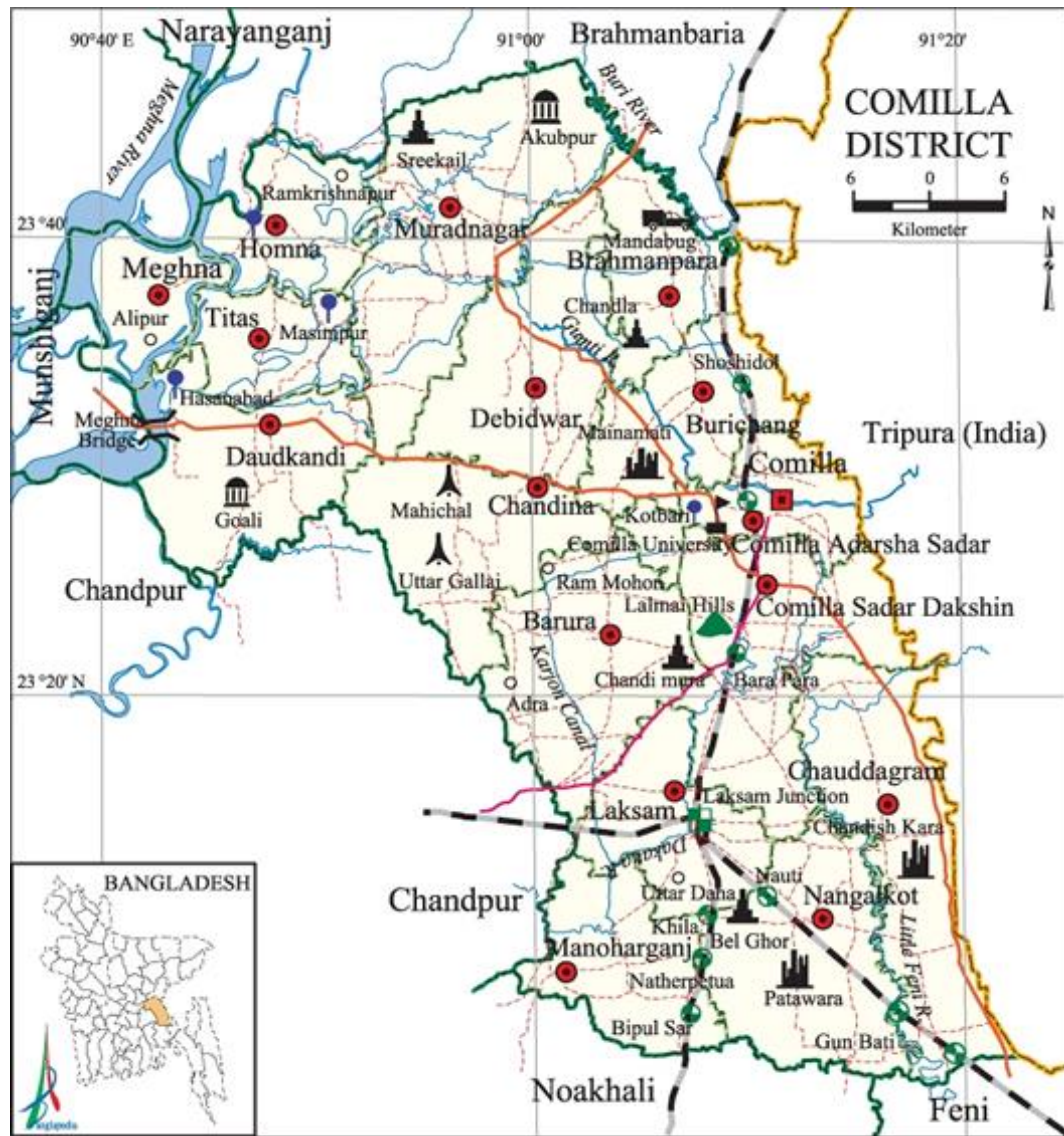
CHAPTER III

METHODOLOGY

Before beginning a research project, it is crucial to have methods and processes in place for data collecting and analysis. The researcher is responsible for clearly outlining the research design, methods, and processes he used to acquire valid and trustworthy data and analyzing and interpreting those data to reach the correct conclusion and summary. This chapter goes through the data collection methods, and the statistical model used to analyze the data that were used in this study.

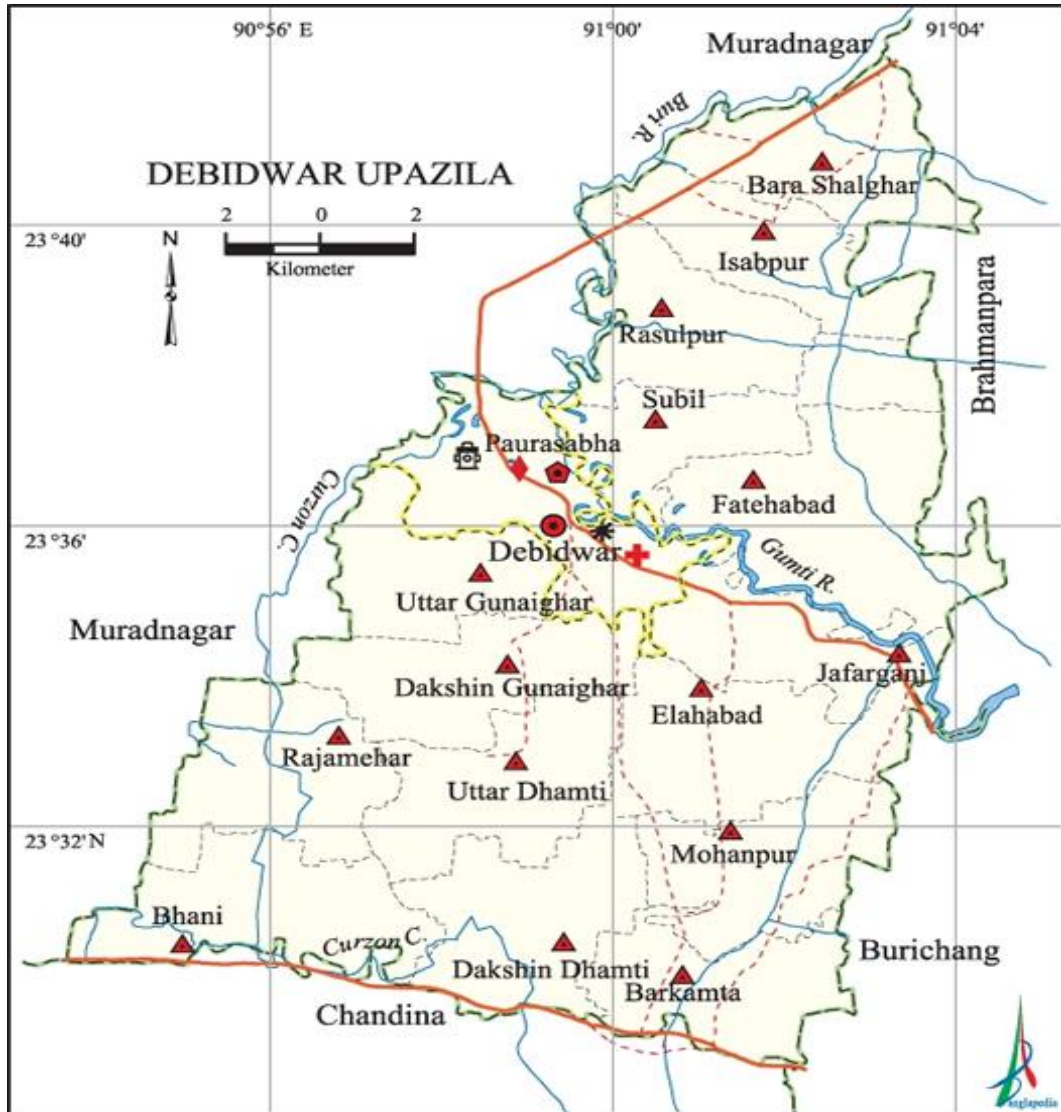
3.1 Location of the Study

The study was conducted at Debidwar Upazila under Comilla district. The area of this Upazila is about 238.36 sq km. The population in total is 378401, where Males constituted 50.33% of the population, and females 49.67% (Banglapedia, 2021). Debidwar Thana was formed in 1915 and it was turned into an Upazila in 1983. Debidwar Upazila is divided into Debidwar Municipality and 15 union parishads (Fig 3.1 and 3.2). Among them, Mohanpur union parishad and Barkamta union parishad are selected as the research's locale. Then 5 villages are determined for collecting data. Among them, 2 villages namely Mohanpur, Chhotona are under Mohanpur Union and 3 villages namely Barkamta, Bagmara, Bramankhara are under Barkamta Union. According to the field survey of the researcher, the farmer of these areas produces rice three times in a year. Almost all the of their cultivable lands are used in rice cultivation. Most of he farmers of these areas also use mobile phone comprehensively in cultivation purpose. So the researcher selected this area in order to make a complete analysis about the use of mobile phone in rice marketing.



Source: Banglapedia, 2021

Figure 3.1 Map of Cumilla District Showing Debidwar Upazila



Source: Banglapedia, 2021

Figure 3.2 Map of Debidwar Upazila showing the Union Parishads

2.2 Population Selection and Sampling Procedure

The study's population was primarily composed of rice farmers in the area. The researcher compiled a list of farmers in the study area with the assistance of local farmers. The study's population was made up of 501 farmers on the lists. A total of 100 farmers (20% of the total population) were chosen from 501 farmers using a basic random sample procedure, with the decimal number modified accordingly.

Table 3.1 Distribution of the farmers showing the population and sample size in selected villages under Debidwar upazila.

Upazila	Union	Villages	Number of the rice farmers	
			Populations	Samples size (20%)
Debidwar	Mohanpur	Mohanpur	108	22
		Chhotona	105	21
	Barkamta	Barkamta	110	22
		Bagmara	92	18
		Bramankhara	86	17
Total	2	5	501	100

3.3 Data Collection Method

Data were collected using a face-to-face interviewing method for primary data. In order to accomplish this, a structured interview schedule with both closed and open form questions was prepared. The questions were brief and direct in order to get the farmers' feedback. Data were collected during 29 August to 30 October, 2021.

For the collection of secondary data, various articles, journals, publications of related organization had been reviewed. Data also collected from the website of Department of Agricultural Marketing (DAM), Department of Agricultural Extension (DAE), Bangladesh Telecommunication Regulatory Authority (BTRC) and Bangladesh Bureau of Statistics (BBS) etc.

3.4 Explanations of the Variables Used

Any attribute that can take on various or varied values in different instances is referred to as a variable. To determine the relations between the use of mobile phone in paddy marketing by the farmers and their socio-economic characteristics two types of variables used in this study.

3.4.1 Dependent variable:

A dependent variable is a variable whose value changes depending on the value of another variable. Use of mobile phone by the farmers in receiving marketing information was the dependent variable for the study. The variable was measured on the basis of whether the farmers use or not use mobile phone for paddy marketing purpose. The scoring methods for both groups are mentioned below:

Extent of use of mobile phone	Assigned score
Yes	1
No	0

3.4.2. Independent variables

The variables chosen by the researcher to test their dependent variables are known as independent variables. Alternatively, variables that can take on different values and induce changes in other variables also called independent variables. Different independent variables used in this study are briefly discussed below and shown in the Table 3.2.

Age

Farmers' ages were calculated using actual years from their birth to the time of the interview, as determined by the rural people's verbal responses. A score of one (1) was assigned for each year of one's age.

Gender

Gender of the farmers was measured as a dichotomous variable. Score "0" was assigned for male farmers and score "1" was assigned for the female farmers.

Level of education

The capacity of an individual respondent to read and write, as well as the formal education received up to a specific standard, was used to determine their level of education. If any respondent attain no formal education, his score was assigned as zero (0). A score of one (1) was assigned for each year of schooling. If a respondent passed the S.S.C examination, his education score was given as 10, 12 for H.S.C., and so on.

Household income

The farmers do not keep proper accounts of their income. So, the average annual household income of the farmers was used in this study.

Experience of farming

In this study, years of farming represents the number of years the farmers are involved in farming. Some of the farmers were in different occupation before farming. Score '1' was assigned for one year of farming and so on.

Length of mobile use

Duration of mobile phone use simply means the time period of using mobile by the farmers. Score '1' was assigned for one year of mobile phone use.

Farm size

The total quantity of land cultivated by the farmers was used to determine the size of the respondents' farms. Score one (1) was assigned for each acre of land.

Table 3.2 A short description of the independent variables

Variables	Types	Measuring technique
Age	Continuous	1 for 1 year
Gender	Dichotomous	“0” for Male, “1” for Female
Level of Education	Continuous	1 for 1 year of education and 0 for no schooling
Experience of farming	Continuous	1 for 1 year
Household Income	Continuous	Taka(in lakh)
Length of mobile use	Continuous	1 for 1 year
Farm size	Continuous	1 for 1 acre

3.4.3 Likert scale and categorical variables

To analyze the impacts of using mobile phone in collecting paddy market information upon the farmers’ likert scale and categorical variables were used. For example:

	Category	Assigned score
Mobile phone saves the time of information search	Strongly Agree	1
	Agree	2
	Neutral	3
	Disagree	4
	Strongly Disagree	5

	Category	Assigned score
Do you think Mobile phone provides more reliable information than the other sources?	Yes	0
	No	1
	Neutral	2

3.5 Data Processing and Analytical Techniques

3.5.1 Data processing

The collected primary data were examined thoroughly to detect errors and omissions with the consultancy of the respected research supervisor. Then the final data inputted in SPSS software for further analysis.

3.5.2 Analytical techniques

The contribution with the individual characteristics of the respondents on their use of mobile phone in receiving marketing information were ascertained by binary logistic regression model which is popularly known as logit model. For running the regression model a null hypothesis was developed according to the objective.

Null Hypothesis: There is no significant contribution of the selected characteristics of farmers' on the probability of using mobile phone by the farmers in receiving market information.

According to Stoltzfus (2011), "In logistic regression,

1. There should be no extreme values or outliers in the data.
2. There should be no high inter-correlation (i.e. multicollinearity) among the predictors.

To detect the outliers, data were thoroughly checked. Since the researcher found no outliers, all the data kept for further analysis as well.

According to Shrestha (2020) "Multicollinearity occurs when the multiple linear regression analysis includes several variables that are significantly correlated not only with the dependent variable but also to each other. Multicollinearity makes some of the significant variables under study to be statistically insignificant". To detect multicollinearity among the independent variables, correlation analysis had been used.

The binary logistic regression model for this study is given below:

$$\text{Log} [P/1-P] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + e$$

Where,

P= Probability of outcome

β_0 = Intercept

X_1 = Age (Year)

X_2 = Gender (Male=0, Female=1)

X_3 =Education (Year of schooling)

X_4 =Experience of farming (Year)

X_5 =Household income (Tk)

X_6 =Duration of mobile phone use (Year)

X_7 = Farm size (Acre)

$\beta_1 - \beta_7$ = Coefficient of the relative variables

e = Random error

The analysis was done by using SPSS (version 22) software. At the 0.1 level, one asterisk (*) denotes significance, while at the 0.05 level, two asterisks (**) denote significance and at the 0.01 level, three asterisks (***) denote significance.

Finally, to analyze the categorical and likert scale data descriptive statistics for example percentage, mean, standard deviation was used.

CHAPTER IV

RESULTS AND DISCUSSION

Results and Discussion

This chapter presents the study's findings as well as an interpretation of the findings. According to the study's objectives, data collected from respondents through interviews was measured, processed, tabulated, and statistically interpreted. These are divided into four divisions based on the study's aims.

The first section deals with the selected socio-economic characteristics of the farmers. The second section deals with the current status of mobile use among the farmers. The third section determines which socio-economic characteristics affects the use of mobile phone in paddy marketing. Finally the fourth section assess the extent of benefits farmers are gaining from the use of mobile phone in receiving marketing information.

4.1 Selected Socio-economic Characteristics of the Farmers

This section provides the information about descriptive statistics of the farmers according to their various characteristics. Characteristics play a big role in determining an individual's behavior. The findings on the farmers' seven selected characteristics have been discussed in this chapter. The selected characteristics were age, gender, education, farm size, years of farming, income, mobile phone using status, duration of Mobile phone use. Range, mean and standard deviations of these characteristics of the farmers have been described in the following sub-sections.

Table 4.1 Descriptive statistics of the farmers' characteristics

Variables	Minimum	Maximum	Mean	Std. Deviation
Farmer's age	28	75	51.32	12.713
Education level	0	16	6.99	4.951
Experience of farming	4	50	23.50	12.685
Length of mobile phone use(years)	4	17	8.71	2.874
Household income (In lac)	.50	12.00	2.7260	1.52167
Farm size (acre)	.20	5.50	1.8845	1.08527

4.1.1 Age

Data presented in Table 4.1 indicates that, age of the farmers' ranges from 28 to 75 years. The average age is 51.32 years with the standard deviation of 12.713.

4.1.2 Gender

On the basis of gender, the farmers were classified into two categories as shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their gender

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Male	90	90.0	90.0	90.0
Female	10	10.0	10.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

From the table it can be said that the number of women directly participate in farming as a farm owner is so poor (only 10%). In the study area the researcher found that most of the women involved in agriculture indirectly as day labor.

4.1.3 Level of education

Data presented in Table 4.1 indicates that, education level of the farmers ranges from illiterate to graduation level. The average rate of education is 7 approximately, which means that, most of the farmers belong to secondary level of education. According to Chowdhury & Sarkar (2018), “the general education system in Bangladesh is divided into five phases”. The researcher categorized the farmer education level within these five phases. The result is shown in the pie chart below:

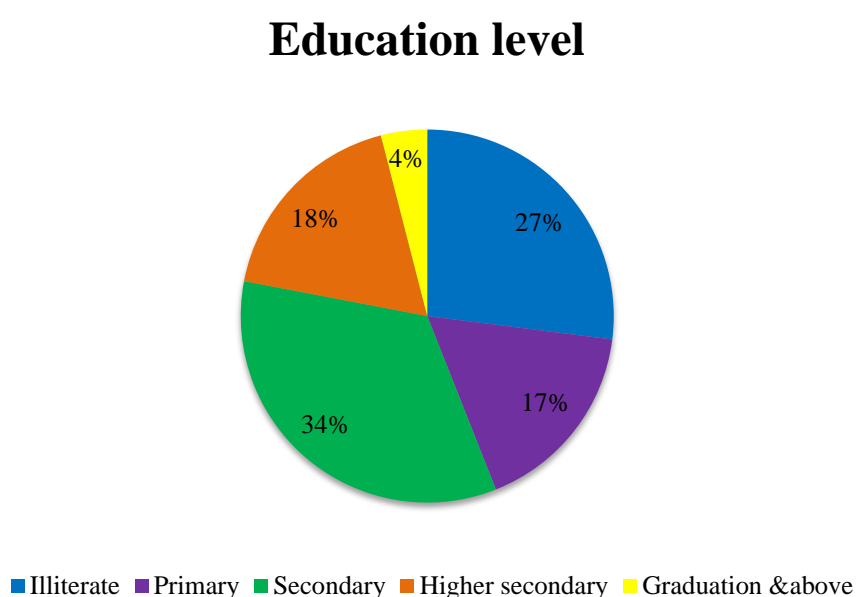


Figure 4.1 Distribution of the farmers on the basis of education

Source: Field survey, 2021

The findings indicate that, most of the farmer belongs to the secondary level of education. The literacy rate of the respondents is about 73.0% in the study area which is around the country’s overall literacy rate of 74.9% (BBS, 2019).

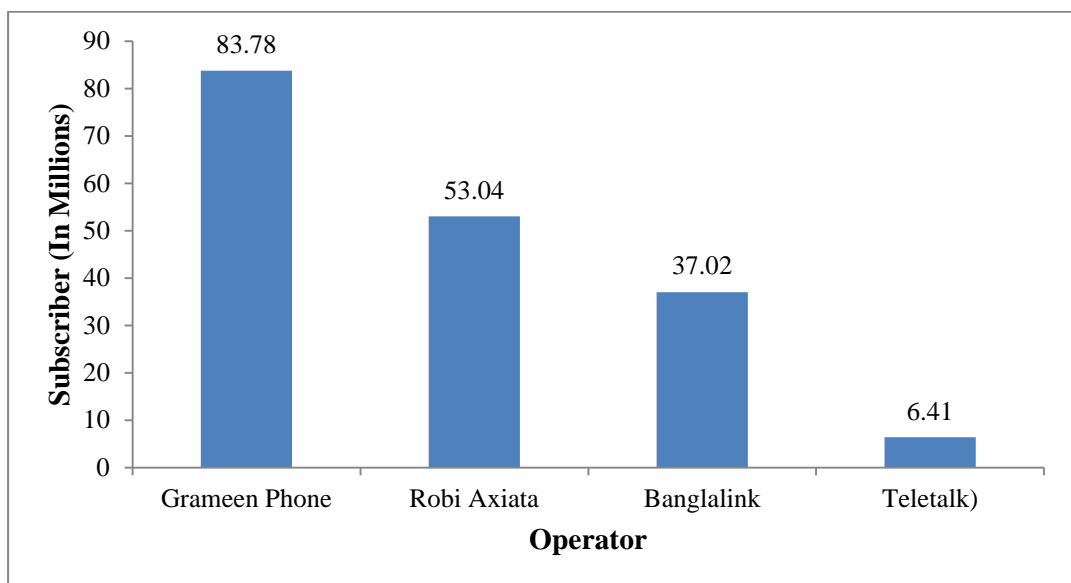
4.1.4 Experience of farming

Data contained in the Table 4.1 shows that the average years of farming is 23.50 years which means that most of the farmers are engaged in farming for many years. There is a large variation (4 to 50 years) among the farmers according to

years of farming. That means the data included all types of farmers as like young farmers and old farmers

4.1.5 The Status of Mobile Phone Use

"The total number of mobile phone customers has reached 180.25 million at the end of September, 2021," according to the Bangladesh Telecommunication Regulatory Authority (BTRC). Subscribers are biometrically validated subscribers/subscriptions that have had at least one action (voice, data, sms, etc.) in the previous 90 days. The following is a list of all mobile phone subscribers, including all operators:



Source: BTRC, September 2021

Figure 4.2 Mobile Phone subscribers in Bangladesh in September, 2021

The current population of Bangladesh based on projections of the latest United Nations data is 166.3 million at July 1, 2021 (WPP, 2021). So it can be said that the mobile phone subscriber's number has already acceded. The mobile phone user in the study area is shown in the table below:

Table 4.3 Percentage of mobile phone owners among the respondent farmers

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	79	79.0	79.0	79.0
No	21	21.0	21.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

The data shows that 79% of the farmers in the study area have their own mobile phone, which supports the statistics of BTRC. Although the farmers in the study area were from lower to middle income group, their level of education is not so high and most of them were from middle age group, the percentage of having mobile phone is quite note worthy.

4.1.6 Length of mobile phone use

The average duration of using mobile phone among the farmers is 8.71 years, which indicates that mobile phone is not a new technology to the farmers at all. Most of them are using mobile phone for a long time.

4.1.7 Household income

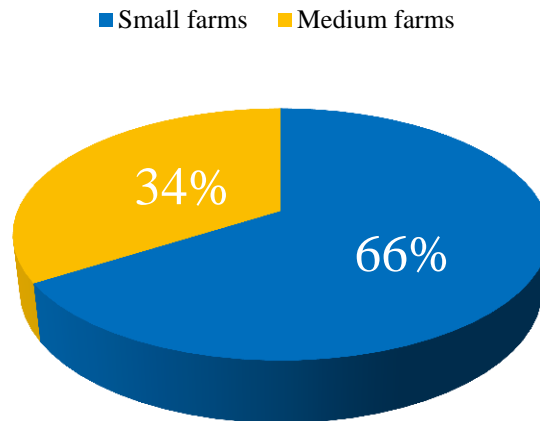
From the above Table 4.1 it can be said that, the average household income level of the farmers ranges between 2 to 3 lac which is not so high and in Bangladesh it is considered as lower to medium income level.

4.1.8 Farm size

According to the Table 4.1, the average farm size is 1.89 acre approximately. BBS (2011) reported that, “All farm holdings have been classified into small, medium, and large holdings. These are sub-divided further into following categories.

1. Operated area small farms: 0.05 to 2.49 acres
2. Medium farms: 2.50 to 7.49 acres
3. Large farms: 7.50 acres & above.”

Percentage



Source: Field survey, 2021

Figure 4.3 Distribution of the farmers on the basis of farm size

The figure reveals that, most of the farmers in the study areas belong to small farm category and there is no large farmer in the area .

4.2 Factors Influencing Mobile Phone Use in Collecting Market Information.

In order to determine the contributing factors on the use of mobile phone by the paddy farmers in receiving market information from the independent variables, binary logistic regression model was used through SPSS Software. To detect whether there is multicollinearity among the independent variables, correlation analysis was done before running the regression analysis. After correlation analysis in SPSS, it was found that the correlation coefficient between farmer's age and their farming experience is 0.848 which is significant at 1% level of significance. (See Table in Appendix-I)

According to Barton and Peat (2014), "In general, if the absolute value of Pearson correlation coefficient is close to 0.8, collinearity is likely to exist".

It indicates that there is a strong positive correlation between the farmer's age and their years of farming. So, to avoid multicollinearity one of the variables should be dropped out. The independent variable years of farming has been dropped for the next analysis-binary logistic regression.

For regression analysis, one dependent variable; the use of mobile phone in receiving market information and six independent variable; age, gender, education, income and duration of mobile phone use were used. The results of the regression is shown in the Table 4.4.

Table 4.4 Binary logistic regression coefficients of contributing factors

Dependent Variable	Independent variable	B	SE	Wald	Sig.	Exp(B)
Use of mobile phone by the farmers in receiving market information	Age	-0.036	0.055	0.424	0.515	0.965
	Gender	1.840	1.674	1.207	0.272	6.294
	Education	0.640	0.194	10.839	0.001***	1.896
	Household income	1.946	0.793	6.017	0.014**	7.000
	Length of mobile phone use	-0.058	0.210	0.077	0.781	0.943
	Farm size	-0.725	0.726	0.996	0.318	0.484

Note:

*** Significant at $p < 0.01$;

** Significant at $p < 0.05$;

Overall percentage of correct prediction = 93.5%

Table 4.4 shows that education and income were the important contributing factors (significant at the 1% and 5% level of significance). The data in Table 4.4 test the final null hypothesis: There is no relationship between the selected characteristics (Age, Gender, Duration of mobile phone use, Farm size) and the probability of the use of mobile phone by the farmers in receiving market information. The analysis also suggests that the respective authority should

consider the respondents' education and income and for increasing the use of mobile phone by the farmers in receiving market information.

In order to justify the model's validity, Cox and Snell R^2 , Nagelkerke R^2 , and Chi-square test has been done (see table in appendix-II).

The Cox and Snell R^2 value is 0.556, which indicates that 56% (approximately) of the variance in the response can be explained by the explanatory variable. The remaining 44.4% can be attributed to unknown. However, each predictor may explain some of the variance in respondents' use of mobile phone by the farmers in receiving market information simply by chance. Nagelkerke R^2 adjusts the Cox and Snell R^2 . The value of Nagelkerke R^2 is 0.815 which means that 82% (approximately) of the variance in the response can be explained by the explanatory variables.

Besides, the overall percentage of correct prediction is 93.5%. The omnibus test of model coefficient is 62.456 which is higher than the tabulated value of chi-square distribution (18.48) at 1% level of significance with 6 degrees of freedom (Table in appendix-III). That means the omnibus test of model coefficient value is valid for this model.

All these findings indicate that, the model is best fitted and valid.

4.2.1 Contribution of Education on the Probability of Use of Mobile Phone

The contribution of farmer's education on the probability of using mobile phone by the farmers in receiving market information by testing the following null hypothesis:

H1: There is no contribution of education on the probability of using mobile phone by the farmers in receiving market information.

The p value of the variable 'education' was found 0.001. The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. At a 1% level, education has a considerable impact on farmers' likelihood of utilizing mobile phones to receive market information. As a result, the null hypothesis can be ruled out.
- b. The relationship between education and mobile phone usage is trending in the right direction. Based on the direction of the coefficient value, a farmer with more education had a higher chance of obtaining market information via cell phone. The Exp (B) value (1.896) indicates a farmer with higher education increases (1.896-1=0.896) or 89% in the odds of using mobile phone than the others who have less education. Farmers' ability to use mobile phones to receive market information is enhanced through education within a short period of time.

4.2.2 Contribution of Household Income on the Probability of Use of Mobile Phone

The contribution of farmer's household income on the probability of using mobile phone by the farmers in receiving market information by testing the following null hypothesis:

H2: There is no contribution of household income on the probability of using mobile phone by the farmers in receiving market information.

The p value of the variable household income was found 0.014. The following observations were made on the basis of the value of the variable of the study under consideration.

- a. At a 5% level, household income has a considerable impact on farmers' likelihood of utilizing mobile phones to receive market information. As a result, the null hypothesis can be ruled out.

b. The relationship between household income and mobile phone usage is trending in the right direction. Based on the direction of the coefficient value, a farmer with more income has a higher chance of obtaining market information via cell phone. The exp(B) value (7) indicates a farmer with higher income increases (7-1=6) 600 % in the odds of using mobile phone than the others who have less income.

4.3 Impacts of Using Mobile Phone in Receiving Market Information

To analyze the impacts of using mobile phone in collecting market information upon the farmers' some observations were made based on farmer's opinion towards some attributes. They are described below:

4.3.1 Quickly collection of information

According to the Table 4.5, 53% farmers agreed that mobile helps them to collect information at large scale which they could not collect so easily and within short time by other means like personal visit or contacting with the other farmers. 19% farmers were not agreed with the statement and 28% farmers were neutral. Among the farmers who responded neutral are mostly those who do not use mobile phone in collecting market information. So it can be said that most of the farmers were positive about this attribute.

Table 4.5 Farmers' response about quickly collection of information

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	53	53.0	53.0	53.0
No	19	19.0	19.0	72.0
Neutral	28	28.0	28.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

4.3.2 Collection of reliable information

According to the Table 4.6 53% of farmers said that, information collected by mobile phone is reliable. They also said that they can collect detail information about a market from 2 or 3 different traders which help them to decide which information is correct and reliable.

Table 4.6 Farmers' response regarding the Collection of reliable information

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	53	53.0	53.0	53.0
No	16	16.0	16.0	69.0
Neutral	31	31.0	31.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

4.3.3 Taking appropriate decision about product marketing

From the Table 4.7, it can be said that most of the farmers agreed that mobile phone helps them in making decisions in paddy marketing like in which market they would sell the product, with which trader or buyer they would contact, which road and transport system they would select etc. 18% farmers were not agreed with the statement and 28 percent farmers were neutral.

Table 4.7 Farmers' response on taking right decision about paddy marketing

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	54	54.0	54.0	54.0
No	18	18.0	18.0	72.0
Neutral	28	28.0	28.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

4.3.4 Reduction of the oppressiveness of the market intermediaries and transport agencies

17% of the farmers were strongly agreed and 32% farmers were agreed that mobile phone reduces the oppressiveness of the market intermediaries or the transport agencies. In paddy market there is a syndicate of intermediaries who coerce the farmers to sell their products to the syndicate. But with the use of mobile phone farmers can contact directly to the ultimate buyer like the wholesaler or the miller. Also there is a syndicate in the transport agency who oppress the farmers in transport hiring. But farmers can directly call the driver of the transport through mobile phone which helps them a lot.

Table 4.8 Farmers’ response on the reduction of the oppressiveness of the market intermediaries and transport agencies

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	1	1.0	1.0	1.0
Disagree	19	19.0	19.0	20.0
Neutral	31	31.0	31.0	51.0
agree	32	32.0	32.0	83.0
strongly agree	17	17.0	17.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

4.3.5 Increase bargaining power

Through mobile phone farmers can gather a lot of information about different markets, their demands, supplies and price. So they can bargain with the buyers. 48 percent of the respondent farmers were also agreed with this statement which is shown in the Table 4.9.

Table 4.9 Mobile phone increases the bargaining power of farmer with the buyer

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	48	48.0	48.0	48.0
No	23	23.0	23.0	71.0
Neutral	29	29.0	29.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

4.3.6 Reduction of information search cost

Most of the respondent farmers (51%) said that use of mobile phone reduces the information search cost. From empirical evidence the fact was also proved. Farmers can collect information mostly from three sources such as from the fellow farmers, by personal visit in market, and through using mobile phone.

Collecting information from fellow farmers is the cheapest way for the farmers. Most of the farmers contact with their fellow farmers to know about the market condition. It usually doesn't make cost. Sometimes they need to offer tea or snacks to their fellow farmers while taking information. But the farmers do not count them as marketing cost at all. They take it as a tool for building relationship with the other farmers.

Table 4.10 Mobile phone reduces information search cost

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	51	51.0	51.0	51.0
No	18	18.0	18.0	69.0
Neutral	31	31.0	31.0	100.0
Total	100	100.0	100.0	

Source: Field survey, 2021

Besides contacting with the fellow farmers, most of the farmers also use second or third source of information to make assurance of the information. Because paddy is a bulky product and the transportation cost is so high. It is not possible for the farmers to bring back the products once they are brought to a market. So before the paddy being marketed, the farmer collect information from all the sources and verify them thoroughly and then take decision in which market he will enter or to which buyer he will sell his products. The costs of other two sources are estimated below:

Table 4.11 Comparative information collection costs scenario

Category	N	Minimum	Maximum	Mean	Std. Deviation
Personal visit cost (Tk)	98	30.00	60.00	41.3265	9.70044
Mobile phone cost (Tk)	57	5.00	30.00	13.6491	5.06913

Source: Field survey, 2021

From the above table it is seen that 98 of the 100 farmers usually go for personal visit to the market. The average cost for each visit costs Tk.41 approximately. On the other hand 57 of the 100 farmers make phone calls for collection of information. The average cost for collecting same amount of information which can be collected from a single visit to the market is Tk.14 approximately. This cost is calculated by multiplication of number of phone calls and cost for each call. All varieties of network service providers are included here. So it can be said that mobile phone really reduces the cost of information search.

4.3.7 Saving the information searching time

Time is the most important thing in human life. It is said that time is money. For the farmers time is also very important. Time is an important factor in farming. Farmers work hard all the day long. It is so helpful for them if they get some extra time. Mobile phone can help the farmers in this regard. By using mobile phone farmers can reduce the time of collecting information and marketing of paddy as well.

Table 4.12 Farmer' responses on saving the information searching time

Category	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly agree	19	19.0	19.0	19.0
Agree	34	34.0	34.0	53.0
Neutral	29	29.0	29.0	82.0
Disagree	18	18.0	18.0	100.00
Total	100	100.0	100.0	

Source: Field survey, 2021

19% farmers strongly agreed and 34% farmers agreed on this. Total 53% of the respondent farmers had positive response about that use of mobile phone saves their time. 29% farmers had no comments about this and 18% disagreed about reducing search time for gathering relevant information.

4.4 Summary of the Study

The study assessed explicitly the factors that influence the use of mobile phone by the paddy farmers for receiving market information and found out the impacts caused by the use of the mobile phone by the farmers. Respondent farmers were chosen through random sampling technique and data were collected through face-to-face interviewing method with a structured interview schedule.

The overall findings from this study have been described accordingly.

4.4.1 Socio-economic Characteristics of the Farmers

The average age of the farmers in the study area is 52 approximately which indicates that most of the farmers in the area belong to medium age.

Around 90 percent of the farmers are men and 10 percent are women. But this result does not properly indicate the participation of women in farming in the area. More women work as day labor in the area.

The average literacy rate among the farmers (73%) is good enough comparing to national literacy rate (74.9). Moreover, most of the farmers (34%) belong to secondary education level in the study area. There are some higher educated farmers in this area. Most of them are retired service holders or teachers.

As there is a large variation (4 to 50 years) among the farmers according to years of farming that means the data included all types of farmers as like young farmers and old farmers in the study.

78% of the farmers in the study area have their own mobile phone which is also a positive remark about the use of mobile phone. Day by day the number is increasing in our country. The day is not far away when 100% of the farmer will use mobile phone and the total agricultural system will be digitalized.

The average duration of using mobile phone among the farmers is 8.71 years, which indicates that mobile phone is not a new technology to the farmers at all. Most of them are using mobile phone for a long time.

The average household income level of the farmers ranges between 2 to 3 lac which is not so high and in Bangladesh it is considered as lower to medium income level.

All the farmers in the study area were small to medium farmers according to the distribution of BBS.

4.4.2 Factors Influencing the Use of Mobile Phone

Among all the socio-economic characteristics of the respondent farmers, education and household income has significant positive contribution in the probability of using mobile phone in receiving market information.

Education has significant positive contribution in the probability of using mobile phone in receiving market information. Education increases the probability of using mobile phone 89% in receiving market information which is similar to the findings of Ofuoku et al. (2007). Most expedient explanation behind this is that, educated farmers become more conscious about profit margin and consequently try to reduce their cost. So, they search for comparatively cheaper way of farming and marketing their products. On other hand, education increases the awareness among the farmers about the facilities provided by the information technologies in their farming and marketing activities. They come to know how they can use information thechnology for better farming and marketing activities and thus can reduce their cost and increase their profit margin thereby.

Household Income has significant positive contribution in the probability of using mobile phone in receiving market information. Income increases 700% of the probability of using mobile phone in receiving market information which resembles the findings of Kashem (2010). Higher income ensures more facilities in our livelihood. Purchasing and maintaining a mobile phone is still expensive in our country for most of the lower income people. People with higher income prefer making a phone call to going for personal visit. Cost of a phone call does not bother them much. But for the poor, it may be a burden. So, income is an important determinant of using mobile phone in collecting market information.

The researcher did not find any contribution of age, gender, duration of mobile phone use and farm size on the probability of use of mobile phone by the farmers in receiving market information.

4.4.3 Impacts of Using Mobile Phone in Receiving Market Information

From this study, various impacts of using mobile phone in collecting market information have been found from farmer's opinion. They are:

- Mobile phone helps the farmers to collect information at large scale at a time.
- Mobile phone provides reliable information which is similar to the findings of Mittal and Tripathi (2009).
- Mobile phone helps in decision making about marketing of paddy.
- Mobile phone reduces the oppressiveness of the market intermediaries and the transport agencies which is identical with the findings of Aker (2008).
- Mobile phone increases the bargaining power of farmer with the buyer.
- Mobile phone reduces information search cost which is equivalent with the findings of Aker (2010).
- Mobile phone saves the time of information search which is identical with the findings of Aker (2008); Antonio and Berkhout (2012).

CHAPTER V

CONCLUSION

5.1 Conclusion

In this study it is found that education and household income has significant effect in the use of mobile phone by the farmers. According to the farmers' response mobile provides timely, reliable and large scale information at comparatively lower cost which increases the bargaining power of the farmers in the market and reduce the oppressiveness of the market intermediaries. After all the discussion, it can be concluded that the use of mobile phone has a huge prospects for developing the agricultural marketing sector. Not only the marketing sector but also the production sector could grab the benefit of using mobile phone by the farmers. The government and the policymaker should utilize the opportunity provided by the mobile phone technology to increase the production and to establish an efficient marketing system for the farmers. The farmers are considered as the backbone of our nation. Without the development of the farmer, the nation or the country can't go far. In case of rice, government should give more emphasis on providing fair price to the farmers. Otherwise, farmers will lose interest in farming and the whole nation will have to experience food crisis in near future.

5.2 Limitations of the Study

The sample size of the study was limited within 5 different villages of Debidwar Upazila in Cumilla district. If the study is conducted further in other parts of Bangladesh, the findings may be somewhat different. It was assumed by the researcher that all the information provided by the farmers was accurate. To remove biasness caused by farmers, deliberately in providing data, the researcher tried to check the data with the respondent farmers thoroughly and repeatedly.

5.3 Recommendations

On the basis of observations and conclusions drawn from the findings of the study following recommendations are made to the planners and policy makers in contriving micro or macro level policy for increasing the use of mobile phone by the farmers in receiving market information:

- I. Income is a crucial factor for using mobile phone by the farmers. The government and other related organization may take necessary steps for making mobile phone available to the farmers who belongs to the lower income group. In this content, the government may give extra facilities such as price discounts,tax reduction in case of purchasing mobile phone for the farmers.
- II. Education of the farmers had significant positive contribution with their use of mobile phone by the farmers in receiving agricultural information. So, it can be recommended that, adult education should be provided to the farmers so that they could increase their educational level which might be helpful to increase their use of mobile phone.
- III. To increase the use of mobile phone in receiving market information and other farming activities, the Department of Agricultural Extension (DAE) and other government and non-government personnel may motivate the farmers. A strong network system might be created by the mobile service provider. So that, the facilities provided by mobile phone use could be more available to the farmers. Also the service charge of the helpline numbers could be reduced.

5.4 Scopes for Future Studies

In this study, the impact of using mobile phone in receiving market information has been analyzed. But there are so many aspects of using mobile phone in agriculture.

- Impact of using mobile phone in receiving production related information for example weather, technology, new varieties of crops, fertilizer use etc. can be a great resource for future studies.
- Marketing agricultural products requires lot of information. Information about market, price, transportation, storage etc. Developing the marketing of agricultural products by using mobile phone can be a concern for future studies.
- The study investigated the contributions of the 6 selected characteristics of the farmers with their use of mobile phone in receiving agricultural information. But farmer's use of mobile phone in receiving market or agricultural information might be affected by other various personal, social, psychological, cultural and situational factors of the farmers. So, further study might be conducted involving other characteristics in this regard.

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Appendices

Appendix-I

Table: Correlation coefficient of the independent variables

	Farmer's age	Education level	Years of farming	Average annual income (In lac)	Duration of mobile phone use (years)	Farm size (acre)
Farmer's age	1	-0.474**	0.848**	-0.038	0.087	0.144
Education level	-0.474**	1	-0.424**	0.529**	0.220*	0.386**
Years of farming	0.848**	-0.424**	1	-0.061	0.003	0.074
Average annual income (In lac)	-0.038	0.529**	-0.061	1	0.352**	0.612**
Duration of mobile phone use (years)	0.087	0.220*	0.003	0.352**	1	0.432**
Farm size(acre)	0.144	0.386**	0.074	0.612**	0.432**	1

** Significant at $p < 0.01$;

* Significant at $p < 0.05$.

Appendix-II

Table: Value of Cox & Snell R Square & Nagelkerke R Square

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
25.752 ^a	0.556	0.815

Appendix-III

Table: Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	62.456	6	0.000
Block	62.456	6	0.000
Model	62.456	6	0.000

Appendix-IV Questionnaire

Socio-economic characteristics

Age:

Gender:

Highest educational attainment:

Farm size:

Assigned No.	Category
1	Small 0.5 acre to 2.5 acres
2	Medium 2.51 acres to 5.0 acres
3	Large – 5.01 acres and above

Years of farming:

Average annual income:

Mobile phone use related information

1. Do you have mobile phone?

1.Yes	2.No
-------	------

If yes, then proceed to the next.

2. Duration of mobile phone use:

3. Do you use mobile phone in paddy marketing?

1.Yes	2.No
-------	------

If yes, then proceed to the next.

4. How do you collect information for paddy marketing?

	Fellow farmers	Market visit& personal observation	Through mobile phone	Others
market demand and market supply				
paddy price				
buyer or traders				
transportation				
labor for loading and unloading of paddy				
paddy storage				

5. Estimated cost for every source:

Source	Cost		
Fellow Farmers	1. Cost per visit	2.No. of visit per season	Total (1*2)
Personal visit	1. Cost per visit	2.No. of visit per season	Total (1*2)
Mobile phone	1. Cost per phone call	2. No. of phone calls per season	Total (1*2)
Others			

6. Do you think mobile phone reduces information search cost?

1.Yes	2. No
-------	-------

7. Do you think mobile phone helps you to collect information at large scale?

1.Yes	2. No
-------	-------

8. Does mobile phone help you to get a lot of market information at a time?

1.Yes	2. No
-------	-------

9. Is mobile phone helpful for you to choose most convenient buyer/ trader among the buyers?

1.Yes	2.No
-------	------

10. Does mobile phone help you in decision making about marketing of paddy?

1.Yes	2.No
-------	------

11. Does mobile phone increase the bargaining power of farmer with the buyer?

1.Yes	2.No
-------	------

12. Does mobile phone help to sell your products at favorable price?

1.Yes	2.No
-------	------

13. Mobile phone reduces the oppressiveness of the intermediaries or the transport agencies

a. Strongly Agree	b. Agree	c. Neutral	d. Disagree	e. Strongly Disagree
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14. Does Mobile phone provide reliable information?

1.Yes	2.No
-------	------

15. Mobile phone saves the time of information search

a. Strongly Agree	b. Agree	c. Neutral	d. Disagree	e. Strongly Disagree
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16. Do you think mobile phone increases the scopes in paddy marketing?

1.Yes	2.No
-------	------

17. Do you think mobile phone increases your income?

1.Yes	2.No
-------	------

If yes, then how?

18. What is your suggestion to improve the mobile phone service in paddy marketing?